

Gorgon Project Marine Turtle Expert Panel – Annual Public Report 2018

This report summarises the advice given by the Marine Turtle Expert Panel (MTEP) to Chevron Australia Pty Ltd (Chevron Australia) on the implementation of the Long-Term Marine Turtle Management Plan (LTMTMP) for the Gorgon Gas Project (the Project) for 2018. This report includes results from the 2017-2018 summer turtle nesting season at Barrow Island and at the mainland Mundabullangana reference site. The report also includes a summary of MTEP advice given in relation to the Coastal Stability Monitoring and Management Program (CSMMP), relevant to turtle behaviour at Barrow Island.

Context

Chevron Australia is the proponent for the Gorgon Gas Development. In accordance with the primary State and Commonwealth approvals for the Project, Chevron Australia has established a Marine Turtle Expert Panel (MTEP) to advise the WA Minister for Environment and Chevron Australia on matters relating to marine turtle monitoring and management for the Gorgon Gas Development. Condition 16 of Ministerial Statement No. 800 (MS 800) requires:

- i. *‘Development and implementation of the Long-term Marine Turtle Management Plan as required by Condition 16.1*
- ii. *Proposal-specific marine turtle studies as required by Condition 16.4*
- iii. *Monitoring program design and methodology as required by Condition 16.4*
- iv. *Additional management measures as required by 16.4 and;*
- v. *Any other marine turtle management matters requested by the Proponent or the Minister.’*

Membership of the MTEP is publicly available at: <https://australia.chevron.com/-/media/australia/our-businesses/documents/gorgon-marine-turtle-expert-panel-members.pdf>

The LTMTMP provides for a monitoring program to measure and detect changes to the Flatback Turtle population on Barrow Island. Further information is available at: <https://australia.chevron.com/-/media/australia/our-businesses/documents/gorgon-emp-long-term-marine-turtle-management-plan.PDF>

The Coastal Stability Management and Monitoring Program (CSMMP) provides for a monitoring program to detect adverse changes to the beach structure and sediments that could have implications for marine turtles nesting on the beaches adjacent to Project marine facilities. Further information is available at: <https://australia.chevron.com/-/media/australia/our-businesses/documents/coastal-stability-management-and-monitoring-plan.pdf>

LTMTMP – Monitoring Results for 2017/ 2018

MTEP advice was sought on the results of the monitoring of turtle populations at Barrow Island and Mundabullangana for 2017/18 and the long-term trends in key population parameters. This year was also the eighth year of post-baseline turtle monitoring, including both construction and operational phases of the Project. The key results were:

- The populations of Flatback Turtles using the nesting beaches of Barrow Island and at Mundabullangana reflect a stable, demographically healthy populations within the baseline population estimates.

- Modelled estimates of annual nester abundance (1844 female turtles at Barrow Island and 2017 at Mundabullangana) were higher than baseline estimates. However, were lower than 2016/17 modelled estimates. This reflects normal inter-annual variation.
- A combined total of 11061 individual female adult flatbacks have been tagged at Barrow Island and Mundabullangana rookeries since the program commenced in 2005/06.
- It was noted that in the 2017/18 season, the density and success of marked nests adjacent to the Materials Offloading Facility (MOF) (in the accreted habitat) on Bivalve and Terminal beach showed higher density of use and higher proportions of disturbance and clutch loss in those areas compared to other areas of these beaches and baseline.
- Overall, most parameters remained within baseline estimates during the 2017/18 nesting season except for:
 - Barrow Island nester abundance (+1 MAD¹) – this trend indicated higher than baseline abundance and has been attributed to natural inter-annual variability.
 - hatchling disorientation at Bivalve Beach (+1 SD¹) – exceeded the +1 SD control limit for the fourth consecutive season and was attributed to artificial light levels visible from Bivalve Beach; despite this detected deviation there was no evidence that hatchling sea-finding ability was impaired.
 - hatchling misorientation at Bivalve Beach (+2 SD¹) – this occurred for the first time post-baseline and was attributed to a combination of low sample size and the location of the sampled nests with increased exposure to artificial light.
 - track count index at Bivalve Beach (-1 MAD¹) – attributed to lower nester abundance on this beach and changes in nesting beach selection attributed to changes in beach sand distribution and exposure of a rock platform arising from physical presence of the marine facilities.
 - track count index at Terminal Beach (+2 MAD¹) – attributed to high annual nester abundance at Barrow Island and continued high nester fidelity. High abundance coincided with an increased occurrence of localised disturbance to marked clutches in habitat with the highest relative turtle sighting density adjacent to the MOF.
 - annual Barrow Island breeding omission probability (+2 SD¹) – this was the fourth consecutive season where there has been a variation beyond control limits and was attributed to the variability in the productivity of remote foraging areas used prior to breeding and related energy demands of long distance migration and reproduction and the ratio of new versus experienced nesters.

The MTEP accepted the Chevron Australia responses to these exceedances but will continue to scrutinise and provide advice on changes to nesting behaviour and success at Terminal and Bivalve Beaches due to the permanent presence of the causeway and MOF. The MTEP will also continue to keep a watching brief on hatchling orientation indices at Bivalve Beach. The MTEP considered that the monitoring program as implemented is appropriate to detect changes or impacts, at a statistical power of 0.8 or

¹ Each trigger is represented as a trend towards, or change beyond a ± 1 (alert), ± 2 (review), or ± 3 (action) statistical deviation (Standard Deviations [SD] or Median Absolute Deviations from median [MAD]) of a demographic parameter from baseline conditions

greater, to parameters related to the viability of the Flatback Turtle population at Barrow Island.

LTMTMP – Studies

During 2018, the MTEP was provided with progress reports and its advice sought on a number of Flatback Turtle studies undertaken by Chevron Australia:

- Hatchling Dispersal. The MTEP was advised of progress in developing flatback turtle hatchling dispersal modelling and further field validation studies to better understand the effects of the physical presence of offshore infrastructure (Causeway/MOF/Jetty) and offshore artificial light on dispersal and survivorship of hatchlings. The MTEP strongly supported the current modelling and data collection of hatchling dispersal and the subsequent development of a robust hatchling dispersal and predation study, expected in 2019 as part of a staged process.
- Review of the statistical method (control charts), population model and baseline dataset applied in the LTMTMP. In 2018, the MTEP was provided with a substantial peer-reviewed report on the current approach to statistical modeling and the use of control charts as indicators of change in key parameters. The MTEP formally advised Chevron Australia of its support for the review and the outcomes including confirmation that the control chart approach was an appropriate and useful tool for informing marine turtle population monitoring and management. The MTEP also supported further development of the population model analyses and outputs in 2019.
- Population Viability Analysis. The MTEP received a preliminary Population Viability Analysis (PVA) report which assessed the potential range of impacts of the permanent presence of the offshore facilities on beach-specific hatchling dispersal and the long-term viability of the Barrow Island Flatback Turtle population. The MTEP noted that this was a preliminary analysis and that further work was needed to refine the model, but agreed that further work be undertaken only if required after the completion of robust hatchling dispersal and predation studies.
- Flatback Turtle Productivity Performance Standard. The MTEP recommended in 2017 that Chevron Australia undertake work to define a measure for Barrow Island Flatback Turtle productivity in light of a new Performance Standard (P4) included in the revised Coastal Stability Monitoring and Management Plan “No significant changes to Barrow Island Flatback Turtle population productivity indicators, attributable to coastal changes on Impact Beaches”. The MTEP supported the development of a robust productivity index when more reliable data on nesting success and hatchling survivorship becomes available.

Coastal Stability Management and Monitoring Program (CSMMP)

During the year the MTEP was advised of further progress in understanding the changes to the volume and distribution of sand at Terminal, Bivalve and Inga Beaches due to storm events and effects of the physical presence of the MOF/Causeway, as reported in previous years. The sand redistribution has meant a reduction in access to available nesting habitat at the southern end of Bivalve Beach, the northern end of Terminal Beach and the southern end of Inga Beach, which exhibit some of the highest proportional use at Barrow Island for nesting Flatback Turtles.

The MTEP provided advice on proposed monitoring and management of changes to beach sand volume and distribution at Terminal, Bivalve and Inga Beaches and monitoring the possible consequential effects on nesting turtles. This included advice on:

- biological/ecological requirements that should be considered when identifying potential options to mitigate the effects of erosion and accretion at Terminal and Bivalve beaches, should this be required (e.g. beach replenishment, modification of beach rock)
- studies into nesting turtle biological responses to exposed beach rock at Terminal Beach
- methods for measuring changes to nesting success at affected beaches
- appropriate management triggers and performance standards for detection of changes in nesting habitat.

MTEP advice was also sought on proposed revisions to the CSMMP arising from the above changes to beaches. This included specific links between marine turtle nesting habitat management triggers (alert, review, action) under the CSMMP and turtle behaviour triggers under the LTMTMP. The MTEP provided formal advice in support of the proposed changes and advised that it had been adequately consulted on changes to the CSMMP before submission to government for approval.

Light Emissions and Management

The MTEP received advice of lighting audits by Chevron Australia and continues to keep a watching brief on the possible effects on turtle nesting, hatchling emergence and hatchling dispersal from operational lighting.

Links with the North West Shelf Flatback Turtle Conservation Program (NWSFTCP)

The MTEP supported a proposal for collaboration on studies and monitoring between the LTMTMP and the NWSFTCP. Flatback Turtles at Barrow Island and Mundabullangana are part of the North West Shelf Flatback Turtle stock and the MTEP agreed there could be some efficiencies in sharing outcomes or combining efforts.

Conclusion

Overall, the MTEP advised that for 2018, it considers that Chevron Australia is meeting the requirements of MS 800 Condition 16 in the implementation of the LTMTMP and continues to apply high scientific, technical and operational standards to the program.

Authorised by:

Simon Woodley
Independent Chair
Gorgon Marine Turtle Expert Panel

25 November 2019

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LTMTMP – Monitoring Results for 2016/ 2017

MTEP advice was sought on the results of the monitoring of turtle populations at Barrow Island and Mundabullangana for 2016/17 and the long-term trends in key population parameters. This year was also the seventh year of post-baseline turtle monitoring during construction of the Project. The key results were:

- The populations of Flatback Turtles that utilise the nesting beaches of Barrow Island and at Mundabullangana reflect a stable demographically healthy population within the baseline population estimates.

- Modelled estimates of annual nester abundance were higher than all previous seasons (2130 female turtles at Barrow Island and 2479 at Mundabullangana).
- A combined total of 10469 individual female adult flatbacks have been tagged at Barrow Island and Mundabullangana rookeries since the program commenced in 2005/06.
- Overall, most parameters remained within baseline estimates during the 2016/17 nesting season except for:
 - Barrow Island nester abundance (+3 MAD¹) – attributed to an increase in nester abundance as a function of environmental variables e.g. variations in food sources at foraging grounds.
 - hatchling disorientation at Bivalve Beach (+2 SD¹) – attributed to artificial light levels visible from Bivalve beach; despite this detected deviation there was no evidence that hatchling sea-finding ability was impaired.
 - track count index at Bivalve Beach (-2 MAD¹) – attributed to lower nester abundance on this beach and changes in nesting beach selection; long-term nesters that used Bivalve beach for nesting continued to show a strong fidelity
 - track count index at Terminal Beach (+1 MAD¹) – attributed to higher annual nester abundance at Barrow Island
 - annual Barrow Island breeding omission probability (+3 SD¹) – attributed to possible greater proportion of experienced nesters and variability in productivity of feeding grounds used prior to breeding.
 - Barrow Island egg hatching probability (+1 MAD¹) and hatchling emergence probability (+1 MAD¹) – reflected an increase in incubation success parameters rather than an adverse deviation, indicating a suitable incubation environment.

The MTEP was satisfied with the Chevron Australia responses to these exceedances. Based on the results and control charts presented, the MTEP supported the conclusions of the program and that results to date indicate that the population of Flatback Turtles at Barrow Island reflect a stable, healthy population within baseline estimates. The MTEP considered that the monitoring program as implemented is appropriate to detect changes or impacts, at a statistical power of 0.8 or greater, to parameters related to the viability of the Flatback Turtle Population at Barrow Island.

LTMTMP – Risk Ranking Changes

During the year advice was sought from the MTEP on changes to the risk ranking for Flatback Turtles at Barrow Island based on the measured reduction in access to marine turtle nesting habitat to date, and likely future reductions. These changes in access to nesting habitat have arisen from the changes in sand distribution and beach profile at Terminal, Bivalve and Inga beaches due to the permanent presence of the causeway and Marine Offloading Facility (MOF). This revised risk ranking (from '6' to '5') requires additional long-term risk mitigation. MTEP was advised of, and supported, proposed changes to the LTMTMP to reflect this change.

LTMTMP - Studies

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During 2016, the MTEP recommended the following Flatback Turtle studies be undertaken by Chevron Australia. Progress reports were received by the MTEP during 2017 on these studies:

- Hatchling dispersal. The MTEP recommended that a study be designed and undertaken to better understand the effects of tanker lighting at the LNG Jetty on survivorship of hatchlings i.e. whether there is increased predation on hatchlings attracted to the light spill at the LNG Jetty.
- Review of the statistical modelling approach (control charts) used in the LTMTMP. The MTEP recommended that a document be prepared to describe the capture-mark-recapture model, including assumptions adopted, methods for incorporation of monitoring data into control charts, model software errors that have been corrected and discrepancies in some reported population estimates. The MTEP recommended that this document be independently peer reviewed. The MTEP also provided advice on the scope of works developed by Chevron Australia.
- Analysis of individual nesting site selection to understand any negative effects on nesting habitat availability. The MTEP received a report during the year that indicated that nesting females at Terminal, Yacht Club North and Yacht Club South beaches are more likely to “stay” at those beaches, than nesting females at other east coast beaches, which are more likely to “move”, if conditions for nesting are not right. This highlights the importance of Terminal beach, in particular, for Flatback Turtle nesting.

Coastal Stability Management and Monitoring Program (CSMMP)

During the year the MTEP was advised of progress in understanding the changes to the volume and distribution of sand at Terminal, Bivalve and Inga Beaches due to storm events and effects of the MOF, as reported in 2015. The sand redistribution has meant a reduction in access to nesting habitat at the southern end of Bivalve Beach, the northern end of Terminal Beach and the southern end of Inga Beach, which exhibit some of the highest proportional use at Barrow Island for Flatback Turtles.

The MTEP provided advice on proposed monitoring and management of changes to beach sand volume and distribution at Terminal, Bivalve and Inga Beaches and monitoring the possible consequential effects on nesting turtles. This included advice on:

- biological/ecological requirements that should be considered when identifying potential mitigation options for redistribution of sand at Terminal and Bivalve beaches, should this be required (e.g. beach replenishment, modification of beach rock)
- possible turtle biological responses to proposed mitigation options
- methods for classifying beaches into different categories for turtle nesting (optimal, sub-optimal and unsuitable)
- methods for measuring changes to nesting success at affected beaches
- appropriate management triggers and performance standards for detection of changes in nesting habitat
- the development of an index of productivity i.e. how many eggs and hatchlings are produced at each nesting beach.

MTEP advice was also sought on proposed revisions to the CSMMP arising from the above changes to beaches. This included specific links between marine turtle nesting habitat management triggers (alert, review, action) under the CSMMP and turtle behaviour triggers under the LTMTMP. The MTEP advised that it had been adequately consulted on the proposed amendments to the CSMMP.

Light Emissions and Management

The MTEP was advised on the results of measurement of light emissions from the Gas Treatment Plant site and other areas which are linked to measurements of turtle hatchlings behaviour as they emerge from nests. Results to date indicate the current level of light from Gorgon Gas Treatment Plant is not having a measurable effect on the behaviour of Flatback Turtle hatchlings in general. However, disorientation of turtle hatchlings detected at Bivalve beach in 2016-17 will continue to be closely monitored. There is no apparent effect on sea-finding ability of those hatchlings.

The MTEP will continue to keep a watching brief on the possible effects on turtle nesting, hatchling emergence and hatchling dispersal from operational lighting for LNG and Condensate tanker loading.

Conclusion

Overall, the MTEP advised that for 2017, it considers that Chevron Australia is meeting the requirements of MS 800 Condition 16 in the implementation of LTMTMP and continues to apply high scientific, technical and operational standards to the program.

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