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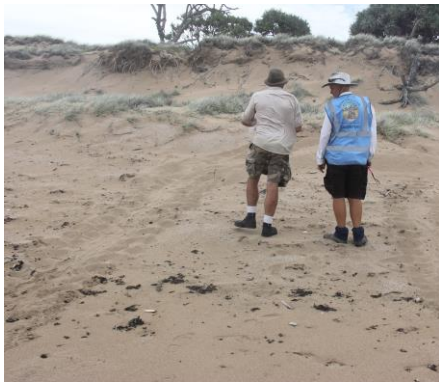

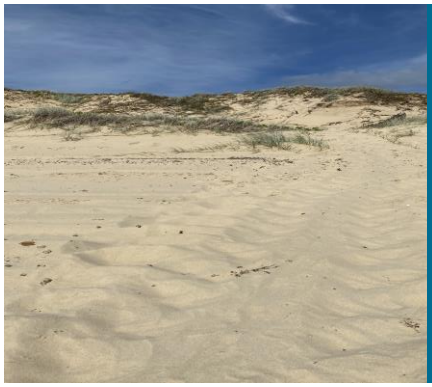

Team Turtle CQ: FBA's Community Marine Turtle Monitoring Program

2020-21 Summary Report
July 2021

The following report was produced by FBA with the assistance of Karl French.

Acknowledgement

The success of Team Turtle CQ (TTCQ) is due to the many hours of volunteer effort contributed by community members of the Capricorn and Curtis Coasts area – this report is dedicated to you.

Karl French, marine scientist, supplied the summarised data and recommendations to inform this report.

TTCQ is managed by Fitzroy Basin Association (FBA). Staff have a key role in training and supporting volunteers and have contributed to this report by reviewing data and providing recommendations.

Fitzroy Basin Association acknowledges the traditional custodians of the land and sea of the Capricorn and Curtis Coasts area, the Darumbal, Woppaburra, and Bailai, Gurang, Gooreng Gooreng and Taribelang Bunda People, and we pay our respects to their Elders past, present and emerging.

The Team Turtle CQ project is funded by the partnership between the Australian Government's Reef Trust and the Great Barrier Reef Foundation with support from FBA and Gladstone Ports Corporation.

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Contents

Introduction

The Fitzroy region is home to six of the world's seven marine turtle species. Three of these species – Flatback Turtle (*Natator depressus*), Green Turtle (*Chelonia mydas*) and Loggerhead Turtle (*Caretta caretta*) – nest on our region's beaches. All marine turtle species found in Australian waters are threatened with extinction, being listed as either vulnerable or endangered under both Queensland and Australian legislation. Monitoring of marine turtle activity has occurred along the Queensland coast for decades, however, a 2014 gap analysis carried out by FBA identified that the Fitzroy region provided a significant opportunity to add valuable information to this dataset: in particular, in the form of a community marine turtle monitoring program.

In 2015, an initial three-year program was established to train a network of community volunteers in turtle monitoring, under the Australian Government's Nest to Ocean Turtle Protection Program. Data collected by volunteers was submitted to the Department of Environment and Science (DES) managed Queensland Turtle Conservation Program (QTCP) database which informs and influences coastal management and threat mitigation around marine turtle species. Volunteers were trained in turtle monitoring techniques by qualified experts, with some attending training at the QTCP at Mon Repos during the summer nesting season. In 2018/19, the program trialled the use of a mobile phone app, BioCollect, to record data in real-time; this data is quality-checked before being sent to the QTCP. By 2019/20 this citizen science program, now known as the Team Turtle CQ (TTCQ) had grown into a vibrant project group with a strong membership and community interest consisting of two cohesive and cooperative groups separated by location (Capricorn and Curtis Coasts). Funding provided by DES (citizen science grants) and the Great Barrier Reef Foundation, supported training volunteers whose verified monitoring data contributed to the QTCP, nest protection and predator control.

This report summarises the results of the 2020-21 Team Turtle CQ program. Funding for this year's activities was provided by the Australian Government's Reef Trust and the Great Barrier Reef Foundation. Gladstone Ports Corporation funding supported Facing Island monitoring activities. Project deliverables included volunteer training in turtle monitoring and use of the BioCollect app, nest and hatching activity monitoring, community engagement and nest protection activities.

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Results

This section presents the results of the TTCQ program for 2020-21. Results have been aligned to the three main activity types: volunteer training and community engagement, turtle monitoring, and nest protection.

Volunteer Training and Community Engagement

Team Turtle CQ

Pre-season TTCQ nesting training workshops were delivered on both the Capricorn and Curtis Coasts, training new and upskilling existing volunteers and ensuring compliance with the QTCP protocols. The training was held on-beach, focussing on practical monitoring skills - identifying tracks of locally nesting species and differentiating false crawls from successful nesting. Volunteers practised uploading BioCollect surveys and were guided through effective track and nest site photography. Quality survey photos allow verification of species and nest success. Volunteers were encouraged to report 'no evidence' of turtle presence through the app, as this helps form a regional picture of turtle activity and confirms beach coverage. Possible threats to nesting success were considered, with fox and human activity to be recorded through the Snap Send Solve app, and natural phenomena such as tidal inundation recorded through BioCollect. Turtle ecology knowledge was included in the training.

Hatching training sessions were held in December 2020 on the Capricorn and Curtis Coasts focusing on best practices in observing and reporting emergence and threats, including predation and inundation, and continued guidance in BioCollect app use.

Post season TTCQ wrap ups were trialled with both groups sharing initial season data, thanking for input and receiving feedback. These sessions provide an opportunity for volunteers to voice what's working well, raise any monitoring issues, suggest improvements and to connect with other TTCQ members. Sharing experiences and supporting each other unifies and strengthens group dynamics and gives FBA and our contracted marine scientist important insights into future project adaptions.

Community

In addition to TTCQ volunteer training, this program aims to increase general community education and involvement in turtle conservation.

Facing Island community engagement and TTCQ training sessions were held for the first time, at both The Oaks and Gatcombe, with several residents signing up as Team Turtle CQ volunteers and henceforth contributing to the TTCQ dataset this season.

Gidarjil Development Corporation (Gidarjil) Land and Sea Rangers participated in TTCQ nesting training, focussing on Curtis Coast data collection, building their existing skills and experience. Gidarjil Skilling Queenslanders for Work (SQW) trainees engaged in a marine turtle ecology and threats education session.

TTCQ volunteers have started a lead role in representing the program at community events:

- Safety on the Sand (Capricorn Coast). Volunteers shared marine turtle information and responsible beach behaviours with Farnborough beach 4WD drivers.
- CQU Gladstone STEM (Science, Technology, Engineering, Mathematics) Expo (Curtis Coast). Volunteers shared the TTCQ citizen science program and marine turtle information with Gladstone region educators.

Field Trips

Field trips led by contracted marine scientist Karl French provided TTCQ volunteers valuable in-field monitoring and data collection training experience, building their capacity and leadership skills.

- **Stanage Bay** nest monitoring, tagging and measuring adult turtles. Data was recorded at three beaches over three days.
- **Facing Island** monitoring. Gidarjil Land and Sea Rangers joined TTCQ volunteers for five days of nesting surveys, and later in the season, three days of hatching success monitoring, consisting of exhumation of emerged clutches and hatching success counts. Opportunistic adult turtle measurement and tagging was also undertaken with QTCP permits.
- **An aerial survey** covering beaches from Bangalee to Broome Head in Shoalwater Conservation Park. Two TTCQ volunteers assisted in recording nests, deceased turtles, potential predator evidence, marine debris aggregations, and mangrove dieback to profile marine turtle activity during the peak nesting period.

The following table summarises the results of volunteer training and community engagement during 2020-21 season. A total of 154 attendees were recorded at events (Table 1), with some attending multiple events (e.g., nesting, hatching and wrap up events).

Table 1. Volunteers attending TTCQ 2020-21 events

Volunteer Training and Engagement Events			
Location	**Total**	**Youth**	**New**
Curtis Coast Nesting Training	14	4	10
Capricorn Coast Nesting Training	37	2	16
Curtis Coast Hatching Training	14	-	2
Capricorn Coast Hatching Training	18	-	2
Aerial Survey	3	-	-
Stanage Bay Field Training	6	-	-
Facing Island Community Engagement	13	3	13
Facing Island Nesting Field Trip	11	-	-
Facing Island Hatching Field Trip	9	3	2
Safety on the Sand 4WD event	8	1	1
CQ University STEM Expo	3	-	-
Curtis Coast Feedback/ Wrap Up	4	-	-
Capricorn Coast Feedback/Wrap Up	14	-	-
TOTAL	**154**	**13**	**46**

FBA staff continue to maintain positive relationships with Gladstone Regional Council and Livingstone Shire Council. Working together on beach signage across the region, encouraging responsible four-wheel driving, reducing light impacts on nesting turtles and hatchlings, minimising disturbance to nesting turtles, fox control work and promoting contact details for community reporting of turtle sightings and activity. On the Capricorn Coast, interactive signage encouraging responsible beach driving was installed at Farnborough beach (pictured below), in addition to increased monitoring and enforcement of local laws relating to illegal recreational beach driving. A partnership with Gladstone Ports Corporation supported Facing Island monitoring, technical support and logistics. FBA continues to raise awareness of turtle conservation in the local community through media opportunities and social media campaigns.

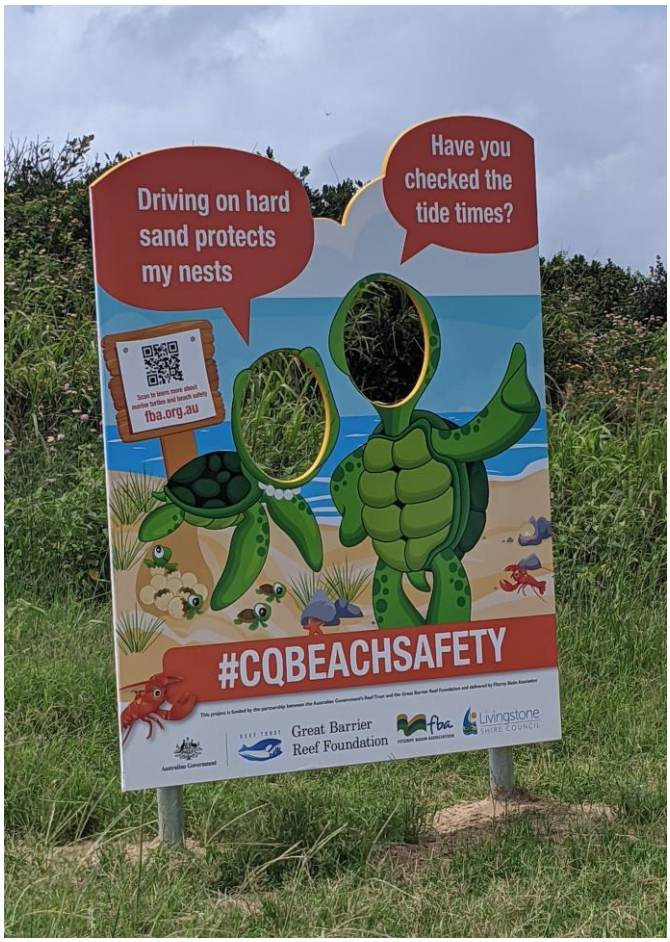


Photo: Capricorn Coast Interactive signage (credit FBA)

Turtle Monitoring

71 active volunteers participated in turtle monitoring and nest protection activities during the 2020-21 season. Monitoring is conducted by volunteers regularly walking, boating to or driving beaches to capture relevant data such as turtle tracks (or lack thereof), nesting attempts and successes, emergence success, predation and natural impacts. Data is reported through the BioCollect app (preferred), emailed, or submitted through FBA's website. Validated data is then provided to the QTCP database, held by the Queensland Department of Environment and Science.

All three locally nesting species were reported this season; these were predominantly Flatback Turtles, however isolated nestings of Green and Loggerhead Turtles were also recorded, mainly on the offshore Islands.

Volunteer survey beach coverage continues to increase, however coverage frequency is dictated by location and access. Many urban beaches (South Bangalee to Zilzie, and Tannum Sands) are monitored daily. Other urban beaches with access limited by tides and/or the need for 4WD access (Lilley's, Wild Cattle Island, Farnborough and Keppel Sands) restricts daily volunteer monitoring. Tracks are obliterated quickly by strong winds and dry conditions on these exposed beaches, with unsurveyed nests probable. Remote beach surveys are infrequent and opportunistic (Byfield beaches, smaller Keppel Islands). Stanage Bay surveys were undertaken by a local landholder, during the FBA field trip and by dedicated Yeppoon based TTCQ volunteers travelling up specifically to monitor emergence. Increased Keppel Island surveys were received from TTCQ and community boaties, and notably from Great Keppel Island by a resident TTCQ volunteer. Facing Island resident monitoring is increasing.

TTCQ volunteers recorded a total of 330 nests and 118 emerged clutches in the 2020-21 season. Table 2 (below) shows the 'per beach' records of turtle activity in 2020-21; and Table 3 presents a summary of volunteer survey effort and turtle monitoring activities since 2015.

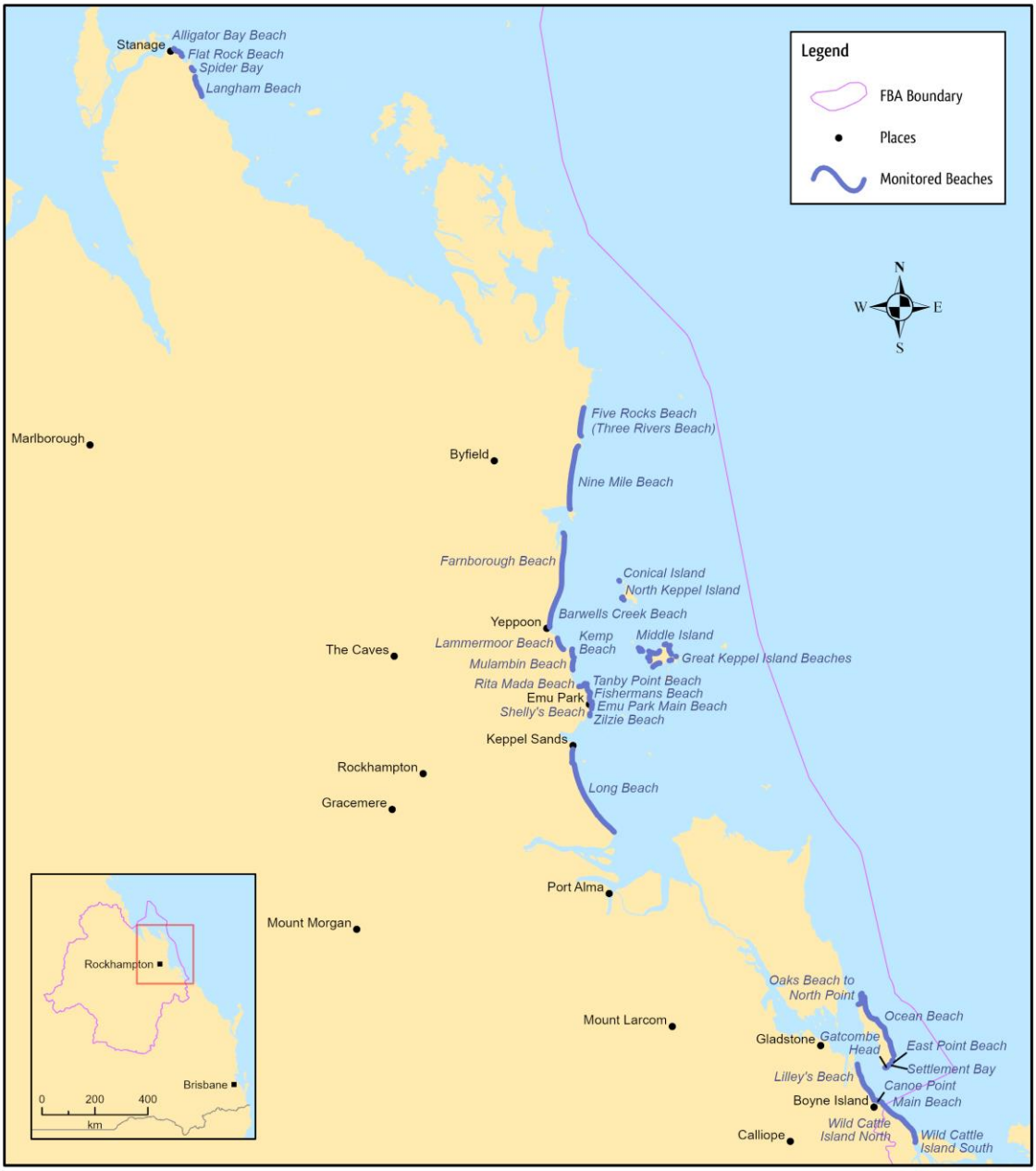
Nesting

Marine turtle nesting fluctuates seasonally, and increased monitoring does not necessarily translate into increased nest numbers. Notably for this season, no nest activity was recorded on Zilzie, Lammermoor or Emu Park Main beach, while increased nest activity was recorded on Wild Cattle Island, Lilley's, Tannum Sands and Kemp beaches.

Strong onshore winds and storm activity coupled with high tides saw several nests succumb to inundation (Fishermans Beach and Wild Cattle Island) and erosion. Erosion banks as a result of storm events during December 2020 were observed to prevent turtles accessing the dunes to lay safely above the reach of the tides in a number of locations across the region (Facing Island's Ocean Beach, Wild Cattle Island, Farnborough Beach).

A hot dry start to the season again saw egg chambers collapsing and turtles nesting further down the beach. If egg chambers repeatedly collapsed it was observed that turtles moved down the beach to cooler moist sand often around the high-water mark. As such these nests were then more likely to be inundated by spring tides and storm events.

Map 1. Distribution of turtle monitoring activities in 2020-21



Team Turtle CQ Monitoring Activities 2020-21

Australian Government | Reef Trust | Great Barrier Reef Foundation | fba Fitzroy Basin Association | GPC Gladstone Ports Corporation — Growth, prosperity, community.

1:1,100,000
(at original A4 size)

0 10 20 30 40 50
Kilometres

Spatial Reference: WGS 1984 Web Mercator Auxiliary Sphere

The Team Turtle CQ project is funded by the partnership between the Australian Government's Reef Trust and the Great Barrier Reef Foundation with support from FBA and Gladstone Ports Corporation.

Map Produced by: Pete Smith
14 July 2021

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Table 2. Turtle activity 2020-21, per beach surveyed. *NR = not reported, Bch=beach, Isl=Island*

Locality/Beach Name	Number of Tracks	Number of Nests	Number predated nests	Number Emerged Nests	Notes /No. Predator Exclusion Devices installed (PEX)
Stanage Bay - Alligator Bay Bch (Nov) Stanage Bay – Alligator Bay Bch (Jan)	46 Flatback 1 Green 64 Unidentified	37 42	Nil Nil	Nil 13	Human interference (campsites/people/lights), fox, cat, inundation, dog
Stanage Bay - Flat Rock Bch	1 Flatback	1	NR	NR	4WD access
Stanage Bay - Spider Bay	Nil	Nil	Nil	NR	Cattle on Bch
Stanage Bay - Langhams Bch	28	28	NR	2	Wind/Storms - nests lost
Byfield – Three Rivers Bch	NR	NR	NR	NR	4WD access
Byfield - Five Rocks Bch	NR	NR	NR	NR	4WD access
Byfield – Nine Mile Bch	1 Flatback, 1 Unidentified	1	NR	NR	4WD access
Capricorn Coast – Farnborough Bch Nth Bangalee	12 Flatback	10	NR	NR	4WD access/dogs/foxes
Capricorn Coast – Farnborough Bch Sth to Barwell's Ck Bch Yeppoon	3 Flatback	2	Nil	2	Light impacted adults and hatchlings
Capricorn Coast – Lammermoor Bch	Nil	Nil	Nil	Nil	
Capricorn Coast – Kemp Bch	6 Flatback	6	Nil	6	2 x PEX (1 fox attempt)
Capricorn Coast – Mulambin Bch	Nil	Nil	Nil	Nil	
Capricorn Coast - Haven (Ritamada/Tanby) Bch	10 Flatback	9	1 fox	7	3 x PEX (fox pred. nest no PEX), 1 dog attempt
Capricorn Coast – Fishermans Bch Emu Pk	16 Flatback	11	3 flooded	6	4 x PEX
Capricorn Coast – Main/Shelley's Beaches	1 Flatback	Nil	Nil	Nil	
Capricorn Coast – Zilzie Bch	Nil	Nil	Nil	Nil	
Capricorn Coast – Long Bch – Joskeleigh – Fitzroy River	Nil	Nil	Nil	Nil	Access increasingly difficult
Great Keppel Isl – Fishermans, Putney, Long Beaches	7 Flatbacks 2 Loggerheads	5 2	1 flooded	4 2	Inundation, light impacts, hatchlings found in resort
Great Keppel Isl – Leekes Bch	17 Flatback	11	1 goanna	10	
Great Keppel Isl – Clam & Butterfish Bays, Wreck + other beaches	8 Flatback 2 Unidentified	7	Nil	NR	
North Keppel Isl	2 Flatback	2	Nil	NR	
Other Keppel Bay Is – Middle, Conical	3 Flatback	Nil	NR	NR	
Curtis Coast – Lilley's Bch Boyne Isl	6 Flatback	5	2 foxes	NR	Light/4WD impacts
Curtis Coast – Canoe Point Tannum Sands - Main Bch	Nil 3 Flatback	Nil 2	Nil Nil	Nil 2	2 nests meshed to prevent trampling
Curtis Coast – Wild Cattle Isl North	8 Flatback 1 Green	6	1 dog/1 fox 1 flooded	3	Erosion bank/inundation
Curtis Coast – Wild Cattle Isl South	15 Flatback	6	2 fox 2 dog	2	Erosion/inundation 1 PEX post 1st hatch
Facing Isl – Oaks Bch to North Pt	Nil	Nil	Nil	Nil	Light Impacts
Facing Isl – Ocean Bch	80 Flatback 1 Green	54	8 goanna	21 1 green	Nests wind obscured, emergence marked by local resident
Facing Isl – East Point (Lighthouse) Bch	30 Flatback 1 Green	24 1 Green	NR	NR	
Facing Isl – Settlement Bay	74 Flatback 1 Logger	57 1 Logger	8 dog 7 goanna	36 1 logger	Feral dog/goanna targeted nests prior to emergence

Table 3. Summary of survey effort and monitoring activities since 2015. *Note: NR = Not Recorded*

Year	Location	No. of beaches surveyed	No. of volunteers	Tracks reported	Confirmed Nest	Emerged Clutches	Predation
2015-16	Capricorn Coast	3	4	10	5	2	1 (fox)
	Curtis Coast	2	3	5	3	1	1 (fox)
	Facing Island	1	0	39	16	2	15 (goanna)
	TOTAL	**6**	**7**	**54**	**24**	**5**	**17**
2016-17	Capricorn Coast	7	16	23	15	11	4 (fox)
	Byfield	1	1	4	NR	NR	NR
	Curtis Coast	4	3	20	6	NR	1 (fox)
	Facing Island	4	2	97	62	20	18 (goanna)
	Keppel Bay Is.	2	3	3	1	NR	NR
	TOTAL	**18**	**25**	**147**	**84**	**31**	**23**
2017-18	Capricorn Coast	6	9	30	12	11	3 (fox)
	Curtis Coast	3	1	6	1	NR	NR
	Facing Island	5	5	95	59	13	46
	Stanage Bay/ Byfield	1	1	25	3	3	3 (fox)
	TOTAL	**15**	**16**	**156**	**75**	**27**	**52**
2018-19	Capricorn Coast	8	10	13	10	8	1 (fox)
	Curtis Coast	2	2	1	0	NR	NR
	Stanage Bay/ Byfield	1	1	3+	3+	1	dogs
	Keppel Bay Is.	1	1	1	1	NR	NR
	TOTAL	**12**	**14**	**18+**	**14+**	**9**	**1**
2019-20	Capricorn Coast	13	23	35	32	24	5 (fox)
	Curtis Coast	5	6	3	2	NR	NR
	Facing Island	5	3	103	82	6	1 (dog/ goanna)
	Stanage Bay incl. Langham	2	4	127	106	26	NR
	Byfield	3	3	6	3	NR	NR
	Keppel Bay Is.	4	4	8	6	NR	NR
	TOTAL	**32**	**43**	**282**	**231**	**56**	**6**
2020-21	Capricorn Coast	15	39	48	38	21	1 fox, 3 flood
	Curtis Coast	5	18	33	19	7	3 dog, 5 fox, 1 flood
	Facing Island	6	11	187	137	59	23 dog/goanna
	Stanage Bay incl. Langham	4	10	140	108	15	NR
	Byfield	1	2	2	1	NR	NR
	Keppel Bay Island	12	8	41	27	16	1 goanna, 1 flood
	TOTAL	**43**	**88***	**451**	**330**	**118**	**33**

***** *Some volunteers monitor more than one location, as such the overall number of volunteers is overstated.*

Hatching success

Adjunct to TTCQ activities, some QTCP trained volunteers have authority to exhume nests and investigate hatching success. This helps quantify successful emergence and identify heat induced mortality (from increased sand temperature during incubation and emergence) and impacts of storm surge and wave run-up on incubating nests.

A reduction of heat induced hatchling mortality was recorded in the 2020-21 season coinciding with cooler temperatures during the incubation period.

Table 4. Clutch size and hatching success for Facing Island, Capricorn Coast and Curtis Coast beaches

	Facing Island		Capricorn Coast (incl GKI)		Curtis Coast	
	Number of Eggs	% Hatching success	Number of Eggs	% Hatching success	Number of Eggs	% Hatching success
Min	34	39.58	21	0	51	88.46
Max	69	100	69	98.18	63	100
Average	53.28	89.89	50.60	82.65	54.00	94.14
Nests Counted	53		30		6	

Table 5. Hatching success averages for Facing Island, Capricorn Coast and Curtis Coast beaches, compared to QTCP monitored index beaches at Curtis Island, Peak Island and Woongarra Coast (Bundaberg area) populations (Limpus et al 2006, 2007, Twaddle et al 2014).

	Number of Eggs	% Hatch success
Facing Island Average 2016/17	53.24	86.20
Facing Island Average 2017/18	53.00	72.44
Facing Island Average 2019/20	53.83	81.36
Facing Island Average 2020/21	53.28	89.89
Capricorn Coast Average 2017/18	49.75	77.28
Capricorn Coast Average 2019/20	49.84	78.60
Capricorn Coast Average 2020/21	50.60	82.65
Curtis Coast Average 2020/21	54.00	94.14
Peak Island Average	52.6	76.8
Curtis Island Average	54.68	64.96
Woongarra Coast Average	55.24	78.11

Note: *Facing Island, Capricorn Coast and Curtis Coast sample sizes are small in comparison to numbers of nests counted by the QTCP resulting in elevated numbers*.

Tagged Turtles

Several TTCQ volunteers have QTCP authority permits to tag and measure marine turtles.

A total of 18 nesting turtles were tagged this season. This included 13 at Facing Island and five at Stanage Bay.

- **Facing Island**
  - 12 new tags - 11 Flatbacks, one Green
  - One Flatback previously tagged in 2003
- **Stanage Bay**
  - Four new tags - three Flatbacks, one Green
  - A previously tagged Flatback was also encountered but had lost her tags so was untraceable

Nest Protection

Turtle eggs are vulnerable to predation by a range of native and introduced predators, including goannas, dingoes, wild dogs, pigs and foxes. Two main methods of increasing nesting success are through protecting nests directly by installing mesh barriers or predator exclusion devices (PEX) and conducting predator control (usually limited to feral animals); both methods were utilised in the 2020-21 season.

TTCQ observations play an important role in identifying predation and referring this information onto the relevant stakeholder. As the program engages more local volunteers, responsible entities will be better placed to act upon predator sightings and activity and adapt nest protection strategies as required.

Predator exclusion

Nine predator exclusion devices (PEX) for foxes were deployed on Capricorn Coast beaches:

- two on Kemp Beach
- three on Tanby Beach
- four on Fisherman's Beach Emu Park

Predators attempted to dig through the mesh at one Tanby Beach nest (dog) and one Kemp beach nest (fox).

Two nests were protected with barrier mesh to prevent human trampling on Tannum Sands main beach and a further PEX (fox) was installed over a partially emerged clutch on Wild Cattle Island in response to fox activity at the nest.

On two occasions logs and branches were dragged around nests (Lilley's and Farnborough Beaches) to deter 4WD vehicles from driving over nests. This is a simple and effective technique which has the benefit of not drawing attention to the nest.

Fox den fumigation

Foxes are recognised as significant local predators of turtle nests, with some exhibiting learned behaviour to locate and predate multiple nests within a home range. This project sought to minimise fox predation on turtle nests by utilising a fox detection dog to locate active dens, which are then fumigated by a qualified contractor. This is a cost-effective method of fox control that avoids the need for poison baiting in public areas (e.g., along beaches) and is highly target specific. This makes it a practical option for councils, where other methods of control such as trapping are potentially more difficult to gain approval for.

Den detection was carried out within parks and reserves from Corio Bay to Zilzie in the Livingstone Shire Council area (five days), and at Boyne Island, Tannum Sands and Wild Cattle Island within the Gladstone Regional Council area (six days) in September 2020. A total of 48 dens were located within the Livingstone Shire Council search area, including 16 active dens, four den attempts, 16 inactive dens and 12 abandoned dens. In the Gladstone Regional Council areas, a total of 21 dens were located, including nine active dens, seven den attempts, two inactive dens and three abandoned dens. Unfortunately, an injury to the detection dog while on Wild Cattle Island hampered efforts in this region and work was limited to denning sites that had been mapped the previous year.

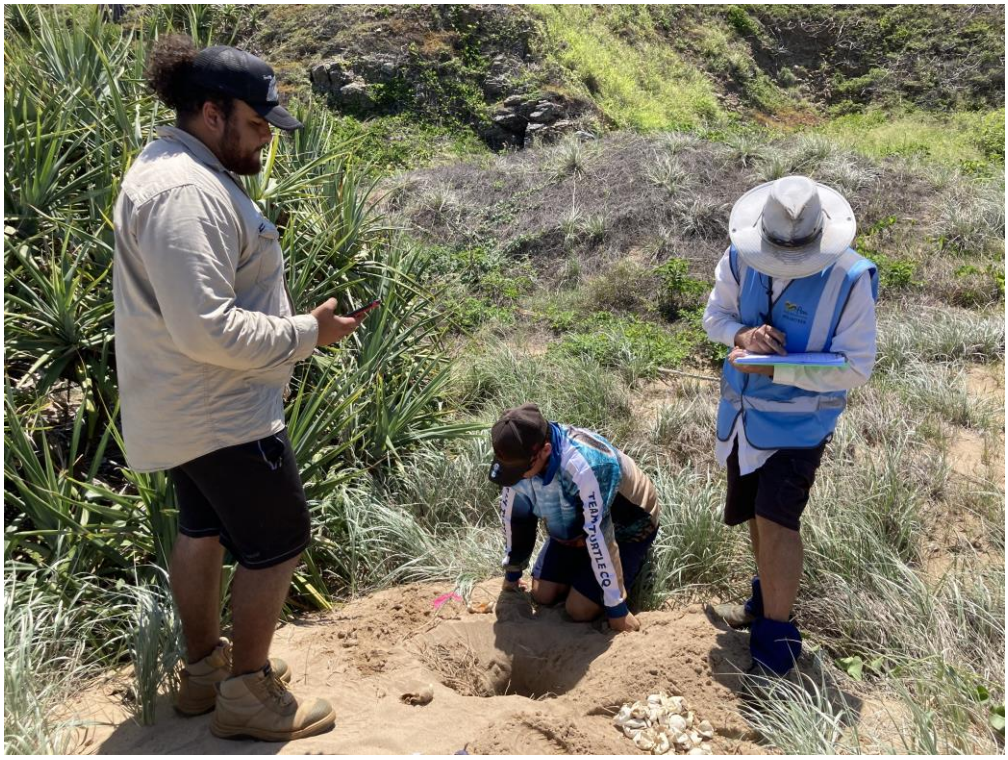

Photo: Gidarjil Land and Sea Rangers and Team Turtle CQ volunteer nest success monitoring (credit: FBA)

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Recommendations

During the delivery of the 2020-21 TTCQ program, opportunities for improvement were identified by volunteers, coordinators, and contractors; these are presented below.

1. **BioCollect app improvements:** redesign Bio Collect app format for 2021-22 season addressing issues arising from increased survey numbers and to streamline data alignment to QTCP. No evidence reports to be collected in an alternative format.

2. **Continue data quality emphasis**: encourage good quality, accurate and complete data (including reporting nil results) through training and mentoring to ensure data shared with QTCP is and remains robust.

3. **Build TTCQ capacity - volunteer training and permitting for specialist activities**: encourage and support TTCQ volunteers to apply for and attend QTCP monitoring and research placements at Mon Repos. Mon Repos experienced volunteers mentor new TTCQ volunteers and if authorised can undertake specialist activities (nest protection, nest success studies and tagging), adding to Central Queensland region data. (Note - Mon Repos placements in the 2020-21 season were COVID-19 restricted to experienced volunteers therefore the many new TTCQ volunteer applications were unable to be accommodated.) Continue volunteer field monitoring trips to Stanage and Facing Island increasing TTCQ capacity building, leadership skills development and team cohesion.

4. **Extend TTCQ activities**: establish new opportunities for volunteers – community education and knowledge sharing opportunities would provide alternative activities for those unable to monitor beaches. These activities would utilise the varied skillsets of volunteers and would likely focus on addressing marine turtle threats, building community stewardship.

5. **Recruit additional volunteers in targeted locations**: continued expansion of the TTCQ program would fill data gaps that still exist in the region. The 2020-21 season focussed on Facing Island recruitment. Potential areas for 2021-22 focus are Byfield and Lilley's beaches.

6. **Welcome First Nation partnerships:** extend invitations to all Capricorn and Curtis Coast First Nation groups to inform them about all aspects of TTCQ and to understand their interests and capacity to be involved as partners. Maintain and build upon the nesting and nest success monitoring partnership established with Gidarjil Land and Sea Rangers in 2020-21 season.

7. **Strengthen and extend partnership opportunities:** continue relationships with existing partners such as Gladstone Regional Council, Livingstone Shire Council, Queensland Parks and Wildlife Service (QPWS), Boyne Smelter Limited (BSL), Gladstone Ports Corporation (GPC), and Gidarjil, to improve various aspects of the TTCQ program. This includes turtle monitoring (GPC and Gidarjil), community engagement and feral animal control (councils, QPWS and BSL).

Pursue engagement with recreational 4WD and beach user groups to promote positive beach behaviours and stewardship, and other regional marine turtle monitoring groups for resource sharing and other forms of support. Continue to consult with key stakeholders post-monitoring season to discuss any issues that impacted on project success, and to identify opportunities for the coming turtle nesting season.

8. **Continue nest protection activities**: in response to volunteer and community predation reports, a proactive response may be coordinated using suitably trained and authorised TTCQ volunteers to install predator exclusion devices.

9. **Continue fox control program**: den fumigation is highly effective in controlling fox populations and will continue across both regions until 2023, however, the most comprehensive control would likely be achieved by pairing fumigation with baiting and/or trapping, particularly to control males which are unlikely to be inside dens when control activities occur. Livingstone Shire Council trialled soft jaw trapping in the 2020-21 season and will be undertaking further strategic trapping, together with QPWS in conjunction with den fumigation in 2021-22.

10. **Reduce light pollution:** light pollution continues to be an issue within the region, impacting potential nesting and the ocean finding behaviour of marine turtles and their hatchlings. Disorientation was reported at Farnborough and on Great Keppel Island in 2020-21. A proactive initiative by Livingstone Shire Council installed amber light globes that can be dimmed through turtle nesting season, light shields and motion sensors at Emu Park prior to 2020-21 season.

    Continue and expand the *Cut the Glow* campaign (pamphlets were distributed in 2020-21 season in Emu Park by LSC and TTCQ volunteers), to reduce waste lighting – residential, commercial, and industrial. Explore with councils coastal vegetation enhancement and replanting to increase screening on nesting beaches. The resultant shade may also improve hatchling survival through reduction of heat induced mortality.

    Pursue implementation of tagging Census at Facing Island to investigate possible shift in nesting populations due to declines in numbers of nesting turtles in recent years at southern Curtis Island beaches, that is, South End beach, an index beach for monitoring nesting flatback turtles.

11. **Assist TTCQ towards becoming a semi-autonomous turtle watch group:** TTCQ has significantly expanded its reach and capability since its inception in 2015, with several volunteers stepping up to leadership roles. It is hoped that, with time, TTCQ will become a semi-autonomous, self-governing turtle watch group. Until this is realised, FBA will continue to provide support to volunteers and volunteer coordinators to enable community-driven marine turtle monitoring activities to be delivered in Central Queensland.

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