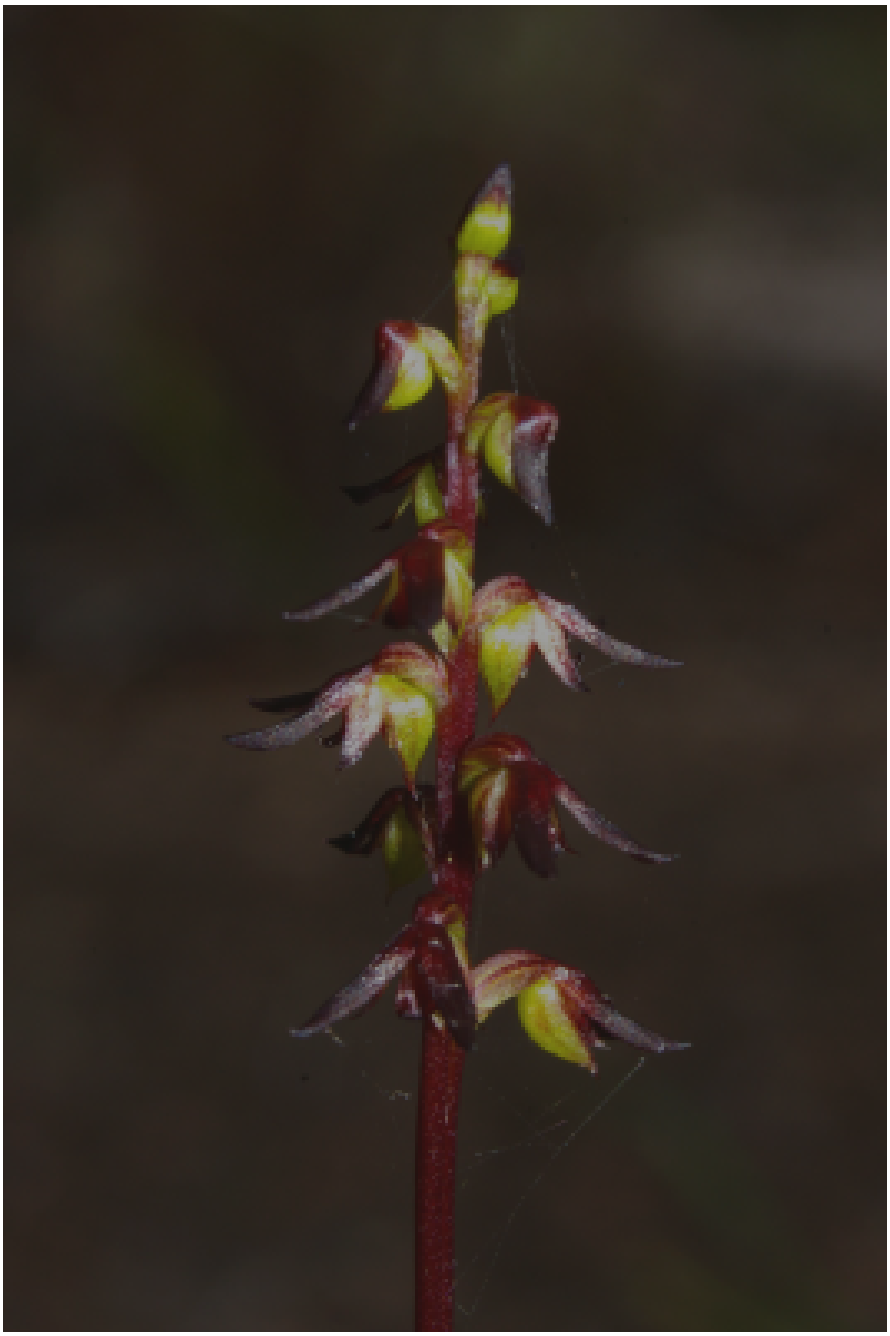
Results of Searches for the Tuncurry Midge-Orchid
(*Genoplesium littorale, syn Corunastylis littoralis*)

Autumn 2008



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The Australasian Native Orchid Society was contacted by the NSW Scientific Committee for comments about a proposed listing of this orchid under the NSW Threatened Species Conservation Act (1999), and contacted Andrew Paget regarding any information the Hunter-Central Rivers Catchment Management Authority had about this orchid.

Very little was known about the orchid except for the following:

- About 20 plants in a small group about 10m in diameter were seen when the plant was first collected in 1993, and subsequently described as a new species (as distinct from G. despectans to which it had been referred previously). This type location was about 100m south of the Tuncurry Tip (John Riley pers comm).
- Some additional plants had been seen near the Tuncurry TAFE and on the edges of tracks between Tuncurry TAFE and the Tuncurry Tip by Bill Brinsley (John Riley, pers comm).
- Some plants had also been seen by Isaac Mamott in 1995-6, approx 300-500m north of the Tuncurry Rock Pool (Wallamba River mouth) (Isaac Mamott pers comm). This area is now very degraded habitat and plants have not been seen there recently.
- The orchid has been known in the location for a long time, although it is uncertain as to when it was first discovered. Bill Brinsley has known the plants at Tuncurry for around 30-40 years (John Riley pers comm).

It was decided that a collaboration would be formed between a range of workers (including Australasian Native Orchid Society volunteers and Hunter-Central Rivers Catchment Management Authority staff) in the local area to undertake a survey for this orchid during Autumn 2008 (when it was expected to be in flower). This purposes of this survey were to determine:
1. The distribution range for this species
2. A better description of the range of habitats in which the species could be found
3. The estimated total population size for this species

This report contains the results of these surveys. This information has been submitted to the NSW Scientific Committee for their consideration in deliberations on the listing of this species.

Acknowledgements

A range of individuals and organisations combined their efforts to compile this report, and the report reflects observations of the following: Andrew Paget (HCR CMA), Barry Ralley (Private), Great Lakes Council Staff, Isaac Mamott, John Riley, Bill Brinsley, and Di Brown (DECC). Thanks also go to Mark Clements for information about this species and confirmation of its identification, and to Mt Annan Botanic Gardens staff who collected seed off plants for long-term storage. Thanks also to Shawn Cappararo (HCR CMA) for comments on the draft report.

Nomenclature

The Midge-orchids were all previously included in the genus *Prasophyllum*. Then the smaller flowered (mainly autumn-flowering) species were split off *Prasophyllum* and named *Genoplesium*s. Recently the work of Mark Clements and David Jones at the Canberra Centre for Plant Biodiversity Research has proposed that many of the *Genoplesium*s become a new genus *Corunastylis*. The NSW State Herbarium in Sydney (on their PlantNET website) has yet to accept the use of this new name, hence this report still refers to the orchid as *Genoplesium littorale* rather than *Corunastylis littoralis*.

Habitats Found in

Initial surveys were undertaken during January and early February 2008 to survey the general location and map out suitable habitat for detailed investigation during the flowering season (mid Feb through to mid April). The following habitat types were considered possible locations for this orchid:

1. The type location was described in the literature as being Coast Teatree Thickets but on revisiting the site it was determined to be Blackbutt (*Eucalyptus pilularis*) Woodland with a shrubby understorey of Lemon-scented Tea-tree (*Leptospermum polygalifolium ssp cismontanum).*
2. Nearby to the type site was a dry ridge which was considered to be even better habitat, and this ridge was almost treeless (only a few scattered Blackbutts *Eucalyptus pilularis*) with a sparse shrubland of *Monotoca elliptica* and *Brachyloma daphnoides*.
3. Some parts of the site contained a mixed Flaky-barked Teatree (*Leptospermum trinervium*) and Saw Banksia (*Banksia serrata*).
4. Other parts of the site 100-200m south of the Tuncurry Tip and southwards towards the Tuncurry TAFE were dominated by low (< 1.5m tall) dense heathland dominated by *Ochrosperma lineare* (syn. *Baeckea linearis)*, with a range of other heathland species (eg. *Eriostemon australasius, Dillwynia retorta)*

Subsequent searches early in the flowering season (18 Feb) located plants in all of these habitat types, so further hunts were then conducted in each of these 4 potential habitat types in the locality, and in broader areas to the north and south to determine if the orchid was also found elsewhere nearby.

The survey concentrated on 3 main searches:
1. The core habitat between Tuncurry Tip and Tuncurry TAFE where plants were previously known from.
2. Target searches in similar habitat to the north, in particular searches in Darawank Nature Reserve immediately to the north to check if they occurred there.
3. Target searches in similar habitat to the south, in particular searches in Booti Booti National Park.

Similar suitable habitat was identified from a combination of local knowledge and the use of vegetation maps and aerial photos to identify similar sparse shrubland communities known to be the preferred habitat of this species.

The results of these surveys are presented in the following tables (Tables 1-3).

Table 1: Tuncurry – Core Area Surveys

Location	**Likely habitat?**	**Approx. Extent of habitat?**	**Condition?**	**Any seen? Qty?**
Darawank Nature Reserve	Some *Leptospermum laevigatum* thickets and some *Monotoca/Brachyloma* shrubland. The Blackbutt forests appear unsuitable due to their frequent burning.	10-15 ha within 826 ha reserve	Good to Poor (mostly poor due to frequent fire regime, but some good areas amongst shrubs with lichen/moss beds)	No, despite extensive search
E & SE of Tuncurry Tip	All 4 habitat types found in this area	21 ha	Excellent	Yes, 510
W of Tuncurry Tip	Some *Leptospermum laevigatum*	4-6 ha	Good	No
N of Tuncurry TAFE	Mainly *Ochrosperma lineare* dense heathland	~500 ha	Moderate to Good, but difficult to survey due to density	Yes, 71 (not fully searched

				due to veg density)
NE of Tuncurry TAFE	*Leptospermum laevigatum* thickets	20-30 ha	Moderate. Dense shady.	Yes, 1
			TOTAL PLANTS	582

Table 2: North of Tuncurry

Location	**Likely habitat?**	**Approx. Extent of habitat?**	**Condition?**	**Any seen? Qty?**
Bonny Hills South	Some *Leptospermum laevigatum* thickets	5-6 ha	Poor (due to windfall, adjacent Bitou control and tracks)	No
Charm Haven Nth	Similar to Blackbutt but with some Bastard Tallow-wood (*E. planchoniana)*	2-3 ha	Good	No
Charm Haven	Some *Lepto laevigatum* thickets but poor quality due to weeds and Bitou invasion/control	5-6 ha	Poor (due to windfall, adjacent Bitou control and tracks)	No
Pt Perpendicular Kattang NR	Some *Leptospermum laevigatum* thickets	2 ha	Moderate	No
Dunbogan Sth	Some *Leptospermum laevigatum* thickets, and *Euc. planchoniana* with heathy understorey, and Monotoca-Brachyloma shrubland and Ochrosperma lineare heathland.	~20 ha	Good	No
Crowdy Bay Nth	Eucalyptus planchoniana – E pilularis woodland	~30 ha	Moderate	No
Crowdy Head to Harrington	Some *Leptospermum laevigatum* thickets,	~100-120 ha	Good to Excellent	No
Old Bar Park	Some *Leptospermum trinervium* thickets but appears too moist (with *Melaleuca nodosa*)	10-20 ha	Moderate to Poor – due to being considered to moist.	No
Saltwater	*Leptospermum laevigatum* and *Monotoca elliptica* thickets, with some *Melaleuca nodosa* (indicating it may be too wet in some parts)	5-6 ha	Good	No
North Diamond Beach	None suitable seen	0	Poor	No
Red Head	Mainly littoral rainforests	0	Poor	No
Black Head	Mainly littoral rainforests	0	Poor	No

Table 3: South of Tuncurry

Location	**Likely habitat?**	**Approx. Extent of habitat?**	**Condition?**	**Any seen? Qty?**
Pebbly Beach	*Leptospermum laevigatum* and *Monotoca elliptica* thickets	< 0.5 ha	Moderate	No
Booti Booti NP – 7 mile beach area	*Leptospermum laevigatum* and *Monotoca elliptica* thickets	2-3 ha	Moderate-Poor	No
Booti Booti NP – SE of Green Point turnoff	*Leptospermum laevigatum* and *Monotoca elliptica* thickets with *Angophora costata* and *Banksia ?serrata*	3-4 ha	Moderate	No
Booti Booti NP – 300m N of Camp Elim	Slashed power easement	1-2ha	Moderate	No
Booti Booti NP – 300m SSE of Camp Elim	*Leptospermum laevigatum* and Bitou Bush infested	1 ha	Poor	No
Booti Booti NP – Santa Barbara Picnic Area	Slashed powerline easement	1-2 ha	Moderate	No
Booti Booti NP – Boomerang Point Reserve Area	*Leptospermum laevigatum* and *Monotoca elliptica* thickets with *Angophora costata* and *Banksia ?serrata*	<0.5 ha	Poor. Too shady and weedy.	No
Mungo Brush south – East of Robinsons Fire Trail	*Leptospermum laevigatum* with scattered *Banksia integrifolia*.	< 2-4 ha	Moderate	No
Mungo Brush south – 100m SSW of Stewart and Lloyd Campground	*Leptospermum laevigatum* dense thickets	5-10 ha	Poor. Too shady.	No

Pipetrack Disturbed Habitat

During the survey it was apparent that the main colony was on some type of previously disturbed habitat, and MidCoast Water (Brendan Guiney) was consulted about possible reasons for this disturbed habitat. Their knowledge and records indicate a number of other recent disturbances in that area related to the new sewerage treatment plant to the NW of the Darawank Nature Reserve, but there was no knowledge or explanation for the old disturbed area on which the orchid was found. It appears that this area is old disturbance of at least 20-30 years ago (as evidenced by large (3-4m) old shrubs of *Monotoca elliptica* found in this area – which is a slow-growing heathland species).

Estimation of Total Geographic Range

From the results of this survey, and from earlier records, it appears that the Tuncurry Midge-Orchid (*Genoplesium littorale*) is very restricted in its distribution and found in an area of only 5km north-south and 1.4km east-west. This includes the records near the Wallamba River mouth at Tuncurry, which have not been seen since about 1995-6. The area in which plants were found in during this survey is only 4.1km north-south (ie without the southern records the range is reduced from 5km to 4.1km).

The historic records (I. Mamott, 1995-6) of plants East of the Tuncurry Caravan Park are in habitat which has been very disturbed and invaded by weeds (in particular Panic Veldt-grass, **Ehrharta erecta*) and no plants have been found recently in this location. Further survey work will be undertaken to try to locate plants in this area, but it is likely they are precarious and may not survive long-term due to the massive disturbances in that area and active threats.

Known Population Size

The known total population size from plants found in this detailed survey is 582 plants. Of the 582 plants found in this survey, 510 of these were found in the area east and south-east of the Tuncurry Tip. This main colony occupies an area of 21 ha and contains 87% of the known plants. As a minimum this area needs to be protected as core habitat. Also the pipetrack location on which the colony is growing needs to be investigated to determine if future disturbance of the underground infrastructure through maintenance or removal is likely, as this could have a devastating impact on the orchid. Similarly the expansion and management of the nearby Tuncurry Tip needs to be done in a way which does not further impact on the orchid. Clearing to the south of the tip has already modified the type location for this species (John Riley, pers comm), and any expansion, fire prevention clearing, or weed invasion eastwards from the tip may dramatically impact on this orchid.

Estimation of Population Size

An estimation of the likely total population size is made based on a number of calculations. The main colony SE and E of the Tip is considered well surveyed and likely to be a fairly accurate count of numbers, with an allowance of 25% increase factor for plants which may not have been seen during the survey (ie an error factor). The larger densely vegetated habitat between the Tuncurry Tip and Tuncurry TAFE is less well surveyed, however. This is due to the density of the vegetation, as the 1-1.5m tall dense shrub layer makes surveying both extremely difficult physically to push through this dense layer for hours on end, but also very difficult in terms of spotting small orchids 20cm tall when the surveyors' visibility to this level is blocked by the dense shrub layer. For this habitat, therefore, the population size has been estimated:

The calculation of estimated population size is as follows:

21/ha main colony of 582 plants x 25% increase	= 698 plants (with allowance for missed)
500/ha with approx 200 ha suitable habitat x 3-6 plants per ha (estimation)	= 600 - 1200 plants
Nil allowance for other locations, since none have yet been found outside of the Tuncurry area	

TOTAL = 1298 – 1898 total population (estimate)

Threats

This orchid occurs in very limited specific habitats, and prefers only open dryish low sand ridge sites with little ground cover (ground cover of moss and lichens or leaf litter beneath shrubs). This preference for open habitat makes the orchid vulnerable to a range of threats, particularly weeds which can colonised and dominated these bare areas and thus render suitable habitat not suitable for this orchid.

A number of threats were observed during this survey, and are as follows (listed in ranked priority order with most potentially devastating first, and more minor down the list).

1. Habitat Loss through development

The primary habitat for this orchid is identified in the Draft Mid North Coast Regional Planning Strategy (Department of Planning) for investigation for possible future residential development. This proposal could eliminate all known habitat of this orchid. It would be important for the survival of this orchid that a large proportion of its habitat be set aside for conservation purposes, and that active management of the spread of weeds and other impacts from expanding habitation to the south is instituted to ensure its long-term survival.

2. Habitat Loss through impacts of adjacent landuses clearing, firebreaks, edge effects

There have been a number of developments in and adjacent the habitat of this orchid which have caused habitat loss or habitat degradation. These include the Tuncurry Tip and associated expansions (and clearing to the south), The Tuncurry TAFE (and clearing to the north and east), and the clearing to the east of the Tuncurry Caravan Park. Not only have these developments and associated clearing removed habitat, but they have caused 'edge effects' like light penetration, nutrient increases, and weed invasion into adjacent habitat, thus causing degradation to nearby habitat of this orchid. This disturbance may also include any infrastructure maintenance or removal for the underground pipeline on which the main colony grows. The creation of pipetracks in the vicinity needs also to be done in a way which reduces the disturbances being a vector for the invasion of exotic grasses, as recent pipetracks created have caused the rapid spread and colonisation of the disturbed areas by *Eragrostis curvula* in particular. Works should include protocols to reduce the risk of spread of seed, and also include follow-up to eradicate any exotic grasses which establish. The slashing of the clearings under the existing power easement approximately 75m east of The Lakes Way needs also to be slashed outside of the flowering-seeding season of this orchid (1 February to 10 May) to avoid this slashing impacting on the orchid's reproduction.

3. Habitat modification by weed invasion by Loblolly Pines (*Pinus taeda*)

Scattered Loblolly Pines (*Pinus taeda*) in the area between the Tuncurry Tip and the Tuncurry TAFE, are causing modification of the orchid habitat through shade, competition, and dense pine needle leaf litter deposition.

4. Habitat modification by weed invasion by Exotic Grasses (including *Andropogon virginicus, Ehrharta erecta, Eragrostis curvula*, and others)

A number of exotic grasses are now well established around the edges, and scattered through, the orchid habitat. They have the potential to modify the habitat by invading and occupying the bare moss/lichen crust areas where the Tuncurry Midge-Orchid grows. This invasion of native plant communities by exotic perennial grasses is a listed Key Threatening Process under the Threatened Species Conservation Act. The track north of the main colony of the orchid is of particular concern as it is lined on each side with a 10-15m wide dense infestation of African Lovegrass (*Eragrostis curvula*) which could dramatically impact on this orchid if it was to spread southwards into the area of the main colony.

5. Habitat modification by weed invasion by Bitou Bush (*Chrysanthemoides monilifera ssp rotundata*) and by Bitou Bush control works.

Invasion of coastal vegetation by Bitou Bush is a major problem and degradation factor for the habitat of the Tuncurry Midge-Orchid, but so also is damage to habitat caused by weed control works for control of Bitou Bush.

6. Habitat modification by weed invasion by Asparagus Fern (*Protoasparagus aethiopicus*)

The Tuncurry Midge-Orchid is found close to the ocean, and parts of it's habitat along the coastal fringe area liable to invasion and modification by Asparagus Fern. This fern has the capacity to create a dense mat of vegetation and underground tubers, and can occupy and modify areas which would have been suitable habitat for this orchid. This weed can therefore modify and render suitable habitat unsuitable for this orchid.

7. Habitat modification by weed invasion by Bryophyllums (*Bryophyllum* spp.)

The Tuncurry Midge-Orchid likes to grow in open areas where bare spaces between shrubs are dominated by lichen/moss crusts. These habitats are open to weed invasion because of their open nature, but in particular they are open to invasion by exotic grasses and succulents. Mother of Millions/Bryophyllums (*Bryophyllum* spp, including *B. delagoense, B. pinnatum*) are succulents which are common in many coastal reserves and have the potential to rapidly colonise the habitat of this orchid.

8. Predation by Rabbit browsing

East of the Tuncurry Caravan Park there is a great deal of evidence of a large rabbit population (between the fore dune and hind dune) and the rabbit population has the potential to impact on the orchid population through browsing.

9. Habitat modification by weed invasion by Lantana (*Lantana camara*)

Most of the habitat of this orchid is on sand ridges, however the adjacent moist low-lying areas have some scattered Lantana in them, and in a few locations these Lantana infestations are forming thickets which are a risk to the ridge areas due to their spread.

10. Habitat modification by weed invasion by Camphor Laurels (*Cinnamomum camphora*)

Most of the habitat of this orchid is on sand ridges, however the adjacent moist low-lying areas have some scattered Camphor Laurels in them, and in a few locations these infestations are forming moderate sized plants which are a risk to the ridge areas due to their shading and the allelopathic chemicals they exude from their roots, and dense leaf litter they deposit.

11. Habitat modification by disturbances caused by rubbish dumping, especially garden refuse.

The majority of the orchid's habitat is crown land which is being used for illegal rubbish dumping and occassional four-wheel driving and beach access. These uses are a threat to the orchid through the direct impact on habitat from physical damage from vehicles (crushing). As well as this the dumping of rubbish (especially garden refuse) also impacts on the orchid by the changes that can result to the orchid's habitat. Rubbish can smother areas where the orchid would otherwise grow, chemically alter the soil (eg iron, concrete) or introduce garden weeds which can compete with the orchid.

12. Habitat modification by disturbances caused by Vehicles

The physical damage to vegetation by illegal and uncontrolled vehicle access to the crown land which is the main habitat of this orchid is a threat to it. The orchid likes to grow around the bases of shrubs, which provide a competitive root zone which may harbour the symbiotic fungi which the orchids live in association with, and also provide a dry area through the root competition they provide. The removal of shrubs by them being run over by vehicles has the potential to alter the habitat of this orchid and render it unsuitable for them. Some shrubs may regrow from occasional damage, but repeated traffic could stop shrubs growing in some areas. Given about 70 of the 120 known orchids are found within 5-10m of a track, the damage by vehicles has the potential to threaten a large proportion of this orchid's population.

Reproductive Success

From observations towards the end of the flowering season, during this survey, it was evident that the pollination rate of this orchid was good, as most plants were observed forming at least some seed pods. There appeared to be around 2-12 seed pods forming on most plants observed. This indicates that the pollinators (likely to be fungal gnats – John Riley pers comm and on-site observations by Andrew Paget and Barry Ralley) were present and performing pollination successfully. This is likely to result in good levels of seedling establishment, and most groups of more that a couple of plants had small seedlings and non-flowering plants present, indicating a good range of age-classes of plants were present within the population.

Seed Colletion

During seeding Mt Annan Botanic Gardens staff visited the population and collected seed to put into long-term storage as a safeguard against loss of plants in the wild.

Conclusion

The nomination of the Tuncurry Midge-Orchid (*Genoplesium littorale*) appears warranted, from the results of this survey, due to a number of factors:

1. The total range of this species is very restricted, being 4.1-5km north-south and 1.4km east-west.

2. The population size of this species appears to be around 1200-1800 plants.

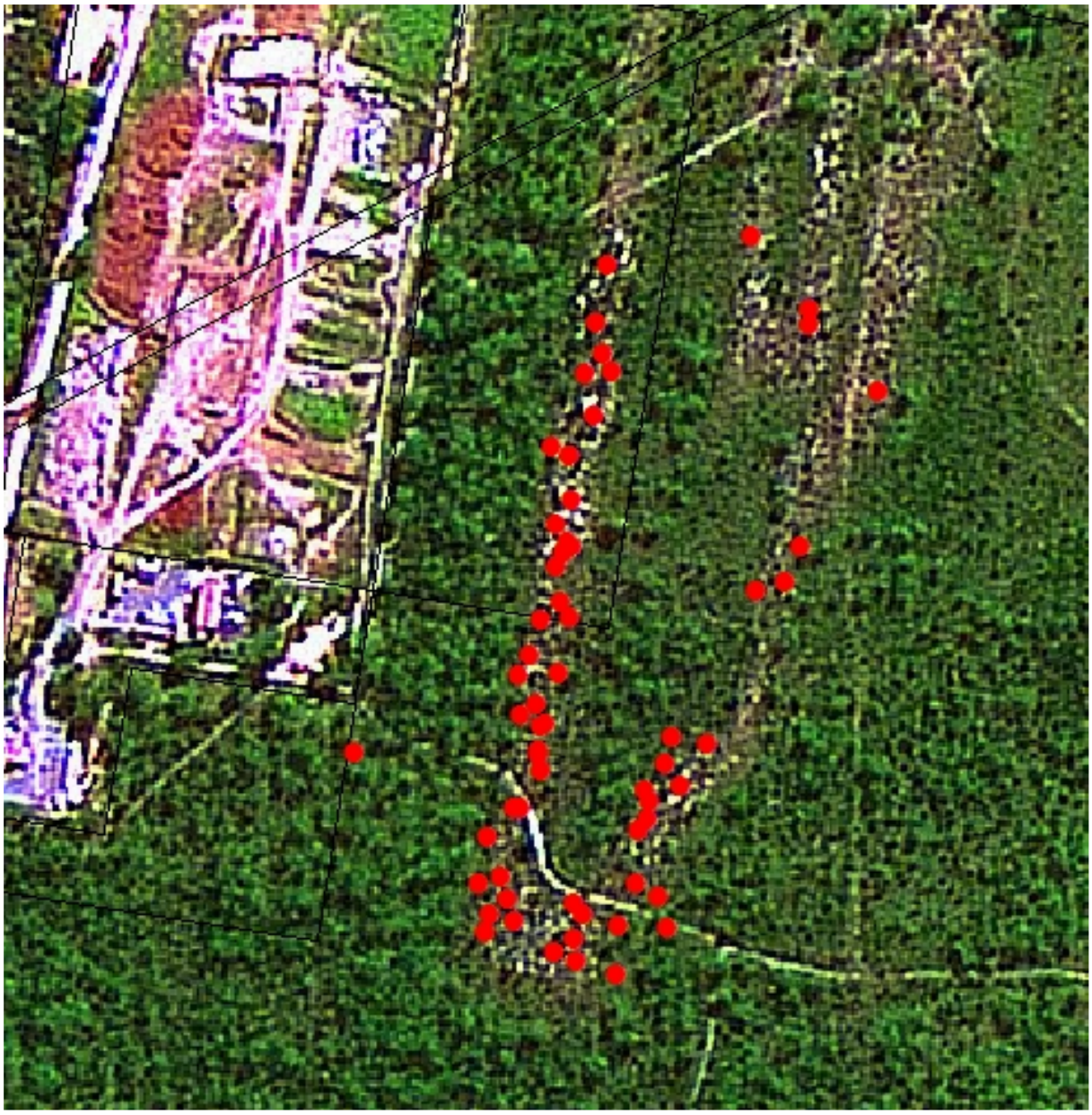
3. There are active threats which if not addressed could lead to the extinction of this species.

LOG OF SURVEY EFFORT

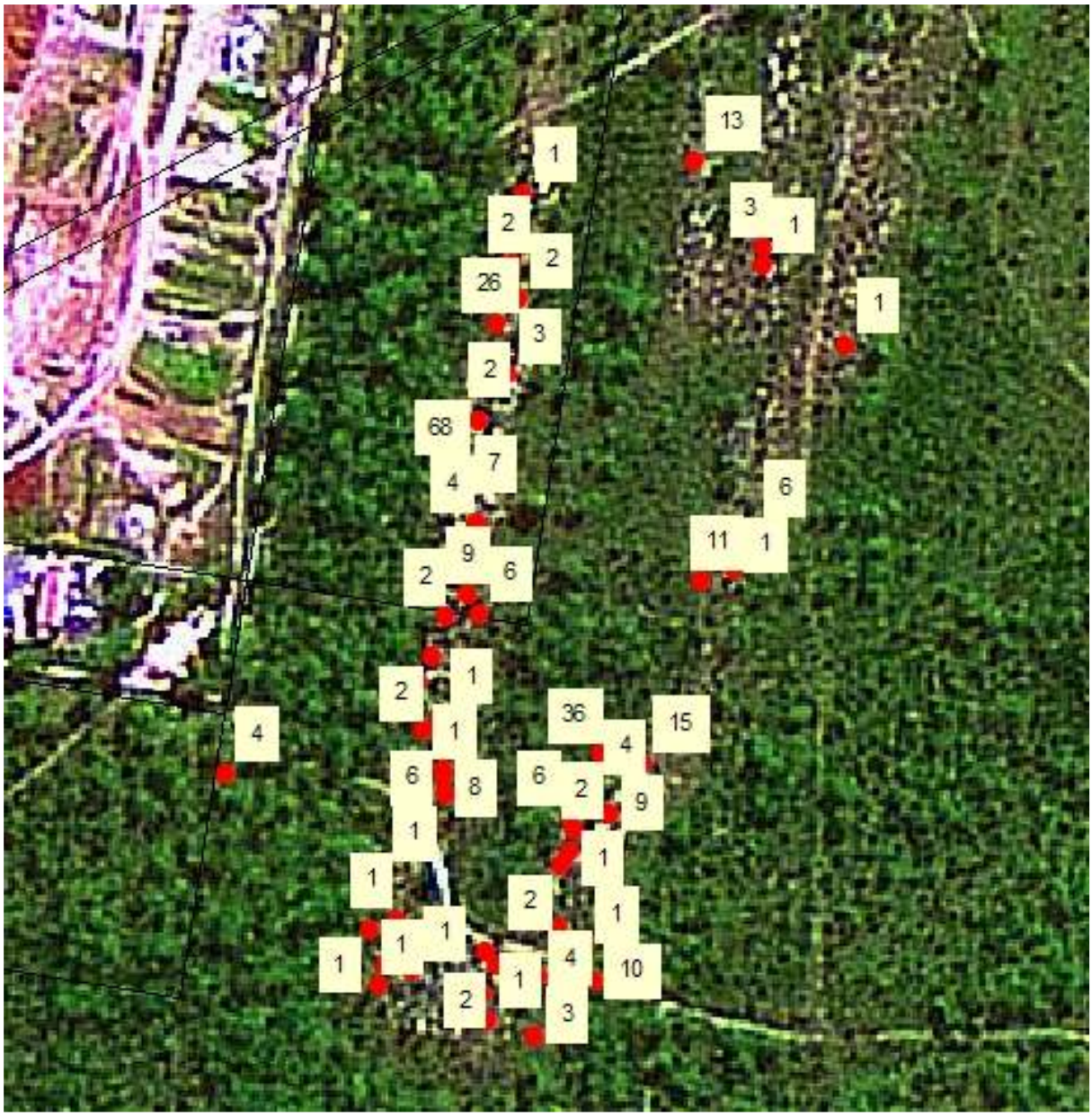
Mon 18 Feb 2008	Meeting between Andrew Paget, John Riley and Barry Ralley at original type location for hunt. First flowering plant found, and 4 others in bud. 3 people x 1 day at type location and several other likely nearby locations (based on earlier habitat mapping). Also met Isaac Mamott re location near Tuncurry river mouth. 5 plants found
Fri 22 Feb 2008	Andrew Paget 1 person x 1 day. Search for in areas to north of known habitat from Bonny Hills to Crowdy Bay National Park.
Fri 29 Feb 2008	Andrew Paget 1 person x 1 day. Searching cor habitat area found last week to count number in 1 ha sample, then expand search to find extent of main colony. 106 plants found.
Wed 5 Mar 2008	Andrew Paget 1 person x 1 day. Search for in areas to north of known habitat from Crowdy Bay National Park to North Diamond Beach.
Fri 7 Mar 2008	Andrew Paget & Barry Ralley and Di Brown (half day) searching in Darawank Nature Reserve and South from main colony. 2.5 people x 1 day. 9 plants found.
Fri 14 Mar 2008	Andrew Paget & Barry Ralley searching in Booti Booti National park to Mungo Brush south (near Tea Gardens)
Fri 28 Mar 2008	Andrew Paget & Barry Ralley searching area between Lakes Way and power easement from Tuncurry TAFE to Tuncurry Tip. 2 people x 1 day. Approx 70 plants found.
Tue 1 Apr 2008	Andrew Paget & Barry Ralley searching main colony area E of Tuncurry Tip. 2 people x 1 day. 270 plants found.
Fri 4 Apr 2008	Andrew Paget & Barry Ralley searching coastal fringe of main area between Tuncurry TAFE and Tuncurry Tip, and checking track edges in main area east of the power easement. 14 plants found.

Map 1: All Current Locations of the Tuncurry Midge-Orchid (*Genoplesium littorale*)

Map 2: Enlargement of main colony of the Tuncurry Midge-Orchid (*Genoplesium littorale*)



Map 3: Northern Quantities of the Tuncurry Midge-Orchid (*Genoplesium littorale*)



Map 4: Southern Quantities of the Tuncurry Midge-Orchid (*Genoplesium littorale*)