Department of **Biodiversity, Conservation and Attractions**

GOVERNMENT OF WESTERN AUSTRALIA

Biodiversity and Conservation Science

Western Ringtail Possum (*Pseudocheirus occidentalis*) Research Opportunities

The critically endangered western ringtail possum (WRP) is endemic to south-western Australia. Before European colonisation, the distribution stretched continuously from north of Perth to east of Albany, and inland to Pingelly and Borden. Its range is now fragmented and estimated to have contracted by around 90%. Threatening processes operating on WRP are complex, interactive, and often population specific, and include habitat reduction and fragmentation, predation, fire, climate change, competition for tree hollows, and tree disease that may impact habitat quality.

The following research questions focus on significant gaps in knowledge and will deliver conservation outcomes identified in the Western Ringtail Possum (*Pseudocheirus occidentalis*) Recovery Plan.

	Research themes	Key research questions	Research scope
1	**Threatening processes**	What are the key threats to WRP and their relative importance at the species, management unit, population, and cohort levels? What are the primary drivers of population decline and recovery and limiters of recovery across the range of WRP?	The relative importance and extent of threatening processes is not well understood for the species or for individual populations (see White *et al.* 2021[1] eight genetic clusters). An assessment of the relative impacts of threats and biotic factors constraining recovery, including habitat loss and fragmentation, predation, climate change, timber harvesting, fire, competition for tree hollows, habitat tree decline, unregulated relocation, pathogens, and disease.
2		How is climate change likely to impact WRP? What climate adaptation and mitigation strategies are most appropriate for managing the conservation and recovery of WRP and their critical habitat, including managing extreme events (drought, wildfire, pathogen/disease outbreak)?	Although climate change predictions have been broadly undertaken for WRP and its habitat, recent improvements in climate change models and software packages warrant re-analysis. Like many species, the likely impact of climate change on WRP is poorly understood. Interactions are expected to be important considerations, such as fire and tree disease. Characterising the vital statistics from WRP populations for population viability analysis (PVA) modelling is also helpful for predicting responses to climate change. An assessment of the extent to which environmental stress (e.g. heat and drought) is a threatening process for wild WRP populations is relevant. Climate change mitigation strategies may include improving habitat quality (e.g. food and shelter), reducing the impact of other key threats and

[1] White, D., Comer, S., Wayne, A. (2021). *Understanding Genomic Variation in the Western Ringtail Possum and its Application to Effective Conservation Management - Final Report*. (NESP Threatened Species Recovery Hub Project 4.1.8 Report, Brisbane).

			drivers of change (e.g. predation, fire), and managing population genetics, etc.
3		What are the primary factors driving population changes in the Upper Warren region?	Investigation of: a) historic data to determine the primary causes of WRP decline in the Upper Warren in 1999-2009; b) what factors best explain the current surprising distribution and abundance of WRP across the region; and c) what factors are limiting recovery.
4		How do you define ecological linkages? What exists and how do we maintain, enhance and create effective habitat connectivity?	Related to, but broader scope than, the linkage projects in 'Urban environmental and population management' research theme below.
5	**Habitat requirements**	What parameters define and quantify WRP habitat?	The ability to effectively manage any species or population relies on the capacity of conservation managers to recognise and quantify, not only habitat, but the relevance of the parameters that define and quantify that habitat. Habitat attributes may include vegetation structure and floristics, environmental factors (soils, hydrology, climate/weather, topography), resource type and availability (food, shelter, water, space), also spatial attributes (habitat size, connectivity, configuration). Competition and predation are also likely to be key considerations in identifying habitat characteristics that are important to WRP in the urban/peri urban environment, Swan Coastal Plain, Southern Forests, and South Coast and Capes regions.
6	**Management effectiveness**	How do WRP respond to different fire regimes in different habitat types? How can fire management strategies reduce impacts on WRP?	The effects of fire on WRP, both directly (on individuals and populations) and indirectly (e.g. effects on habitat) is not adequately understood. As a consequence, the effects of fire management and mitigating strategies are also not well understood. Historic fire regimes and ongoing fire management actions provide an opportunity to investigate the potential role fire can play in the conservation and recovery of WRP in specific habitat types, such as identifying important and optimal attributes of fire regimes (e.g.

			frequency, season, severity, extent, and patchiness) and the effectiveness of mitigations (e.g. retaining unburnt areas within a burn and introduced predator control).
7		How effective are introduced predator baiting regimes and control activities (fencing, trapping etc.) on improving WRP abundance?	How WRP populations and/or management units respond to the introduced predator baiting and control regimes implemented, such as aerial and ground baiting programs, trapping and fenced exclosures will inform ongoing management for the species in conjunction with other resident species, particularly other threatened species.
8	**Sampling methodology**	What are the most effective and efficient survey methods for assessing presence/absence, measuring density/abundance and monitoring WRP populations?	Detecting the presence and abundance of WRP and having adequate protocols to measure and monitor population size, extent and area of occupancy in a variety of habitat types is fundamental to the conservation and management of this species. Robust survey methods will ensure data are comparable over time and can provide reliable estimates of occupancy, population density and/or abundance (as distinct from uncalibrated indices and indirect measures of abundance). It is important to note that the variation in WRP habitats may require different survey and monitoring techniques.
9	**Urban environmental and population management**	How effective has land use planning been in delivering conservation outcomes for WRP at the Commonwealth, State and local level (policies and regulation)?	Action 2.10 from the Recovery Plan: Assess the outcomes and relative conservation values of different mitigation strategies to determine the highest value for money and conservation benefit, including habitat creation, rehabilitation, relocations, artificial habitat connectors etc.
10		What role does the urban environment play in the conservation of the WRP? What habitat characteristics are important to WRP in the urban environment?	Section '12.2 Recovery Actions' in WRP Recovery Plan: Improve scientific understanding of the benefits of an urban environment, strategies to enhance urban environments, and its role in the future conservation. Improve knowledge of the novel benefits and costs of habitat in urban environments and their role in the conservation of WRP.