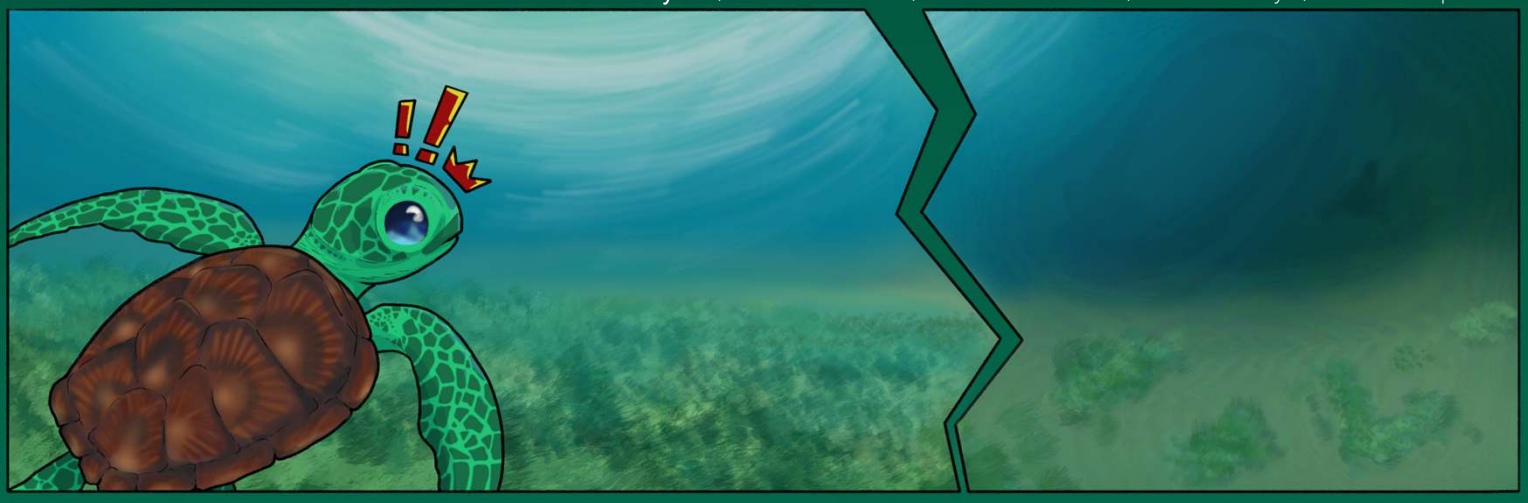
Impact of habitat type and fragmentation on green turtle space use

Michael D Taylor[1,2], Takahiro Shimada[3], Matthew W Fraser[2,4], Graeme C Hays[5], Ana MM Sequeira[2,6]



Background

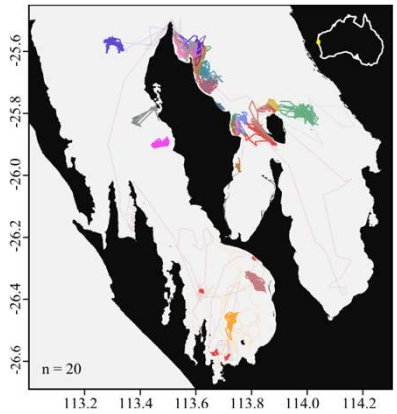
➢ Marine habitats are being lost and fragmented as anthropogenic pressure increases. This has cascading effects on communities, species, and individuals.

➢ We aimed to investigate how movements of marine species respond to variable habitat availability and fragmentation (change in configuration).

➢ Satellite tracks of 20 green turtles in Shark Bay, Western Australia, were used to define foraging ranges.

➢ Range extent was investigated in association with the amount of high- vs low-quality and fragmentation of high-quality habitat within them.

1 Green turtle tracking



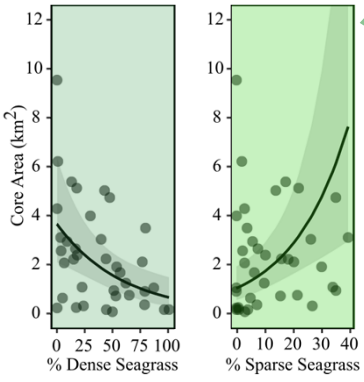
2 Calculate foraging ranges

3 Extract cover and fragmentation

4 Modelling

Fastloc-GPS | BCPA | CTMM | landscapemetrics | GLMM

Results - **Space use** increases in **low-quality** and **fragmented habitats**

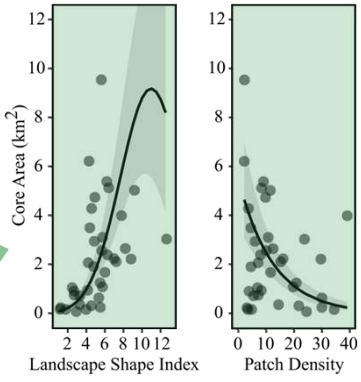


▲ High-quality = ▼ Core Area

▲ Low-quality = ▲ Core Area

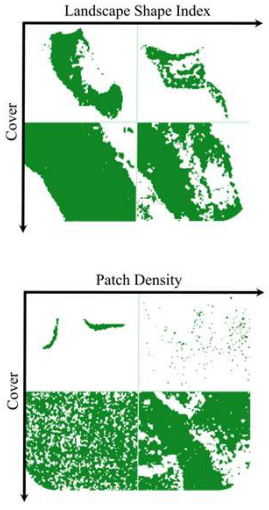
Greater availability of high-quality dense seagrass and decreasing presence of low-quality sparse seagrass associated with reduced core areas (r^2 = 0.31). Influence on overall extent of foraging ranges was limited.

Dense seagrass fragmentation explained greater variability in core space use (r^2 = 0.77) and led to larger core areas. Fragmentation thresholds may influence relationship with patch density.



▲ Shape Complexity = ▲ Core Area

▲ Patch Density = ▼ Core Area



Implications

✓ Green turtles likely to expand movements when habitat quality reduces, and fragmentation occurs enabling continued access to resources and the ability to persist if their local environment is degraded.

✖ Expanded movement will have negative impacts on fitness of individuals as they expend additional energy and are exposed to threats.

✖ Competition for limited resources is liable to pressure degraded systems, potentially leading to further environmental collapse.

? Impacts of fragmentation on movement of marine taxa are likely to be species- and environment-specific. Investigation of fragmentation thresholds and any scaling of negative impacts of expanded movements to populations will determine conservation implications and management response.

Contact: michael.taylor@research.uwa.edu.au

THE UNIVERSITY OF WESTERN AUSTRALIA | OCEANS INSTITUTE

SEQUEIRA LAB

[1] School of Biological Sciences, The University of Western Australia, WA, Australia
[2] UWA Oceans Institute, The University of Western Australia, WA, Australia
[3] Department of Environment ,Science, and Innovation,, QLD, Australia
[4] Flourishing Oceans Initiative, Minderoo Foundation, WA, Australia
[5] School of Life and Environmental Sciences, Deakin University, VIC, Australia
[6] Division of Ecology and Evolution, Research School of Biology, The Australian National University, ACT, Australia