

**A RAPID HABITAT ASSESSMENT FOR THREATENED
FROG SPECIES AND MITCHELL'S RAINFOREST SNAIL IN
THE AREA OF THE PROPOSED UNICORN FALLS TRACK,
MT JERUSALEM NATIONAL PARK, NORTH EAST NSW**



Coachwood-Crabapple subtropical rainforest at location of Chowan Creek day-use area for proposed Unicorn Falls walking track, Mt Jerusalem National Park



Giant Barred Frog



Pouched Frog



Mitchell's Rainforest Snail



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Annette McKinley prepared the track route map and photographs were taken by David Milledge apart from the cover photograph of the Pouched Frog, which was taken by Murray Lord.

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1. INTRODUCTION

In June 2019 the NSW Office of Environment and Heritage requested a rapid habitat assessment for three threatened frog species and the Endangered Mitchell's Rainforest Snail *Thersites mitchellae* (as listed under the NSW *Biodiversity Conservation Act 2016*) in the area of the proposed Unicorn Falls walking track route in Mt Jerusalem National Park, north east NSW. The threatened frog species considered as potential occurrences in the area were the Vulnerable Pouched Frog *Assa darlingtoni*, Endangered Giant Barred Frog *Mixophyes iteratus* and Endangered Loveridge's Frog *Phyllorhina loveridgei*.

No records of the three threatened frog and the snail species were known from the area of the proposed track route, although a small number of records of all four species existed within 10 km of the route (NSW OEH BioNet database, accessed June 2019; CSIRO 1996). As no targeted threatened frog or snail surveys had been undertaken in appropriate seasons and under suitable weather conditions along the route, the four species were considered as potential occurrences within or adjacent to the footprint based on the presence of known habitat and records in adjacent areas.



Photo 1 Coachwood-Crabapple rainforest with a moderately-developed litter layer on the edge of a clearing at the location of the proposed Chowan Creek day-use area (WP048, **Fig. 1**), providing potential foraging habitat for the Giant Barred Frog, potential foraging and breeding habitat for the Pouched Frog and potential habitat for Mitchell's Rainforest Snail

The route of the proposed track was from a camping area on a spur off Mann's Road (210 m asl) descending to a day-use area off South Chowan Road (125 m asl, **Photo 1**) and adjacent to Unicorn Falls, over a distance of approximately 1.2 km (Mountain Trails 2019).

Track construction was intended to be relatively low-key using natural materials, although considerable excavation of soil was required for cross-slope benching in steep sections (Mountain Trails 2019). Creek crossings were proposed to be constructed with locally-sourced stepping stones and local stone was proposed to be used for track steps and paving (Mountain Trails 2019). Timber was also proposed to be used for some track steps. Selected tree removal was expected in the day-use and camping areas and in places on the track route where these pose a risk to walkers (Mountain Trails 2019).

2. METHODS

A rapid habitat assessment was undertaken on foot during daylight hours along the route of the proposed walking track (marked with flagging tape) on 18 June 2019 (**Fig. 1**). The inspection began at the proposed day-use area off South Chowan Road, where two tributaries of Chowan Creek meet at Unicorn Falls. It then proceeded upslope across steep slopes and flatter ridges and benches, with five crossings of ephemeral streams to the proposed camping area off Mann's Road.



Photo 2 Coachwood-Crabapple rainforest with Brushbox and a well-developed litter layer on the edge of a clearing at the proposed Chowan Creek day-use area (WP048, **Fig. 1**), providing potential foraging habitat for the Giant Barred Frog, potential foraging and breeding habitat for the Pouched Frog and potential habitat for Mitchell's Rainforest Snail

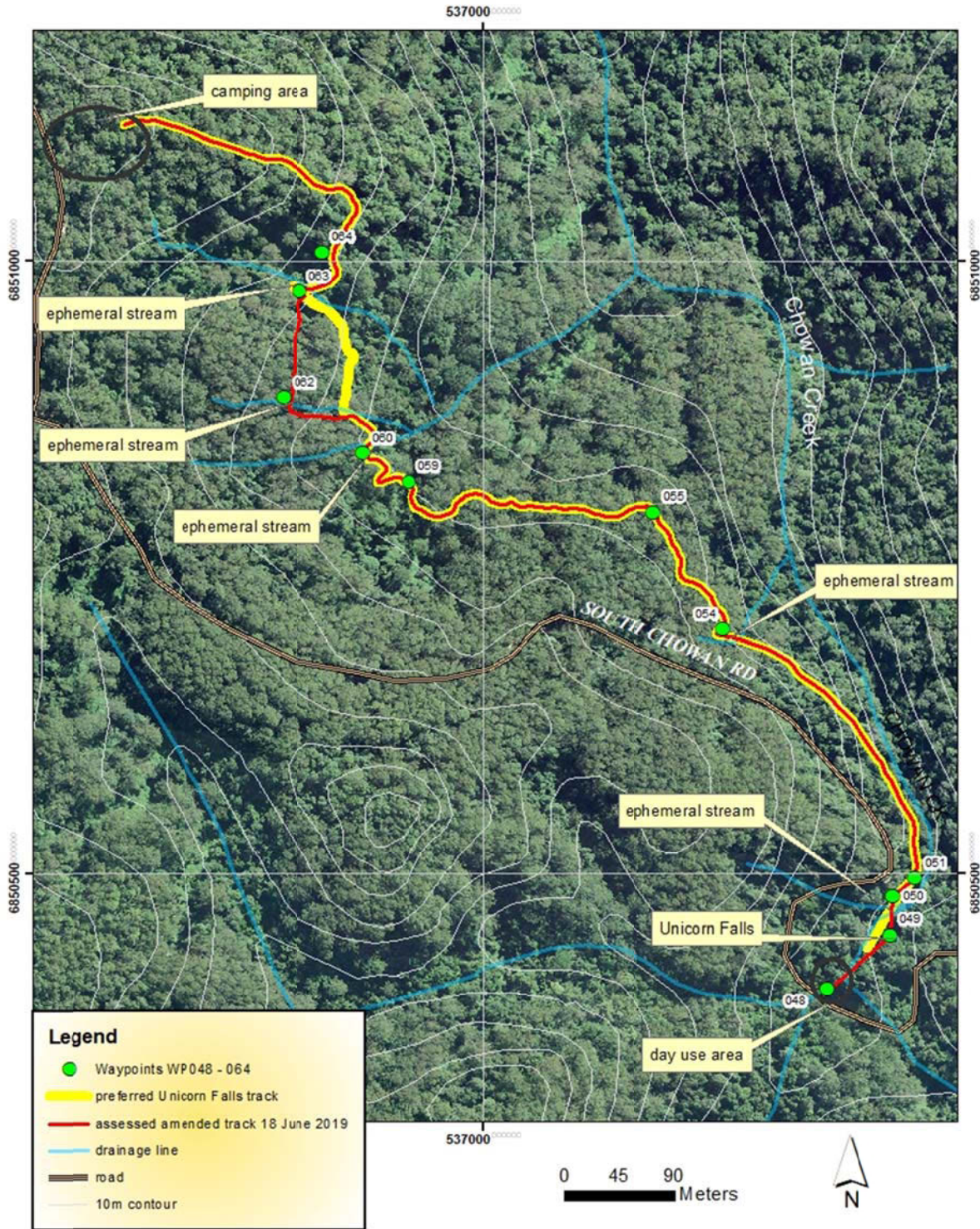


Figure 1 Unicorn Falls proposed walking track route and amended route assessed on 18 June 2019, showing waypoints relevant to the occurrence of potential threatened frog and snail habitat

Notes were taken of vegetation types along the route footprint, the presence of habitat attributes important to the three threatened frog and one threatened snail species, evidence of past disturbance (particularly logging and fire) and the presence of weed species.

Photographs were taken at locations comprising potential threatened frog and snail habitat and other relevant features along the route and MGA co-ordinates of these locations were recorded using a Garmin GPSmap 76CSx unit (co-ordinates listed in **Appendix 1**).

3. RESULTS

3.1 Threatened frog and snail species' habitats along the proposed route

3.1.1 Route footprint at WP048 (Fig. 1) The lower end of the proposed track and day-use area off South Chowan Road passes through Coachwood *Ceratopetalum apetalum*-Crabapple *Schizomeria ovata* subtropical rainforest with scattered Brushbox *Lophostemon confertus* in the canopy (**Photos 1 and 2**). This section of the community is characterised by relatively flat terrain and a well-developed litter layer.

Although a small clearing has been maintained close to the road, probably as an informal picnic area, the flatter terrain represents potential foraging habitat for the Giant Barred Frog. Where a deep litter layer has developed away from the clearing, this provides potential foraging and breeding habitat for the Pouched Frog (**Photos 1 and 2**).

The substrate represents potential foraging habitat for Mitchell's Rainforest Snail and the species may occur around the clearing where scattered large logs provide it with necessary shelter habitat (**Photos 1 and 2**).

3.1.2 Route footprint between WP048 and WP050 (Fig. 1) Leaving the day-use area, the route passes close to Unicorn Falls (WP049, **Fig. 1**), where two tributaries of Chowan Creek converge, forming pools above and below the Falls (**Photos 3, 4, 5 and 6**). The route crosses the western tributary before climbing a steep slope through Coachwood-Crabapple forest. The slope is rocky in places and does not support a well-developed litter layer.

During the inspection it was noted that water in pools above and below the Falls and in the western tributary that passes under a bridge on South Chowan Road was highly turbid (**Photos 3, 4 and 5**). Water in the eastern tributary was slightly less turbid.

Both tributaries and Chowan Creek below the Falls, together with the pools above and below the Falls and associated riparian areas provide potential foraging and breeding habitat for the Giant Barred Frog (**Photos 3, 4, 5, 6 and 7**). Some potential foraging and breeding habitat for the Pouched Frog is present on the slopes where litter has built up against large logs and the buttresses of large trees (**Photo 7**), although this is only likely to comprise marginal habitat for the species.



Photo 3 The pool above Unicorn Falls showing the western tributary of Chowan Creek with potential Giant Barred Frog habitat (WP049, **Fig.1**) and turbid water

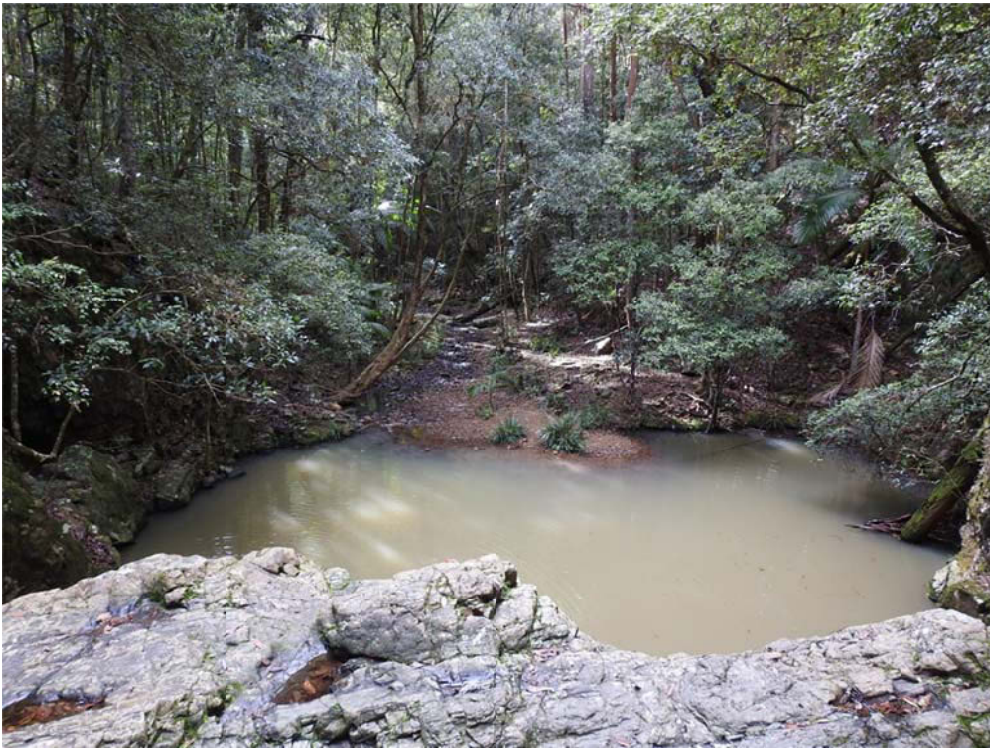


Photo 4 The pool below Unicorn Falls showing potential Giant Barred Frog breeding habitat (WP049, **Fig.1**) and turbid water probably emanating from the road



Photo 5 The road bridge over the western tributary above the Falls, probably the source of sediment affecting potential Giant Barred Frog breeding habitat



Photo 6 The eastern tributary entering the pool above the Falls, providing potential Giant Barred Frog breeding habitat along the stream course (WP049, **Fig. 1**)



Photo 7 Chowan Creek below the Falls from the ascending track route (WP050, **Fig. 1**), showing potential Giant Barred Frog breeding habitat along the creek



Photo 8 Potential foraging habitat for the Pouched Frog and Mitchell's Rainforest Snail about large logs below the route adjacent to Chowan Creek (WP050, **Fig. 1**)



Photo 9 Evidence of past logging and burning from remaining stumps and logs, with litter build up against large logs and tree buttresses providing potential foraging and breeding habitat for the Pouched Frog and Mitchell's Rainforest Snail (WP051, **Fig. 1**)

The slopes probably represent unsuitable habitat for Mitchell's Rainforest Snail, which appears to prefer flatter, more even terrain.

3.1.3 Route footprint at WP051 (Fig. 1) After the steep climb from the Falls area, the route levels out across a more moderate slope through Coachwood-Crabapple-Brushbox-Turpentine *Syncarpia glomulifera* forest that has been subject to moderately intensive past logging and burning (**Photo 9**). Litter is well developed with a deeper build-up against logs and about large tree buttresses. Large logs are widespread as a result of the logging.

The deep litter layer accumulated against logs and trees in this area provides potential foraging and breeding habitat for the Pouched Frog, particularly in moister areas receiving seepage or run-off from an ephemeral drainage line. Mitchell's Rainforest Snail may also be present in areas of more even terrain due to shelter habitat provided by large logs (**Photo 8**).

3.1.4 Route footprint between WP051 and WP054 (Fig. 1) The route rises slowly across a mainly moderate cross-slope along this section through logged Brushbox-Flooded Gum *Eucalyptus grandis*-Tallowwood *E. microcorys*-Turpentine wet sclerophyll forest with a rainforest understorey (**Photo 10**). Large logs are scattered through from moderately intensive past logging and evidence of past fire is apparent, probably from post-harvest burning. Litter is moderately well-developed.

Potential habitat for the Pouched Frog occurs above and downslope of the route where litter has accumulated about large logs, although the upslope area appears less likely as it is rockier and drier (**Photo 10**). Benches on slopes approaching the creek where deeper litter has accumulated and moisture levels are highest and more constant probably represent the best quality breeding and foraging habitat for the species along this section of the route.

It is considered unlikely that Mitchell's Rainforest Snail is present in the area because of the steep slopes.



Photo 10 The moderately-developed litter layer on a steep slope above the track route through logged forest, providing marginal foraging habitat for the Pouched Frog (WP051 to WP054, **Fig. 1**)

3.1.5 Route footprint at WP054 (Fig. 1) At this location the route crosses an ephemeral stream and although carrying old logging debris, potential foraging and breeding habitat for Loveridge's Frog may occur downstream where the stream course joins Chowan Creek.

3.1.6 Route footprint between WP054 and WP055 (Fig. 1) The route along this section traverses heavily disturbed forest over undulating terrain, comprising young, even-aged Flooded Gum and Blackbutt *Eucalyptus pilularis* stands with some Brushbox, a regenerating tall rainforest understorey and a dense low understorey of Lantana *Lantana camara*. This formation appears to be the result of previous intensive logging and a hot post-harvest burn. Some flatter sections have a moist but poorly-developed litter layer under the Lantana.

The habitat on the flatter sections may provide marginal foraging habitat for the Pouched Frog, as it is known to occur in logged eucalypt forest with a Lantana understorey (CSIRO 1996, Fitzgerald and Milledge 2012). However, if present here the species is only likely to occur at very low density.

The forest may not have recovered sufficiently from extensive past logging operations to provide suitable habitat for Mitchell's Rainforest Snail.

3.1.7 Route footprint between WP055 and WP059 (Fig. 1) This section represents a continuation of the young even-aged Flooded Gum and Blackbutt forest on the route from WP054 to WP055 but on more even terrain with a less well-drained substrate and a more substantial litter layer (**Photo 11**).

As a consequence, the section is likely to provide slightly improved foraging habitat (compared with the marginal habitat along the previous section) and possibly breeding habitat for the Pouched Frog.

Due to the higher moisture levels of the litter layer, it may also provide marginal habitat for Mitchell's Rainforest Snail where large logs are present.

3.1.8 Route footprint at WP060 (Fig. 1) The route crosses an ephemeral stream at this location through young Flooded Gum and Blackbutt forest with a regenerating tall rainforest understorey and a patchy lower layer of Lantana (**Photo 12**).



Photo 11 Potential marginal foraging habitat for the Pouched Frog under patchy, young eucalypt forest with a dense low cover of Lantana (WP055 to WP059, **Fig. 1**)

Potential foraging habitat for the Pouched Frog occurs upslope from the stream course above the route crossing (**Photo 12**), with better quality habitat below. Further downstream, potential habitat for Loveridge's Frog is present along stream edges close to where other small streams meet before joining the main course of Chowan Creek.

3.1.9 Route footprint between WP060 and WP062 (Fig. 1) Habitat similar to that present in the previous section between WP055 and WP059 occurs along this section as it ascends to an ephemeral stream crossing at WP062. As with the habitat along the previous section, the regenerating forest provides potential marginal foraging and breeding habitat for the Pouched Frog.



Photo 12 Looking upstream at the ephemeral creek crossing at WP060 (**Fig. 1**), showing potential foraging and breeding habitat for the Pouched Frog upslope from the stream course

3.1.10 Route footprint at WP062 (Fig. 1) The route crosses an ephemeral stream at this location through regenerating Flooded Gum and Blackbutt forest with a tall rainforest understorey and a patchy lower layer of Lantana (**Photo 13**).

Potential marginal habitat for the Pouched Frog occurs upslope from the stream line above and below the crossing, where the rainforest understorey is developing (**Photo 13**). Downstream where it merges with other ephemeral streams before joining Chowan Creek, there is potential foraging and breeding habitat for Loveridge's Frog along the stream course.



Photo 13 Looking upstream from the ephemeral creek crossing at WP062 (**Fig. 1**), showing the developing rainforest understorey and potential foraging and breeding habitat for the Pouched Frog

3.1.11 Route footprint between WP062 and WP063 (Fig. 1) As with the route sections from WP059 to WP060 and WP060 to WP062, this section ascends through regenerating Flooded Gum and Blackbutt forest with a patchy rainforest understorey. Past logging operations appear to have been less intensive as a number of larger canopy trees are present.

Potential habitat for the Pouched Frog occurs above and below the route and is of higher quality with a better developed litter layer compared with lower sections (WP059 to WP060 and WP060 to WP062). This is due to a well-developed rainforest understorey below the route and an overall lower level of disturbance and Lantana invasion.

Potential habitat for Mitchell's Rainforest Snail occurs where large logs and litter accumulation occur below the route.

3.1.12 Route footprint at WP063 (Fig. 1) The route crosses the last ephemeral stream at this location before it ascends up a spur along an old logging track to the proposed camping area off Mann's Road (**Fig. 1**). Large Brushbox are present among younger Flooded Gum and Blackbutt, with a well-developed rainforest understorey and litter layer along the stream course.

Potential habitat for the Pouched Frog occurs upstream and downstream of the route crossing (**Photos 14 and 15**) and the stream banks provide potential habitat for



Photo 14 Looking upstream from the ephemeral creek crossing at WP063 (Fig. 1), showing potential foraging and breeding habitat for the Pouched Frog



Photo 15 Looking downstream from the creek crossing at WP063 (Fig. 1), showing potential foraging and breeding habitat for the Pouched Frog

Loveridge's Frog downstream where the stream merges with other ephemeral streams draining into Chowan Creek.

3.1.13 Route footprint between WP063 and WP064 (Fig. 1) Upslope of the ephemeral stream crossing at WP063 the track route passes through less heavily logged forest with large Brushbox, Flooded Gum and Turpentine above and below the route. The rainforest understorey begins to transition to sclerophyll, with a well-developed litter layer.

Although relatively steep, this section may provide marginal foraging habitat for the Pouched Frog, but the area probably represents the elevational limit of the species' potential occurrence along the route.

The terrain is probably too steep to provide potential habitat for Mitchell's Rainforest Snail although large logs remaining from past logging are widely distributed.

4. DISCUSSION

The rapid habitat assessment for the three threatened frog species and Mitchell's Rainforest Snail found potential habitat for all four species in most of the area along the proposed track route. Potential habitat extended from the day-use area adjacent to Unicorn Falls and ascended to the lower slopes of the spur (at WP064) leading to the camping area off Mann's Road. However, the distribution of potential habitat varied for the different threatened species.

Potential foraging and breeding habitat for the Pouched Frog, which requires high levels of moisture and a well-developed litter layer (OEH BioNet database profile, accessed June 2019), was widespread. Potential habitat extended from the rainforest in the vicinity of the day-use area to close to where the regenerating wet sclerophyll forest transitioned to moist sclerophyll forest on the lower slopes of the spur leading to the camping area (about WP064). The habitat occurred within, upslope and downslope of the route footprint but was predominantly found downslope where moist litter build-up was best developed on flatter areas and benches. Areas of heavy past logging with Lantana invasion were considered suitable habitat due to the species' known use of litter under this introduced vegetation (Fitzgerald and Milledge 2012). Potential habitat was also present about logs and large tree buttresses on slopes, with the highest quality habitat in the wettest areas.

For the Giant Barred Frog, potential foraging and breeding habitat was mainly confined to the rainforest about the day-use area and the pools, stream courses and riparian zone adjacent to the route. This habitat extends to the point where the route climbs steeply above Unicorn Falls and Chowan Creek and diverges from the riparian habitat (about WP050, Fig. 1). The Giant Barred Frog requires riparian habitat with a well-developed litter layer along permanent or semi-permanent water for foraging and breeding, favouring stream sections with riffles and sloping banks for breeding (OEH BioNet database profile, accessed June 2019). Sedimentation can adversely affect this habitat and the turbidity observed in streams and pools below the South Chowan Road bridges during the assessment is cause for concern.

No potential habitat for Loveridge's Frog occurred along or closely adjacent to the route footprint, although it was found downstream from the route in the lower reaches of the ephemeral streams (crossed at WP050, WP054, WP060, WP062, WP063) where they descended through steep banks and boulders before reaching the main course of Chowan Creek. Loveridge's Frog favours semi-permanent and ephemeral headwater streams, particularly where soaks and seepages maintain high moisture levels (OEH BioNet database profile, accessed June 2019).

Potential habitat for Mitchell's Rainforest Snail was the most difficult to predict along the route as the micro-habitat attributes associated with this species in hinterland forests are poorly understood. However, it is known to shelter under large logs and in fig *Ficus* spp buttresses on relatively level ground in floodplain areas, where a high moisture regime is maintained (NSW NPWS 2001, OEH BioNet database profile, accessed June 2019) and it is assumed that a similar micro-habitat is preferred away from the coast.

5. RECOMMENDATIONS

Following the findings of the rapid habitat assessment along the amended track route (**Fig. 1**), the following recommendations are suggested to mitigate impacts on potential threatened frog and snail habitat:

1. Investigate any options to reposition the track route further upslope on more even ground to reduce the requirement for benching and the potential for erosion together with a reduction in the amount of bench spoil needing to be redistributed;
2. Locate crossings of ephemeral streams further upstream where possible to reduce the impacts of erosion and sedimentation downstream, particularly in the lower reaches where streams join Chowan Creek;
3. Install effective sediment traps about the South Chowan Road bridges over the eastern and western tributaries of Chowan Creek to reduce sedimentation of Giant Barred Frog breeding habitat above and below Unicorn Falls;
4. Remove and spread spoil from benching upslope on more even terrain and away from logs and moist, well-developed litter layers;
5. Adjust the track route locally to avoid large logs and the buttresses of large trees, particularly in wetter areas with well-developed litter layers;
6. Attempt to retain large logs requiring removal upslope on benches below the track as habitat for threatened frog and snail species;
7. Progressively remove small patches of Lantana rather than large expanses because of the likelihood of the presence of Pouched Frogs in this habitat;
8. Post signage at the day-use area warning against excessive disturbance of the pools about Unicorn Falls during the Giant Barred Frog's spring-summer breeding season and particularly against the use of hair shampoo by bathing back-packers

REFERENCES

CSIRO 1996. Murwillumbah Management Area, Fauna Survey. CSIRO Division of Wildlife and Ecology, Canberra, ACT.

Fitzgerald, M. and Milledge, D. 2012. Low elevation records for the Pouched Frog *Assa darlingtoni* in Byron Shire. *Herpetofauna* 42: 8-10.

Mountain Trails. 2019. Tweed Byron hinterland tracks. Unicorn Falls link track. Unpubl. report to NSW National Parks and Wildlife Service.

NSW NPWS 2001. Mitchell's Rainforest Snail *Thersites mitchellae* (Cox, 1864) Recovery Plan. Approved Recovery Plan. NSW National Parks and Wildlife Service, Hurstville, NSW.

APPENDIX

Appendix 1 Waypoints marking threatened frog and snail habitat and equivalent waypoints from Mountain Trails (2019) Unicorn Falls link track report

waypoint	Easting	Northing	equivalent Mtn Trails waypoint
WP048	537281	6850406	-
WP049	537332	6850449	WP1473
WP050	537335	6850481	WP1445
WP051	537368	6850494	WP1439
WP054	537262	6850699	-
WP055	537139	6850794	-
WP059	536939	6850820	WP1465
WP060	536902	6850843	WP1464
WP062	536837	6850888	-
WP063	536850	6850975	WP1460
WP064	536869	6851007	WP1459