

SURVIVAL OF THE SLENDER ROPEDANCER MAHOGANY GLIDER *PETAURUS GRACILIS*

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The impact and aftermath of natural catastrophe often presents unique challenges in the realm of endangered species recovery. Operating at differing scales of damage, natural catastrophe can exacerbate existing threatening processes on an endangered species, may introduce new or novel unforeseeable impacts, and/ or result in a concentration of wider inexorable pressure at a whole of habitat scale that may test the resilience of a species to absorb and buffer. Cyclonic damage and wildfire impact are perhaps the two best known forms of natural catastrophe within the Australian environment, with the impact and aftermath of Tropical Cyclone Category Five Yasi providing one very pertinent example which has introduced new challenges to the recovery of the endangered mahogany glider. Known scientifically as *Petaurus gracilis* meaning slender rope dancer, the survival of the mahogany glider is precariously perched not on the direct impact and scale of cyclonic disturbance itself, but on the resonance needed within the community to recognise and protect the very damaged wildlife corridors that provide connectivity between meta populations of one of Australia's most endangered arboreal marsupial species.

Natural catastrophic events often bring to attention the plight of an endangered species to an immediate focus within a much broader community, beyond the ongoing efforts of conservation groups striving for recovery of that species. Galvanising and mobilising action in such circumstances is part of a wider community orientated disaster response, where donations, direct volunteer effort and rebuilding programs within our built environment may be equitably matched by a strong sense of community conservation to supplement or intervene to save a species facing severe impact from a natural catastrophe. Conservation partnerships often may be renewed and rekindled towards a common goal in the aftermath of these events, with new sources of volunteer contribution offered from outside the normal recovery shell wrapped around an endangered species program. Leadership and recognition of ways to align conservation efforts and ameliorate impacts can quickly come to the fore, such as through the moratorium to halt traditional hunting on dugong and marine turtles by the Giringun Aboriginal Corporation as a result of Tropical Cyclone Yasi. A strong aspiration to conserve a traditional harvest resource of cultural importance, in recognition of the decline in numbers and rise in starvation of dugongs and marine turtles as a consequence of associated floodwater plumes settling suspended soils on seagrass meadows, which smothers and inhibits their growth, provides an excellent example of a responsible approach and to elevate community awareness in the aftermath of a natural catastrophe.

However, catastrophe orientated recovery actions need to be built from a sound understanding that intervention is itself first necessary, for exactly what purpose, that this objective is communicated widely, and resourcing is understood by partners where best directed. This is seen clearly within the Tropical Yasi cassowary response program, where the objective to install at its maximum peak over one hundred and thirty fruit stations was not solely undertaken as a supplementary food measure, rather to draw cassowaries away from negative interactions with proximity to households and associated human feeding, road strike encounters and dog attack, experience learnt from previous cyclone response.

The decision to intervene in the wake of a natural catastrophe can be fraught with the challenge of introducing a dependency as a consequence, of creating undesirable complications or interactions, or even that effort expended will have a low level of uptake or actual need by the target endangered species. The experience learnt out of the Tropical Cyclone Yasi mahogany glider response program distinguishes both between very positive approaches and outcomes towards realigning recovery efforts of conservation groups for this species, but also where an assumed need for direct intervention was found ultimately to be of low uptake.

As Tropical Cyclone Yasi represented the first natural catastrophe experience for conservation groups striving towards the mahogany glider's recovery since its rediscovery, reviewing the response program is a highly useful exercise to examine the future direction of recovery, particularly to communicate with resonance the core actions and requirements of the mahogany glider to a broader audience. Anticipated and quite realistic concerns regarding an influx of distressed, weakened mahogany gliders was ultimately not realised in the aftermath of Tropical Cyclone Yasi, nor in the increased reliance or utilisation of installed artificial den boxes. What emerged from the lesson learnt through Tropical Cyclone Yasi is that, for the mahogany glider every tree matters.

Rediscovered in 1989, the mahogany glider is a true flagship species in an armada of conservation issues facing the southern Wet Tropics coastal lowlands between Cardwell to Ingham. With an estimated population size of less than one thousand and five hundred animals remaining and only fifty one percent of former habitat represented of tenuous connectivity and high degree of fragmentation between meta populations, the mahogany glider is considered one of Australia's most threatened arboreal marsupials. Reliant on a highly diverse open sclerophyll forest and woodland habitat found only between Ollera Creek south of Ingham north to the Hull River, Tully in north Queensland, the habitat of the mahogany glider is comprised of over sixty four regional ecosystems restricted below one hundred and twenty metres above sea level. Observed at pinch points such as fragmented wildlife corridors, direct threats to mahogany gliders primarily involve barbed wire entanglements and road strike which account for forty six and thirty percent respectively of injured mahogany glider encounters.

At a population level, a pervasive impact also operates through further habitat fragmentation and loss of habitat integrity due to infrequent fire intervals and the smothering nature of dense weed infestations which suppress key food resources such as *Albizia procera*. As a largely canopy restricted species in tall open forest and woodland habitat, the mahogany glider is an ideal candidate for demonstrating corridor connectivity. Perhaps best described as tree canopy connectivity, the mahogany glider requires a continual spacing of less than 30 metres between trees to enable passage within open forests and woodlands. The impact of Tropical Cyclone Yasi highlights the vulnerability of corridors to a species such as the mahogany glider, where for very tenuous habitat linkages the loss of a single tree can break connectivity. Susceptibility to barbed wire entanglement can ensue in highly fragmented habitat as a direct outcome, or more indirectly but equally significantly in the inability of dispersal opportunity for juvenile mahogany gliders to reach new territory.

Built on an existing alliance between the Wildlife Preservation Society Qld (Tully Branch), Qld Parks and Wildlife Service, Terrain NRM, and Giringun Aboriginal Rangers, the Tropical Cyclone Yasi mahogany glider response program swung quickly into operation in its aftermath. In a heart warming appreciation received by local conservationists who drive the mahogany glider recovery program, nearly fifteen thousand dollars of food supplement via the Royal Society for the Prevention of Cruelty to Animals and two hundred den boxes constructed by a variety of community organisations across Queensland, were donated and sourced very soon in the early

stages of the Yasi mahogany glider response program. Post cyclonic flooding hampered accessibility to sites where damage was considered to have been concentrated, particularly to the narrow, tenuous wildlife corridors of Meunga, Lily and Corduroy creeks north of Cardwell, however trials supplementary food stations monitored by motion sensor cameras and installation of den boxes were undertaken as soon as safely possible and accessible to these key locations. Funding support by the Foundation for Australia's Most Endangered enabled John Winter (ecologist) and three students through the World Learning School of International Training to work alongside Qld Parks and Wildlife officers to ascertain both the role of den boxes and supplementary feeding for the mahogany glider, and in the persistence and impact on populations of the mahogany glider at several representative sites.

The uptake of supplementary feed stations by the mahogany glider in the aftermath of Tropical Cyclone Yasi was found to be very low despite a reasonable spread of stations within continual habitat and narrow fragmented corridors, with a higher rate of utilisation by sympatric arboreal fauna such as the sugar glider, striped possum and white tailed rat. As there was no means to exclude access by other fauna to the supplementary feed station due to similarity of body size, the non target application of this technique was initially considered a scattergun approach that is supplementary feeding was viewed to be of benefit to a range of arboreal fauna in a highly disturbed, damaged environment. However concern emerged over potential cross disease transmission, by bringing different arboreal marsupials into the same food source where usually a separation by habitat niches keeps these species apart from closer proximity. The overall low uptake and visitation to feed stations however saw their application taper off, in conjunction with locating individual mahogany gliders of near or above ideal body weight conditions, no sign of impairment and a typical timing of the breeding season commence in early August.

The conclusion to the study into supplementary feeding was that, although it has a narrow role within highly fragmented sites where stations can be maintained by residents and may maintain significant animals at a local, corridor level, at a population level with the extremely large home range of ten hectares per pair, it is impossible to supplement feed at a meta population scale. The nature of forest recovery in the aftermath of Tropical Cyclone Yasi was determined to have a significant influence in this event to support mahogany gliders through natural food resources. Rapid epicormic budding within the key food trees of the mahogany glider such as swamp mahogany, blue gum and bloodwood species was observed very early in the aftermath of the cyclone, and staggered flowering events of swamp mahoganies was also an early resource in profusion. In turn, leaf eating insects such as katyids swarmed at regular intervals providing an alternative protein food source for the glider, whilst typical food resources such as flowering grass tree spikes were not affected by the cyclonic damage. The occurrence of Tropical Cyclone Yasi within the wet season and with considerable flooding rainfall after the event appeared to stimulate and support sap flows as part of the normal range of diet preference utilised by mahogany gliders and as a substitute to blossom and nectar as otherwise food resources that may have seasonally been available at that part of the year.

Similarly, the utilisation of installed den boxes was found to be of a very low uptake by the mahogany glider, indeed by most arboreal fauna, with indications of leaf nesting material indicating a short term occupation of den boxes in less than five percent of den boxes installed. Occupation by ants was witnessed as a common occurrence, whilst the final check on sixty five den boxes revealed occupation by one goanna indicated by a sloughed skin fragment. Observations on the survivorship of hollows, which for the mahogany glider are almost exclusively within live trees, revealed that approximately eleven percent loss of existing limbs that may have suitable den characteristics from

cyclonic winds were damaged or toppled to the ground, but that these same winds also created approximately thirty five percent of new hollow opportunities. What emerges from this study is the wider, long term role that artificial den boxes may play for a corridor reliant species such as the mahogany glider, in supporting the dispersal opportunity for juvenile animals to reach new territory.

For those involved with the Tropical Cyclone Yasi mahogany glider response program, the resounding message learnt is that, for the mahogany glider damage to habitat occurs more critically before and in the aftermath of the cyclone event, rather than during. Affording the resilience of habitat to buffer future catastrophic events is an important element of mahogany glider recovery, more critically however is ensuring the connectivity of habitat between times of extreme to reduce the susceptibility of disjunct fragmented habitat to slowly slide towards localised extinction. The challenge lies not in the willingness, expertise and proficiency of those supporting recovery actions, but in reaching a resonance within the broader community to recognise that for the mahogany glider, every tree matters.

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