



Sunshine Coast Council Marine Turtle Conservation Plan *Making tracks together*

Attachment 1: Strategic Planning and
Policy Guidance and Implementation

Acknowledgement of Country

We acknowledge the Kabi Kabi peoples as the Traditional Custodians of the land and sea country covered by this marine turtle conservation plan—and recognise that these lands and sea country have always been places of cultural, spiritual, social, and economic significance.

We pay our respects to Elders, past, present, and emerging, and commit to continuing to build a shared positive future together.

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This Plan is based on initial draft prepared by Terry Harper, through TerraForm Design, for Sunshine Coast Council, November 2021

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Reference document

Sunshine Coast Council (2023) Sunshine Coast Region Marine Turtle Conservation Plan (2023 – 2033),

“Making Tracks Together”. (Draft for public consultation).

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The desired future for marine turtles on the Sunshine Coast

Vision

Consistent with the National Recovery Plan and the Queensland Marine Turtle Conservation Strategy, this Marine Turtle Conservation Plan (MTCP or the Plan) aims to stop the decline and support the recovery of depleted stocks and maintain functional populations of the six species of marine turtles found on the Sunshine Coast, with a particular focus on the nesting populations of loggerhead and green turtles. The long-term vision is:

Marine turtles surviving and thriving on the Sunshine Coast, co-existing in harmony with people.

Achieving the vision will require a reduction in all manageable threats to allow for the conservation status of these marine turtles to improve so that they can be removed from Queensland and Commonwealth threatened species lists by 2122¹. Recognising the long timeframes required to achieve the vision, a Primary Goal provides intermediate guidance for marine turtle management on the Sunshine Coast.

Primary Goal

Supporting the recovery of self-sustaining populations of marine turtles on the Sunshine Coast by reducing threats, improving habitat quality, and strengthening community-based management.

To achieve the long-term vision and primary goal, this Plan sets out desired outcomes and strategic directions under three themes of work that are overlapping and mutually supportive (summarised in Table 1):

- Turtle-sensitive lighting and coastal development
- Regional marine turtle recovery actions
- Sunshine Coast community based TurtleCare program delivery

For each theme the journey ‘from here to there’ is explained using:

- essential background information (where are we now?)
- long-term desired outcome (where do we want to be?)
- success indicators including targets and performance measures¹ (how are we going to get there?)
- success indicators including targets and performance measures (how will we know we are on track?²)

Taken together, the actions identified under all three themes are expected to support the recovery of marine turtles on the Sunshine Coast in line with recognised contemporary practice (11). The actions complement existing recovery strategies including the National Recovery Plan for Marine Turtles in Australia, the Queensland Marine Turtle Conservation Strategy, and the Single Species Action Plan for the Loggerhead Turtle (*Caretta caretta*) in the South Pacific Ocean.

The actions described in the Plan are intentionally ambitious and necessarily realistic, tested through Sunshine Coast Council expert focus groups and the Technical Advisory Panel. Some targets identified in the success indicators are higher than in the National Recovery Plan and considered necessary to recover depleted stocks in the face of increasing threats such as climate change. The targets are ambitious but potentially more achievable with the active support of a turtle-friendly community to implement the necessary recovery actions.

¹ Three successive generations of sustained population growth are required before a species can be removed from the threatened species list—in the case of marine turtles that means about 100 years (and even then, the population is unlikely to return to original natural levels of abundance).

² Note. Some targets identified in the success indicators are higher than in the national Recovery Plan and considered necessary to recover depleted stocks in the face of increasing threats such as climate change. The targets are ambitious but potentially more achievable with the active support of a local team of turtle supporters to implement the necessary recovery actions.

Table 1. The desired future for marine turtle conservation on the Sunshine Coast

VISION		
Marine turtles surviving and thriving on the Sunshine Coast, co-existing in harmony with people.		
PRIMARY GOAL		
Supporting the recovery of self-sustaining populations of marine turtles on the Sunshine Coast by reducing threats, improving habitat quality, and strengthening community-based management.		
DESIRED OUTCOMES		
1.0 Turtle-sensitive lighting and coastal development	2.0 Regional Marine Turtle Recovery Actions	3.0 Community-based TurtleCare Program Delivery
<p>By 2033 to have:</p> <ul style="list-style-type: none"> • strategic planning and policy guidance tools in place including: <ol style="list-style-type: none"> (i) a regulatory framework for coastal development in the Sunshine Coast LGA that appropriately integrates State interests and the MTCP (ii) educational guidance tools to support the development sector, property owners and residents to seek to achieve world best practice turtle sensitive development outcomes • development and implementation of lighting policies and standards that deliver a commitment to Dark Sky objectives and a naturally dark coastline at night, with minimisation of direct light sources and ambient light visible from sensitive nesting beaches and adjacent marine areas • nesting beaches identified as future climate refugia and protected as part of integrated coastal hazard management. 	<p>By 2033 to have:</p> <ul style="list-style-type: none"> • the identified threats (that are under the influence of the Sunshine Coast Council) reduced to lowest residual risk level to minimise negative impacts on nesting marine turtle populations • sufficient resilient essential habitat to support effective marine turtle nesting, foraging and courtship behaviour • maintain current male to female ratios on the Sunshine Coast to ensure continued recruitment of male turtles to the breeding population 	<p>By 2033 to have:</p> <ul style="list-style-type: none"> • the Sunshine Coast is recognised as a national and international leader in community-based marine and the TurtleCare program is fully integrated into Queensland and Australian strategies • secure, adequate funding for TurtleCare (and allied programs) allows optimal contribution to monitoring, managing, and recovering marine turtles in line with world best-practices • Kabi Kabi First Nation Peoples are fully integrated into marine turtle management – the knowledge, culture and traditions, traditional rights, interests, management capacity and customary obligations are respected, strengthened, valued, and promoted • a community of residents and visitors value marine turtles and are engaged in turtle conservation –community custodians/stewards

Theme 1. Turtle-sensitive lighting and coastal development

Background

With some of Australia's best beaches, the Sunshine Coast is a rapidly growing region with most of the population living close to the coast. Without careful management, the coastal development required to support this growth and maintain the enviable 'Sunny Coast lifestyle' can directly and indirectly impact on critical habitats required by marine turtles for nesting, foraging and courtship. Potential development impacts can include changes in vegetation cover and coastal freshwater flows, hardening of coastlines through rock walls, roads, and foreshore facilities, altered night skies and marine feeding areas such as seagrass meadows and coral reefs, and discarded waste.

Existing development and associated human uses also need to be carefully considered to minimise the potential legacy impacts of past decisions. This can include artificial lighting on and near nesting beaches, human behaviour around critical marine turtle nesting, foraging and courtship activity, and ongoing use of pre-existing coastal facilities.

By committing to a bold vision of helping to bring marine turtles back from the brink of extinction, this Plan reinforces the Sunshine Coast as a leader in sustainability, creativity, and liveability. Appropriate land use planning and policy guidance is required to achieve this vision, especially in relation to artificial light, modified beach habitat (including landform, vegetation cover and barriers preventing access from the water, retreat options to maintain viable future nesting beaches, and maintaining natural hydrological systems affecting beaches used by turtles).

Providing guidance for practical and effective guidance for turtle-sensitive development in the Sunshine Coast (LGA) using world best-practice statutory and non-statutory sustainable development guidelines and related tools (e.g., planning scheme provisions, local laws, advisory information, capital works and maintenance programs).

Artificial light at night

Artificial light at night (ALAN) associated with human development is an emerging threat to a wide range of wildlife worldwide (8). Changes in ambient light levels and the night sky horizon can cause a decline in successful marine turtle nesting and disrupt ocean-finding by emerging hatchlings (3) (1). In 2017 and again in 2022, Sunshine Coast Council engaged leading experts to scientifically quantify the biologically available light on Sunshine Coast beach sites (12).

The study recorded levels of light ranging from 'rural area night sky' to 'poor urban night sky' and established a benchmark allowing for changes in illumination to be quantified, assigned to a source and where problematic, reduced or removed. The initial study found that a combination of vegetation screening, cliff elevation, lighting design and management, and building orientation can be used to reduce the impacts of artificial light and support hatchling sea-finding along the coastline.

According to the ALAN Benchmark survey the primary source of sky glow at all locations was towns and cities located along the coastline. Glow from Brisbane was visible from Bribie Island and Caloundra and is likely to be contributing to the sky glow visible from beaches along the Sunshine Coast albeit at lower intensity levels than more localised sources. The 2022 survey found that light pollution had increased between 20 – 70% on Sunshine Coast nesting beaches over the five-year period from 2017. This represents considerably higher than global average increase in light pollution at some locations in our region (18). Local efforts to limit light pollution on Sunshine Coast beaches can help reduce navigation risks for both nesting turtles and hatchlings making their way to the ocean. A collaborative approach from all coastal councils in South-east Queensland will be required over the long-term to restore dark skies over critical turtle nesting beaches and other priority areas such as the rural hinterland.

Turtle sensitive lighting in public places

Sunshine Coast Council has already retrofitted many lights in public areas to be motion activated after 8pm and appropriately shielded from adjacent nesting habitat. For example, the Point Cartwright Toilet Block has 14 lights—12 motion activated after 8pm and 2 shielded lights stay on all night. As a person approaches the building, the lights come on; as they enter a toilet stall, more lights come on, and after they leave the lights automatically turn off. Turtle-sensitive lighting is a smarter approach to meeting human lighting needs in a way that helps recover marine turtle populations, as well as achieving greater energy efficiency.

NB: public safety is recognised as an important consideration in this approach.

The lighting solutions required for marine turtle conservation and dark skies preservation in the hinterland are identical. The Australian Government's *National Light Pollution Guidelines for Wildlife*³ suggest only using outdoor lighting where required, ensuring all light is directed down, using dimmers, timers, motion sensors, and turning lights off when not required, and using warm colours in preference to blue rich or daylight tones (8). These principles are encompassed in Council's Urban Lighting Master Plan and associated technical standards.

Turtle-sensitive coastal development

The Queensland Government Sea Turtle Sensitive Area Code: A Model Code for Local Government (the model code) provides councils with a set of provisions that can be implemented in planning schemes on a voluntary basis. Councils can adapt the provisions within the model code to suit their local area.

The model code suggests that the provisions contained within it (if included within a planning scheme) could apply to all assessable development (other than for reconfiguring a lot) occurring within a Sea Turtle Sensitive Area defined in a planning scheme (13). The purpose of the model code is to ensure that development does not create harm to sea turtle nesting and sea turtle activity by avoiding adverse impacts generated from artificial light that is directly visible from the beach or ocean, or ambient light that contributes to sky glow within the Sea Turtle Sensitive Area. The model code includes acceptable solutions to achieve the purpose and overall outcomes of the code.

The Queensland Government has prepared mapping to ensure that councils reflect this State interest in their planning schemes. All beaches within the Sunshine Coast local government area are identified as significant nesting beaches under the State Planning Policy.

To support implementation of the State interests, Sunshine Coast Council has developed Sea Turtle Sensitive Area Mapping that defines two scaled impact zones and applies acceptable solutions to achieve the management objectives of each zone. A third zone extending to the hinterland is identified consistent with impact area identified in the National Light Pollution Guidelines for future consideration. These mapping tools may be used to inform future planning scheme provisions, developed in conjunction with the State Planning Policy mapping.

The current Sunshine Coast Planning Scheme 2014 does not have specific provisions in relation to sea turtle sensitive areas. However, there are more general provisions in the biodiversity, waterways and wetlands

³ The National Light Pollution Guidelines aim to raise awareness of the potential impacts of artificial light on wildlife and provide a framework for assessing and managing these impacts around susceptible listed wildlife. The Marine Turtle Conservation Plan aligns with the national guidelines while being responsive to Sunshine Coast circumstances <https://www.environment.gov.au/biodiversity/publications/national-light-pollution-guidelines-wildlife>

overlay code and the Coastal Protection overlay code that relate to the protection of biodiversity values and coastal development. In addition, various development approvals have been issued by council that contain development conditions with respect to managing the impacts of development on sea turtle sensitive areas. To date, many of these conditions require a higher performance standard than those identified in the model code. The inclusion of specific planning scheme provisions is therefore a priority to provide clear guidance for marine turtle sensitive development that reflects State interests and community expectations.

Change for good—smart lighting saves more than turtles

Installing turtle-sensitive lighting on existing buildings is becoming easier to do and has multiple lasting benefits for tenants, turtles, and the environment. Addressing light pollution has practically no downsides:

- *Light pollution can be instantly cured.*
- *It is good for wildlife.*
- *It is good for human health.*
- *It is good for our carbon footprint.*
- *It is good for our bank balance.*

Case study: *A high-rise apartment building in Maroochydore located 3km from a turtle nesting beach recently undertook a dark sky compliance refit of lighting. An audit identified 99 light fixtures to change on the outside of the building and a further 75 in the basement carpark. The retrofit was undertaken over 18 months at a total cost of \$18,000. Light pollution from common area lighting reduced by an estimated 90% and the quality of lighting dramatically improved with no complaints, only compliments from residents in the 71 units.*

The carbon footprint for the building reduced by more than 10 tonnes per month with electricity savings of over \$1,000 per month. After subtracting lights and installation costs, the building expects to save \$132,000 over ten years. A change for good and a win/win/win for tenants, turtles, and the environment (14).

<https://www.australasiandarkskyalliance.org/post/turtle-shields-creating-dark-sky-friendly-homes>

Desired Outcomes

The desired outcomes are, by 2033 to have:

DO1: Strategic planning and policy guidance tools in place including:

- a regulatory framework for coastal development in the Sunshine Coast LGA that appropriately integrates State interests and the MTCP
- educational guidance tools to support the development sector, property owners and residents to seek to achieve world best practice turtle sensitive development outcomes.

DO2: Development and implementation of lighting policies and standards that deliver a commitment to Dark Sky objectives and a naturally dark coastline at night, with minimisation of direct light sources and ambient light visible from sensitive nesting beaches and adjacent marine areas

DO3: Nesting beaches identified as future climate refugia and protected as part of integrated coastal hazard management.

Strategic Directions and Implementation*

Strategic Direction	Transformational Action	Priority	Cost	Status
1.1 An identified head of power assesses and prescribes the conditions in planning scheme provisions of development applications to achieve marine-turtle sensitive design requirements.	1.1.2 Develop a planning scheme provision that addresses problematic artificial light at night for marine turtles.	Now	Low	Underway
1.2 Develop specific planning scheme provisions and sea turtle sensitive area mapping for the greater Sunshine Coast marine turtle nesting bioregion—to provide clear guidance for marine turtle sensitive development that is consistent with State interests and reflects contemporary community expectations on the Sunshine Coast.	1.2.2 Within the drafting of the Sunshine Coast planning scheme provisions, consider the application of a scaled approach (using viewshed analysis or other evidence-based investigation) for lighting management based on the significance and sensitivity of sites: <ul style="list-style-type: none"> Direct Light (avoid new and actively mitigate existing direct light and sky glow): Structures directly visible of the nesting habitat, the beach or near shore environment. Sky Glow (avoid new and opportunistically reduce existing indirect light and sky glow): Structures within 20km of the nesting habitat. 	Now	Med	Underway
	1.2.3 Develop practical, contemporary, and appropriate guidelines to achieve the outcomes for both existing and proposed development.	Next	Low	Underway
1.3 Effective mechanisms ensure compliance with development approval conditions over time, including the potential requirement for an annual declaration of compliance from building owners and managers. These mechanisms may be built-in, self-regulated, or automated.	1.3.2 Develop and implement effective mechanisms for compliance.	Next	Low	

* now [1-2yrs], next [3-5yrs] and later [5-10yrs]; and cost—low [<10K], medium [10 – 100K], high [100k+].

Strategic Direction	Transformational Action	Priority	Cost	Status
1.4 Stakeholder consultation ensures development approval conditions appropriately reflect the MTCP and the Sunshine Coast Planning Scheme.	1.4.2 Implement appropriate education and engagement opportunities within council and with external stakeholders to develop shared understanding of contemporary turtle sensitive design principles and practices.	Next	Med	
	1.4.3 Develop a compliance methodology (eg. ALAN surveys in current conditions pre- and post-construction and in response to reasonable complaints).	Next	Med	
1.5 MTCP informs all planning scheme provisions and planning scheme policies, given its standing as council's policy position on marine turtle management.	1.5.2 Identify appropriate provisions for building height, density, orientation, and form within sensitive marine turtle areas.	Now	Low	
1.6 A proactive solutions-focussed approach is fostered through work with the development sector, local businesses, and residents to ensure marine turtle sensitive design outcomes using policy and planning instruments, providing, clarity, certainty, and consistency for all users of the development system.	1.6.2 Establish a development toolkit that provides guidance to the development sector, local businesses, and residents in suitable products (commercially available) to manage ALAN.	Now	Med	Underway
1.7 Research and monitoring of altered light horizon impact on marine turtles ongoing and supported.	1.7.2 In collaboration with Department of Environment and Science (DES) and research community, undertake hatchling orientation and survivorship research at nesting beaches across the region.	Next	Med	Ongoing
1.8 Light reductions measures are adopted and promoted through appropriate mechanisms (statutory and non-statutory) that are consistent with the National Light Pollution Guidelines and the United Nation Environment Programme Single Species Action Plan for the Loggerhead Turtle in the South-west Pacific.	1.8.2 Public lighting is addressed to ensure consistency with the United Nation Environment Programme Single Species Action Plan for Loggerhead turtles and the national light pollution guidelines.	Now	High	Ongoing
	1.8.3 Lighting options researched, tested, and identified that support community life (e.g., parks, events, playgrounds) and do not impact turtle behaviour and population function.	Now	Low	Ongoing
	1.8.4 Community education and behaviour change campaign to 'Cut the Glow'.	Now	High	Ongoing
	1.8.5 Consider incorporating public art, green landscapes or behaviour change approaches to address vehicle light impacts at high priority beaches.	Now	Low	Underway

Strategic Direction	Transformational Action	Priority	Cost	Status
1.9 Dark skies protection and restoration within the Sunshine Coast LGA to achieve an area of at least 20% of the total.	1.9.2 Contribute to dark sky policy preparation and delivery.	Now	Low	Underway
	1.9.3 Replace the current metal halide street lighting as identified in the Urban Lighting Master Plan with appropriate dark sky compliant LED lighting.	Next	High	Underway
	1.9.4 Investigate feasibility and implement near to real time light pollution monitoring.	Later	High	
1.10 2017 Benchmark Survey of artificial light at night (ALAN) survey repeated every five years to better understand local light pollution levels, hatchling and adult turtle orientation and audit lighting assets to target further improvement opportunities to reduce artificial light impacts on marine turtles.	1.10.2 Engage industry experts to undertake ALAN survey at nesting beaches every five years.	Now	Med	Ongoing
	1.10.3 Continue to record high quality orientation data from adult and hatchling turtles at all nesting beaches to inform ALAN survey results and providing training to support accurate orientation data collection.	Now	Low	Ongoing
	1.10.4 Audit all council-controlled lighting impacting nesting beaches.	Now	Med	Ongoing
1.11 Light pollution at Shelly Beach and Buddina Beach reduced as a priority through work of council and turtle partners with the residents and building owners adjacent to the high-density nesting sites.	1.11.2 Deliver a community education, behaviour change and subsidy project to support the community to make voluntary changes to existing residential lighting and light use behaviours within 1.5km of nesting beaches.	Now	Med	Ongoing
	1.11.3 Address public lighting infrastructure at Shelly and Buddina beaches as a priority.	Next	Med	Ongoing
1.12 Actively participate in the implementation of the Sunshine Coast Urban Lighting Master Plan (2016).	1.12.2 Support councils Transport Infrastructure Management branch to integrate contemporary turtle sensitive lighting outcomes into public infrastructure.	Now	Low	Ongoing
	1.12.3 Emerging technologies and cost and energy efficiencies are monitored and promoted, facilitating the ongoing implementation of turtle sensitive lighting.	Now	Low	Ongoing
1.13 A voluntary mechanism in place to assess and recognise turtle sensitive light management best practice in existing buildings on the Sunshine Coast (e.g., a turtle star rating or accreditation system).	1.13.2 Establish a turtle-friendly building (commercial and residential) accreditation program.	Next	Med	

Strategic Direction	Transformational Action	Priority	Cost	Status
1.14 Maintain accurate publicly available maps of marine turtle nesting habitat and in collaboration with the Queensland Department of Environment and Science use best available evidence to develop a nesting habitat site quality index to assess, monitor and improve the quality of current and potential future refugial marine turtle nesting beaches in the Sunshine Coast marine bioregion.	1.14.2 Share data and provide feedback to Queensland Government to ensure that State Planning Policy - sea turtle sensitive area mapping, is accurate.	Now	Low	Completed
	1.14.3 Develop a nest habitat site quality index in partnership with research community.	Later	Med	
1.15 Planning controls and management actions safeguard identified future refugial nesting habitat that turtles will potentially use under a rising sea level scenario (e.g., higher elevation dunes with retreat options to accommodate sea level rise), where practical.	1.15.2 In collaboration with the Queensland Government, develop a fine-scale mapping and monitoring tool to identify and assess the quality of current and potential alternative 'refugia' marine turtle nesting habitat on the Sunshine Coast under climate change scenarios.	Later	Med	
	1.15.3 Explore options to protect potential future habitat including by managing development on foreshores to minimise unnatural barriers; maintain and enhance access by female nesting turtles to suitable nesting habitat; and maintain coastal retreat options.	Next	Low	
1.16 Coastal hazard adaptation strategies avoid the use of engineering solutions such as hard seawalls or coastal armouring in areas where this will impact marine turtle nesting beaches.	1.16.2 Continue to engage with coastal land managers to support marine turtle conservation outcomes.	Now	Low	Ongoing
	1.16.3 Consider where the use of buffers between future development and the coastal zone may be beneficial to enhance current and future marine-turtle nesting habitat and effectively manage coastal hazards (including those arising from predicted climate change). This includes potential consideration of turtle-sensitive development as impact assessable or code assessable development within mapped erosion-prone areas.	Next	Low	
1.17 A best practice 'business-as-usual' approach to protecting turtle habitat is in place in council, demonstrating an integration of environmental management considerations in all aspects of operation.	1.17.2 Deliver annual workshops for council officers, development consultants and other industry specialists to discuss ALAN and management of ALAN. Focus on new research, technology, and habitat preservation e.g., Australian Dark Sky Alliance Certification for Wildlife Lighting.	Now	Low	Ongoing

Strategic Direction	Transformational Action	Priority	Cost	Status
<p>Success indicators</p> <p>Progress towards achieving the desired outcome will be measured using the following success indicators:</p> <ul style="list-style-type: none"> • Planning scheme provisions and other non-statutory mechanisms support turtle sensitive development. • Sunshine Coast recognised as leaders in sustainable urban design. • 95% of all new developments voluntarily exceeding Code requirements. • Incompatible development is managed at 100% of nesting beaches. • Dark skies protected and restored over at least 20% of the Sunshine Coast LGA, including the Buddina and Shelly Beach council dark skies nominated areas. • Progressive reduction in the level of direct and ambient light at all reference beaches (as measured every five years using the Artificial Light at Night – or ALAN – method). • Annual voluntary adoption of turtle-sensitive lighting upgrades (e.g., 10 developments/buildings per year undertaking turtle-sensitive lighting upgrade programs). • Public lighting upgrades to all council-controlled lighting infrastructure adjacent to turtle nesting beaches, representing industry best practice lighting design and turtle-aware lighting initiatives • Progressive increase in the quantity, quality and resilience of current and potential future nesting habitat using a peer-reviewed site quality index. • Protection of existing and potential refugial nesting beaches in all relevant council planning instruments and coastal hazard management strategies. 				

Theme 2. Regional marine turtle recovery actions

Background

A combination of historic and continuing human-caused threats operating at the local to global scale hinder the recovery of marine turtle populations found along the Sunshine Coast (see section 4.0 for key threats). Regionally relevant recovery actions undertaken during the life of this plan are critical threads required to weave a global safety net for marine turtles and help restore local stocks over the next century.

Given the increasing pressures and threats facing marine turtle populations globally, and the severely depleted status of local stocks, it is necessary to aim higher than simply maintaining the current population and to take immediate and ongoing action. A greater level of human intervention is likely to be required to achieve the nesting and hatchling success rates necessary for recovery of stocks found on the Sunshine Coast. For example, interventions such as relocation of doomed nests, assisted incubation, proactive translocation of pioneer nesting populations, and habitat enhancements through artificial shading and watering are likely to increasingly become 'business as usual' to prevent further decline (or collapse) and support recovery of the existing stocks. Because the science and practice of intervention, including criteria for deciding why, when, where and how to take active recovery action, is still emerging. An adaptive management approach will be essential.

Increasing marine turtle habitat and population resilience in the face of climate change and other threats will also benefit people who live, work, and recreate on the Sunshine Coast. For turtles, the priority is to increase nesting and hatchling success rates to ensure the maximum number of turtle hatchlings reach the ocean, preferably with a male gender bias.

When improving habitat quantity and quality and reducing risks for marine turtles, council should focus on those matters for which they have some control or influence and work with other partners to make progress on those outside its jurisdiction. For example, in relation to nesting beaches, actions by council could include reducing light pollution, preventing beach obstructions, maintaining suitable sand temperatures, and reducing predation and visitor disturbance. Actions to manage threats in foraging habitat could include working with partners to reduce land based marine debris, boat strike, and negative interactions with the shark control program, and improve management of the marine environment more broadly.

Desired outcomes

The desired outcomes are, by 2033 to have:

DO4: The identified threats (that are under the influence of the Sunshine Coast Council) **reduced to lowest residual risk level** to minimise negative impacts on nesting marine turtle populations.

DO5: Sufficient resilient essential habitat to support effective marine turtle nesting, foraging and courtship behaviour.

DO6: Maintain current male to female ratios on the Sunshine Coast to ensure continued recruitment of male turtles to the breeding population.

Strategic Directions and Implementation*

Strategic Direction	Transformational Action	Priority	Cost	Status
2.1 Adaptive and responsive management of current and emerging threats consistent with the Queensland Turtle Conservation program	2.1.1 Consistent with Queensland Turtle Conservation Project guidelines, continue the program of rescuing at-risk or doomed eggs (laid near or below the high tide) and review the efficacy of adaptive management techniques (e.g use of tarpaulins, moving sand etc.) to protect at risk nests, increase hatch success and counter the effects of other threats.	Now	Low	Ongoing
	2.1.2 Consider actively restoring sand dunes on nesting beaches where natural processes fail to reinstate sand dunes following storm erosion events.	Next	High	
2.2 Contributions made to ongoing research and monitoring of marine turtles' population characteristics and habitat requirements.	2.2.1 Better understanding of population characteristics and habitat requirements of marine turtles on the Sunshine Coast including important nesting, inter-nesting, foraging and courtship areas (using for example telemetry and citizen science-based photo identification tools).	Now	Med	Ongoing
	2.2.2 Expand the long-term sand temperature monitoring at representative sites across the Sunshine Coast (including maintaining historic temperature monitoring sites at Shelly Beach and Yaroomba Beach).	Now	Low	Completed
2.3 Disruption to ocean finding behaviour of marine turtles minimised by ensuring a dark horizon on nesting beaches.	2.3.1 Restore natural light horizons through manipulation of dune vegetation, dune height (sand) and skylines behind nesting beaches to provide a dark horizon to minimise disruption to ocean finding behaviour of hatchlings and adult turtles.	Now	Med	
	2.3.2 Reassess existing regeneration works plans and condition assessments at turtle nest beaches to incorporate ecological role of vegetation for turtle nesting (such as shielding artificial light).	Now	Med	
	2.3.3 Audit dune vegetation transparency and identify priority locations for 'trees for turtle' planting opportunities.	Next	Med	

* proposed timing—now [1-2yrs], next [3-5yrs] and later [5-10yrs]; and cost—low [<10K], medium [10 – 100K], high [100k+].

Strategic Direction	Transformational Action	Priority	Cost	Status
2.4 Turtle nests, hatchlings and nesting habitats are managed to minimise the impacts of pest animals and plants.	2.4.1 Continue providing proactive nest protection and predator control actions during nesting seasons to maximise clutch output.	Now	Low	Ongoing
2.5 Natural beach vegetation maintained and enhanced to support optimal turtle nesting habitat.	2.5.1 Create a Sunshine Coast marine turtle dune vegetation plan that considers local species, vegetation communities and threats to marine turtle nesting. Use the plan to guide bush/coast care groups to improve dune vegetation.	Next	Low	
	2.5.2 Maintain and enhance coastal zone stability, shield artificial light spill, desired incubation temperatures and natural hydrological flows that achieve optimum sand moisture levels.	Now	Low	
	2.5.3 Maintain guidelines for use by bush/coast care groups to improve dune vegetation (including species selection for height, diversity, density, connectivity, and functionality).	Now	Low	
2.6 Practical nest cooling strategies at key nesting beaches result maintenance of hatchling sex ratios.	2.6.1 If/when required, partner with Queensland Government and research community to identify suitable nesting beaches, strategies, and resources to manage the temperature of sand incubating marine turtle nests.	Later	Moderate	
2.7 Water discharging into the Sunshine Coast marine environment is of high quality - no plastics and other pollutants.	2.7.1 Achieving beyond compliance (best practice) standards for municipal sewage treatment (including the 'Blue Heart' as a wetland filter).	Next	TBC	
	2.7.2 Supporting community partnerships to restore catchments, improving the retention and quality of stormwater runoff (especially along riparian zones and identified high risk sites in the catchment).	Now	TBC	
	2.7.3 As part of region-wide waste management initiatives, seek to reduce all forms of land-based marine debris at source, including by conducting beach clean ups (especially during nesting season to remove beach washed debris that may impede successful nesting and hatching); a proactive program of installing gross pollution traps on all stormwater discharge points; community education and waste reduction programs including avoiding single-use plastics; and adopting circular economy principles to convert waste streams into resource recovery opportunities (eg conversion into useful landscape elements)	Now	TBC	

Strategic Direction	Transformational Action	Priority	Cost	Status
2.8 Advocacy for marine park management arrangements that are beneficial to marine turtle populations.	2.8.1 Advocate the Queensland Government to establish a Sunshine Coast Marine Park over Queensland State waters (linking the existing Moreton Bay Marine Park with the existing Great Sandy Marine Park in areas that are beneficial to marine turtle conservation.	Now	Low	
	2.8.2 Support the appropriate use of green zones, go slow zones and other practical measures to protect important turtle nesting, foraging and courtship areas, and support community appreciation of the proposed marine park.	Now	Low	

Success indicators

Progress towards achieving the desired outcome will be measured using the following success indicators:

- At least 90% of Sunshine Coast beach nesting habitat is protected from incompatible development, is available for nesting and is and rated as 'suitable' or better.
- At least 80% of identified foraging and courtship areas in Queensland waters adjacent to the Sunshine Coast are effectively protected and managed (e.g., in declared protected areas or equivalent).
- Successful nesting rates of at least 80% (due to no or very few potential disturbances or barriers).
- Successful hatching of at least 80% of clutches laid (including through rescuing doomed eggs as feasible).
- Mean hatchling emergence success of at least 80% from clutches that produce hatchlings.
- A target sex ratio maintained at a regional scale to support long-term stock recovery.
- Statutory requirements for water quality are met.



Theme 3. Community-based TurtleCare program delivery

Background

TurtleCare Sunshine Coast is a community-based citizen science program coordinated through Sunshine Coast Council, in partnership with the Queensland Government, for the monitoring and protection of nesting marine turtles on Sunshine Coast beaches. From humble beginnings in 2005 when formal monitoring commenced, the program has grown to include over 200 volunteers and a dedicated council-employed coordinator.

TurtleCare Sunshine Coast operates under permit with the Queensland Government Turtle Conservation Project (QTCP) as a collaborative research partnership. With a study area that covers 22km of beach from North Bribie Island to Mooloolah River, the local program provides monitoring, protection, and conservation outcomes for marine turtles. TurtleCare Sunshine Coast works in collaboration with the Coolumb and North Shore Coast Care (CNSCC) and Bribie Island Turtle Trackers which operate independently to the north and south respectively.

Through the TurtleCare program, trained volunteers record nesting and hatchling data which is provided to the Queensland Government turtle database. Volunteers also undertake surveillance and various interventions for the protection of nesting turtles, nests and hatchlings, throughout the season (e.g. installing fox exclusion devices, relocating doomed nests, and educating the community).

The TurtleCare program has been hugely successful and consequently is running at capacity in terms of available volunteer positions and trained supervisors. Growth and demand are key challenges that will need to be addressed to ensure the program continues to effectively contribute to marine turtle conservation, is rewarding for participants, is embraced by the community and operationally sustainable over the long-term. With about 8,500 in-kind hours provided each nesting season (October - May), volunteer citizen scientists are the heart and soul of the TurtleCare program and maintaining the quality of their volunteering experience and level of engagement is critical. This includes managing the disappointment of turning people away when the program is over subscribed.

Group leaders are responsible for coordinating teams of up to 30 volunteers to conduct daily beach assessments throughout the nesting season. These roles require a significant level of commitment and training, and increased support and succession planning is considered necessary for the program to reach its full potential.

As a citizen science project, data quality control for the TurtleCare program is essential. Under the QTCP research agreement, daily data sheets completed by beach volunteers are collated and, depending on the volunteer group, checked by either the Sunshine Coast Council and/or the Queensland Department of Environment and Science. At the completion of each turtle season data collected by TurtleCare are reviewed by an independent expert before being entered into the Queensland marine turtle data base.

As part of the 10-year review undertaken by Sunshine Coast Council, community engagement specialists from the University of the Sunshine Coast evaluated the TurtleCare program in 2019 (see text box for highlights) (2). Griffith University peer reviewed the evaluation and considered it to be well designed and executed and providing a robust foundation for future improvement.

Overall, the review identified a range of program strengths including high quality training, strong support from council, positive input into marine turtle policy and planning, contribution to scientific knowledge and research, support for community wellbeing and sense of belonging. Opportunities for program improvement included greater recognition of participants, better crowd management, stronger habitat protection, improved communications within and between the program and key stakeholders, and broader community engagement. In all cases, respectful relationships were identified as a pre-requisite for success.

TurtleCare program evaluation highlights

- *The program is well organised and provides a positive, meaningful experience for volunteers, including opportunities to volunteer in other community activities.*
- *The leadership provided by the Sunshine Coast Council and recognised expertise in sea turtle conservation is highly regarded.*
- *Community awareness of the TurtleCare program is very high (90%).*
- *The program is supporting the Guideline aim to sustain an ongoing marine turtle monitoring program.*
- *Almost three quarters (74%) of surveyed residents are aware of actions needed to protect marine turtles.*
- *More than half (56%) of surveyed residents reported learning about turtle conservation by observing TurtleCare volunteers in action.*

The program is mature, well run, and considered best practice, but needs to be better recognised, resourced, and positioned for the next phase of growth and improvement. In terms of resourcing, the TurtleCare program (and more so the Coolum and North Shore CoastCare and Bribie Turtle Trackers) are overly reliant on volunteers, including a relatively small number of highly trained voluntary coordinator roles. Without additional investment and capacity building the program is potentially unsustainable in the long-term.

The key strengths, weaknesses, opportunities, and threats of the current TurtleCare program are summarised in Table 2 and have been considered in developing strategic directions for future delivery of the program.

Table 2 Key strengths, weaknesses, opportunities, and threats of the TurtleCare program

Strengths	Weaknesses
<ul style="list-style-type: none"> - Over 200 committed volunteers with a primary focus on marine turtle conservation. - Highly trained and dedicated coordinators. - The only 'out of ordinary hours' volunteer program offered by council. - High quality volunteer training. - Strong support from council. - Positive input into marine turtle policy and planning. - Contribution to scientific knowledge and research. - Sense of community wellbeing and belonging (strong TurtleCare family culture). 	<ul style="list-style-type: none"> - Limited operating resources. - Kabi Kabi First Nations perspectives not yet integrated. - Currently at capacity (turning people away). - Inadequate communication resources. - Reliance on small number of highly trained volunteers.
Opportunities	Threats
<ul style="list-style-type: none"> - Additional investment from government, business, and community sector. - Chance to add more breadth and depth to the program (with specialist functions). - Integrate with Kabi Kabi First Nations perspectives. - Greater recognition of participants. - Better management of crowds. - Stronger habitat protection. - Improved communications within and between the program and key stakeholders. - Broader community engagement. 	<ul style="list-style-type: none"> - Lack of appropriate resourcing to support program requirements and associated outcomes. - Loss of experienced coordinators. - Inadequate mentoring, succession arrangements.

The Sunshine Coast TurtleCare program and related initiatives demonstrate the important contribution that can be made by dedicated community citizen science volunteers and supporting organisations. This Plan proposes to further strengthen the existing program with a dedicated coordinator and structured training and engagement program for a growing body of volunteers to undertake an expanded range of marine turtle conservation related activities.

This Plan recognises the significant cultural, social, and spiritual ties that Kabi Kabi First Nation Peoples have with marine turtles. Respecting and strengthening the traditional rights, interests, management capacity and customary obligations of Kabi Kabi First Nation Peoples in relation to marine turtles is fundamental to the long-term success of the Plan.

Desired outcomes

The desired outcomes for Sunshine Coast community-based turtle program delivery by 2033 are:

DO7: The Sunshine Coast is recognised as a national and international leader in community-based marine turtle care program fully integrated into Queensland and Australian strategies.

DO8: Secure, adequate funding for TurtleCare (and allied programs) allows optimal contribution to monitoring, managing, and recovering marine turtles in line with world best-practices.

DO9: Kabi Kabi First Nation Peoples are fully integrated into marine turtle management – the knowledge, culture and traditions, traditional rights, interests, management capacity and customary obligations are respected, strengthened, valued, and promoted.

DO10: A community of residents and visitors value marine turtles and are engaged in turtle conservation –community custodians/stewards.

Strategic Directions and Implementation*

Strategic Direction	Transformational Action	Priority	Cost	Status
3.1. Collaboration and integration of community groups and partners engaged in marine turtle conservation across the Sunshine Coast marine turtle nesting bioregion.	3.1.1. Explore options to expand the annual 'Clean Up for the Hatchlings' event to cover all Sunshine Coast nesting beaches, potentially culminating in a new community celebration event dedicated to sustainable management of the Sunshine Coast beaches, that celebrates arrival of nesting turtles and helps embed marine turtles as part of the fabric of life on the Sunshine Coast.	Later	Med	
	3.1.2. Explore options for an event delivered by First Nation's Partners to recognise the annual start of turtle nesting season, connecting community to marine turtles and traditional culture.	Next	Med	
	3.1.3. Data uploaded to open data website annually.	Now	Low	Completed

* proposed timing—now [1-2yrs], next [3-5yrs] and later [5-10yrs]; and cost—low [<10K], medium [10 – 100K], high [100k+].

Strategic Direction	Transformational Action	Priority	Cost	Status
3.2 The concept of a council (Sunshine Coast, Noosa, Moreton Bay) and Queensland Government turtle partnership explored, to coordinate an expanded community-based turtle monitoring program across the Sunshine Coast marine turtle nesting bioregion.	3.2.1 Explore the option with local non-government organisations and South-east Queensland local governments to establish a permanent regional Turtle conservation program coordinator situated within Sunshine Coast Council the option of creating extension officer role(s) in participating councils to proactively lead delivery of community engagement and behaviour change programs across the Sunshine Coast marine turtle nesting bioregion.	Next	Med	
3.3 TurtleCare (and allied programs) profile is high, and the regional community recognised as leaders in the field of turtle conservation.	3.3.1 Establish a control chart reporting scheme on council's website for key monitoring parameters for the nesting populations and actively promote access to the community.	Now	Low	Completed
	3.3.2 Actively promote partnerships and success.	Now	Low	Ongoing
	3.3.3 TurtleCare (and allied program) representation at professional conferences.	Now	Low	Ongoing
	3.3.4 Partner with research organisations to publish findings in peer-reviewed and open-access scientific journals.	Next	Low	Ongoing
3.4 Strengthened TurtleCare and associated programs through supporting and valuing volunteers, intergenerational engagement, capacity building and exploring new volunteer opportunities.	3.4.1 Create a full-time permanent volunteer coordinator position to support program growth.	Now	High	Underway
	3.4.2 Partner with Queensland Government to create a nationally recognised Marine Turtle Conservation course to recognise the skills and expertise of community citizen scientists.	Next	Med	
	3.4.3 Actively recruit volunteers from all age sectors to better reflect the makeup of the Sunshine Coast community.	Now	Low	
	3.4.4 Further developing mentoring, capability building and succession planning approaches to ensure a high level of skills and experience are maintained long-term for enduring and sustainable capacity within the volunteer program.	Next	Med	Underway
	3.4.5 Empowering volunteers to do increased community education and engagement using standard presentation resources.	Now	Low	Completed
	3.4.6 Developing additional mechanisms to formally recognise individual volunteer contributions, especially for younger volunteers seeking to demonstrate work experience.	Next	Med	
	3.4.7 Updating TurtleCare Volunteers guidelines biannually to ensure advice is based on best available science and adaptive management feedback (e.g. response to spontaneous and pre-organised crowds of observers).	Now	Low	Ongoing

Strategic Direction	Transformational Action	Priority	Cost	Status
	3.4.8 Create additional training resources for TurtleCare volunteers (e.g. method videos, waterproof handbook with key methods and messages).	Now	Med	Underway
	3.4.9 Review and update the TurtleCare volunteer recruitment, training, and retention programs.	Next	Low	
	3.4.10 Partner with the University of Sunshine Coast to engage Animal Ecology and Tourism students in 'Turtle Guide' program to address work experience and community interpretation demands.	Next	Low	
	3.4.11 Development of a 'Friends of TurtleCare' program to activate the demand for connection with the marine turtle program in the community.	Now	Med	Underway
	3.4.12 Explicitly including habitat protection as an objective of the program and identify how volunteers can contribute (e.g. Dune vegetation restoration and becoming a turtle lighting ambassador.)	Now	Low	
	3.4.13 Working with research community and allied groups to expand and further strengthen citizen science programs to harness community input and augment academic and applied research relevant to the recovery of marine turtles on the Sunshine Coast.	Next	Low	Underway
	3.4.14 Community understanding of TurtleCare citizen scientists facilitated: role, value, and expertise.	Now	Low	Completed
	3.4.15 Providing intra-season training to enhance hard and soft communication skills and team building.	Now	Med	Ongoing
	3.4.16 Increase volunteer engagement through meaningful research-community interactions.	Now	Low	Ongoing
3.5 Funding options explored to obtain emerging technologies that improve research, monitoring and management of marine turtles on the Sunshine Coast (e.g. low impact virtual tourism experience).	3.5.1 Seek tourism support for virtual experiences to develop a product offering that does not require visitation experience.	Later	Med	
	3.5.2 Partner with research organisations to consider use of drone technologies to monitor remote nesting beaches (North Bribie Island).	Now	Low	Underway
3.6 Reliable resourcing secured from partners across government, education, community, business, and tourism sectors to sustainably grow the TurtleCare program (including potentially using existing environment and tourism levy funding).	3.6.1 Prepare an investment prospectus and seek additional reliable resourcing from potential partners.	Next	Med	
	3.6.2 Strengthened funding for the program's citizen science to deliver enhanced research and monitoring that fully integrates with Queensland and national strategies.	Next	Med	

Strategic Direction	Transformational Action	Priority	Cost	Status
3.7 A permanent extension officer role(s) established to deliver community engagement and education (preferably employing Kabi Kabi First Nations representatives).	3.7.1 Establish a permanent extension officer role to deliver community engagement and education (preferably employing Kabi Kabi First Nations representative).	Next	High	
3.8 Partnered with the Kabi Kabi First Nation Peoples to develop, deliver and integrate cultural content (as deemed appropriate) for the Sunshine Coast marine turtle program.	3.8.1 Develop culturally appropriate marine turtle content for community education (interpretive signage, community education).	Next	Med	
	3.8.2 Valuing, protecting, and promoting Kabi Kabi First Nations knowledge, culture, and traditions.	Next	Med	
	3.8.3 Establish a Kabi Kabi advisor role in the TurtleCare project governance.	Now	Low	
3.9 Other communities supported to live in harmony with marine turtles including by championing the benefits, principles, practices, and experience on the Sunshine Coast (e.g. urban lighting master plan, influencing State policy, respecting Indigenous culture, living alongside turtles in an urban environment, preventing waste from entering the ocean, educating the community, children, and turtle volunteers, biosphere reserves etc.).	3.9.1 Establishment of Queensland marine turtle land managers network (community of practice) in partnership with the Commonwealth Migratory Species Section and Queensland Government.	Now	Low	Complete
3.10 Marine turtles recognised as a keystone species for coastal processes of the Sunshine Coast and people understand the broader benefits of turtle protection.	3.10.1 Develop culturally appropriate community education content including marine turtles as a keystone species for the Sunshine Coast.	Next	Low	
Community education and engagement				
3.11 Community engaged and educated to support the delivery of the MTCP – facilitated by a strategic program.	3.11.1 Implement improvements identified by the University of the Sunshine Coast review of the TurtleCare program.	Now	High	Underway

Strategic Direction	Transformational Action	Priority	Cost	Status
3.12 An annual communication plan supports the delivery of the MTCP.	3.12.1 Raise awareness about the challenges facing marine turtles, the need for recovery actions and empowering local community and business involvement in marine turtle conservation.	Now	Low	Underway
	3.12.2 Use a diversity of communication channels and social marketing to reach target audiences (including TurtleCare volunteers, residents, visitors, and students, across multiple generations).	Now	Low	Ongoing
	3.12.3 Actively involve TurtleCare citizen scientists in development of a communications plan.	Next	Low	
	3.12.4 Developing suitable communication products including beach access and interpretive signage, community handouts, turtle presentations for community and school-based programs, and products for the tourism industry (e.g. coffee table book).	Now	Med	Underway
	3.12.5 As part of the annual program communication plan, strengthen communication skills and processes within and between key program stakeholders including by: <ul style="list-style-type: none"> Clarifying volunteer responsibilities (including workplace health and safety and media obligations). Establishing a formal process to identify ongoing program improvement opportunities. Providing interpretation and public education training (including persuasive communication/active listening/conflict management) to support compliance with behavioural guidelines when observing or interacting with turtle nesting, engaging directly with residents, and improving advocacy of the turtle program (less 'us and them' conflict over difficult issues). Facilitate local resident custodianship of turtle nesting by promoting opportunity to view nest success digs. 	Next	Med	
3.13 TurtleCare Program is expanded and promoted the as a flagship element of the Sunshine Coast Biosphere.	3.13.1 Work with the tourism sector (e.g., Australia Zoo and Sea Life) to promote the Sunshine Coast as a domestic and international destination where both visitors and turtles are welcome (and treated like family) and highlight the regional aspiration to be a global leader in community-driven recovery of marine turtles in conjunction with the Biosphere initiative.	Later	Low	

Strategic Direction	Transformational Action	Priority	Cost	Status
	3.13.2 Explore the feasibility of establishing a dedicated marine turtle discovery/experience centre on the Sunshine Coast as a gateway for community, citizen science and visitor engagement in marine turtle and marine conservation and broader environmental management of the coastal environment.	Later	High	
3.14 Opportunities to increase the scope of volunteering to increase environmental resilience explored. Consider tiers of involvement, and diversity of roles and responsibilities and coordination of volunteers across an expanded range of program activities.	3.14.1 Maintaining a minimum of 200 volunteers in the current program and work towards a program of 1,000 volunteers (permanent and casual) by 2030 with sufficient guidance, resourcing, and support to be sustainable.	Next	High	
	3.14.2 Explore opportunities to increase the breadth and depth of volunteering, to increase environmental resilience of the region. Consider tiers of involvement, and diversity of roles and responsibilities and coordination of volunteers across an expanded range of program activities for TurtleCare and turtle conservation affiliated volunteer opportunities through: <ul style="list-style-type: none"> Marine turtle nesting research and monitoring (maintain and enhance current program) Marine turtle foraging habitat use (photo identification) 'Trees for Turtles' coastal dune restoration (fully integrated with Bushcare) Community environmental education and engagement Indigenous Ranger program Partner with USC Animal Ecology and Tourism students in 'Turtle Guide' program to address work experience and community interpretation demands One off or casual volunteer opportunities Turtles for Tourism (sensitively and appropriately marketed for region) Marine turtle experience centre Healthy waterways Short-term citizen science programs supporting priority academic research Cut the glow turtle ambassadors. 	Next	High	

Strategic Direction	Transformational Action	Priority	Cost	Status
<p>Success indicators</p> <p>Progress towards achieving the desired outcome will be measured using the following success indicators:</p> <ul style="list-style-type: none"> • Formal, but flexible cooperative arrangements between region's delivery partners: DES, Moreton Bay and Noosa Councils, TurtleCare, Coolum North Shore, Bribie Turtle Trackers, and others. • At least 95% of all nesting activity (attempts and successful clutches) recorded within 24 hrs of occurrence in the Sunshine Coast marine turtle nesting bioregion. • Successful nests actively managed throughout the incubation period for optimal survival rates. • 1,000 active volunteers delivering an expanded multi-themed TurtleCare program throughout the year (target of 25,000 hours of in-kind contribution per year); the group self-sustaining. • A successful and well-resourced citizen science program delivered in partnership with leaders in marine turtle management. • Marine turtles recognised as Sunshine Coast asset, positively contributing to the regional economy and quality of life. • A 10-year evaluation of TurtleCare is repeated and shows improvement in program strength, resilience, and sustainability - financial, social, personal, professional, resourcing and recognition. • Investment prospectus and reliable resourcing established. • Kabi Kabi knowledge culture embraced and enmeshed into the turtle program by Council and volunteers. • A full time identified position embedded within Council's TurtleCare management team and Kabi Kabi representative within the program governance system. 				



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