



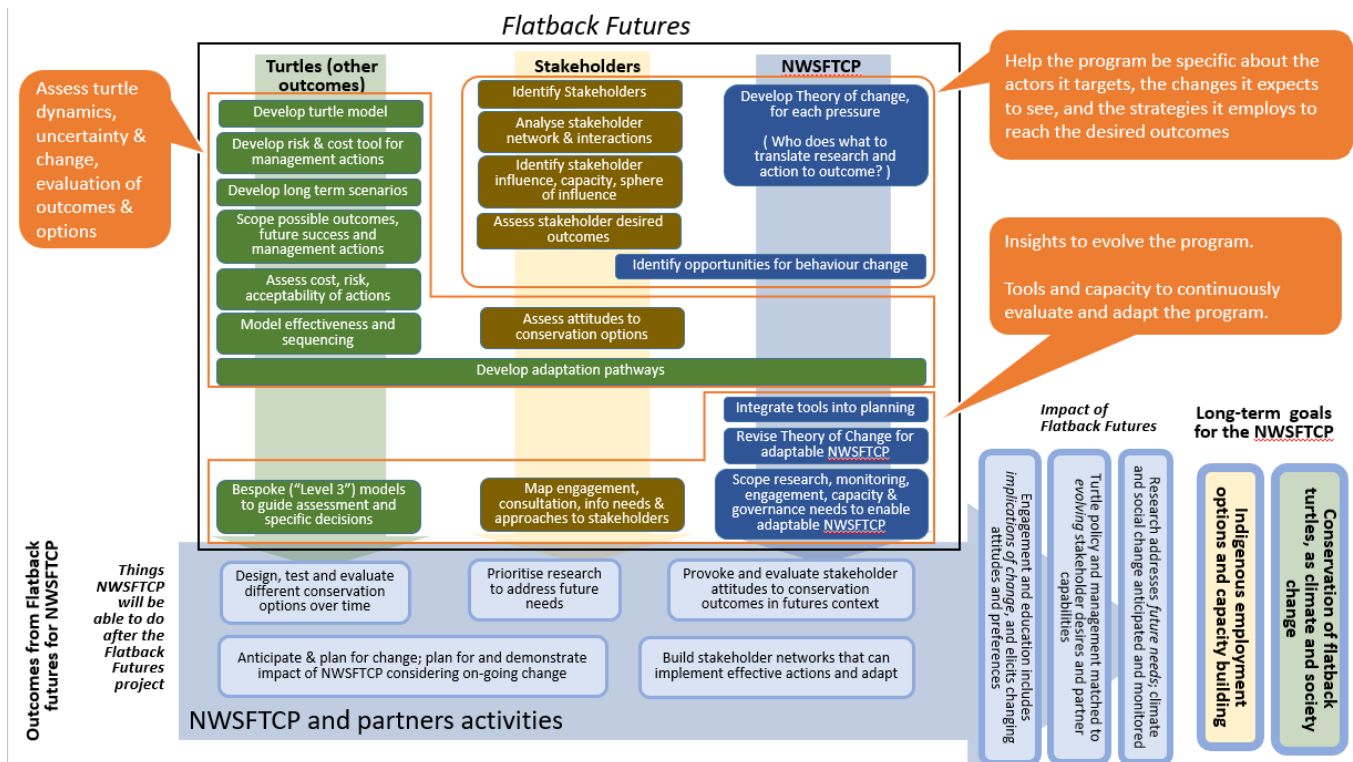
Flatback Futures – Summary of Research

Update 7 – May 2024

This update summarises the Flatback Futures Theory of Change, the final set of project publications and the implication of the work completed in this project.

Theory of Change for Flatback Futures

The project theory of change (below) describes a range of actions and outcomes (orange boxes). The project team sought to assess how Flatback turtle population dynamics, including uncertainty, could be included in population models to evaluate the outcome of different options (orange box, left). This was delivered through a range of activities, including development of models and tools to support decision making (green boxes). Development of specific theories of changes for different pressures has helped NWSFTCP to identify groups of actors, set expectations, and refine strategies to achieve desired outcomes (orange, upper right). The project team also identified stakeholder groups that were influential for the NWSFTCP (brown boxes). The approaches and models developed will support the NWSFTCP continuously evaluate and adapt this long-term program (orange box, lower right). Overall, outputs from this project will support the NWSFTCP to design and test intervention options, prioritise actions, and build stakeholder connections (lower blue box). The impact and long term goals of the NWSFTCP that are advanced by this project are shown in the lower right of the figure.



We delivered this research through workshops, engagement with stakeholders, development of models and decision-support tools, and publications. A number of these publications are described in the remainder of this Update.

Research summary

A major focus of our project was the development and evaluation of intervention options for flatback turtles to increase likelihood of population persistence into the future. We generated a range of intervention options that could be used to reduce impacts from six primary threats. These were ranked using an intervention prioritization tool based on their economic cost, implementation feasibility, social acceptability, and perceived effectiveness in maintaining or increasing future turtle populations (Excel Prioritization tool and **Hobday et al. 2024**). Similar methods have been used for other species and can guide research and conservation investment decisions by managers.

We developed an age-based, spatially implicit population model for the north-west shelf flatback turtle to estimate the long-term outcomes for range of these conservation interventions (Excel Simulation tool and **Richards et al. 2024**). Analysis of the model shows that young adults contribute most to population growth, however, this is the most difficult life-stage to manipulate in the field. As observable outcomes of interventions on eggs or hatchlings cannot be seen for many years, this type of model can be used to rapidly estimate the impacts of climate change and conservation interventions on turtle dynamics and help guide monitoring efforts to assess their value for real populations. One surprising result from the model was that if environmental warming increases the probability offspring are female and adult female bias reduces mating success, then turtle populations may show stability or increases before crashing, often with a long delay.

Not all the interventions that are possible might be acceptable to managers or public-at-large and so we assessed the social acceptability of the intervention options we developed (**Tuohy et al. 2024**). Engaging with the public can be time consuming, so previous studies have used expert opinion as predictors of social acceptability, however, the assumption that the social acceptability of interventions is the same for the public and experts is largely untested. We used surveys of experts and community members in two towns adjacent to rookeries to assess the social acceptability of 24 interventions. Surprisingly, residents generally ranked interventions that directly intervene with human behaviour or the environment as more acceptable than those that directly targeted turtles, while experts tended to favour direct turtle interventions. Experts and community members differed in their acceptability of different options, which highlights the importance of understanding social acceptability of interventions before implementation, particularly when interventions might be controversial or restrict human behaviour directly.

Where interventions are potentially controversial, efforts in engagement and communication strategies to build social acceptability may be warranted before commencing interventions. Working in the same communities, we examined attitudes to turtle conservation and found broad agreement between respondents from both locations on the most and least acceptable interventions (**van Putten et al. 2023**). Interventions that limit human behaviour, as opposed to interfering with the species themselves, are likely to be most socially acceptable. Understanding attitudes to conservation intervention is important to avoid conflicts and build community support for conservation efforts.

Finally, long-term climate change and other stressors, such as industrial development, are changing the environment in which flatbacks live and are projected to continue for many decades. We sought to provide approaches for conservation managers and policy makers to explore the range of future conditions that will lead to conservation success. We developed illustrative scenarios spanning a range of plausible futures in which the intensity of climate change and development vary (**Hobday et al in review**). These illustrative set of adaptation pathways allow consideration of alternative conservation management and policy options and the lead times for these options. These approaches can be used to future-proof thinking for conservation managers and should be used widely for improved outcomes in natural systems.

Project publications covered in this update

- Hobday et al (2024). Flatback futures - Evaluating conservation interventions to reduce threats to an endemic Australian turtle. *Endangered Species Research* 54: 29-40 <https://doi.org/10.3354/esr01321>.
- Hobday et al (in review). Flatback Futures: Scenarios and adaptation pathways for a marine turtle facing long-term change. *Endangered Species Research*.
- Richards et al (2024). Identifying impactful sea turtle conservation strategies: a mismatch between most influential and most readily manageable life-stages. *Endangered Species Research* 34: 15-27 <https://doi.org/10.3354/esr01326>.
- Tuohy et al (2024). Social acceptability of climate-management interventions for flatback turtles: comparing expert and public perceptions. *Endangered Species Research* 53: 1-12. <https://doi.org/10.3354/esr01283>.
- van Putten et al (2023). Prioritising management interventions for flatback turtles: Understanding social acceptability and preferences from different communities. *Endangered Species Research* 52: 189-201. <https://doi.org/10.3354/esr01273>.

Flatback Futures Project (2018–2023)

The Northwest Shelf Flatback Turtle Conservation Program (NWSFTCP) is coordinated by Western Australia's Department of Biodiversity, Conservation and Attractions (DBCA). Key to the success of the program is its ability to ensure effective linkages between research and conservation outcomes by integrating and planning research and activities for turtles and the community-at-large. Flatback Futures project information available at: <https://research.csiro.au/teps/current-activities/mapping-and-monitoring-outcomes-and-developing-adaptation-pathways-for-the-northwest-shelf-flatback-turtle-conservation-program-western-australia/>

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