Platymantis sp transects

Introduction

The status and distribution of *Platymantis* sp was investigated. Nothing is known about this frog, which has a potentially highly restricted distribution. It has not been found on Luzon, therefore may be endemic to Polillo. The most similar frog on Luzon is *Platymantis luzonensis* however the call of *P.luzonensis* differs from *Platymantis* sp as described in the sound analysis section. A detailed study is required to determine the comparative morphological differences between the two frogs.

Only 10 individuals were found in total from the transects and 7 from the timed counts. This species was also only found at the forest sites, making it one of the rarer frogs. Many of the anecdotal Platymantis sp sightings were 2m or more above the ground. The chance of finding frogs at heights greater than 2m is much less than below 2m i.e. within our field of vision. Discovering the call of *Platymantis* sp made it possible to locate individuals more easily to within 1m square (pinpointing the individual takes much more time and effort). The call also confirmed anecdotal evidence that most individuals call from at least 2m above the ground. Therefore search techniques used previously may not be effective in finding individuals because of their spatial location and habitat preference.

A technique was devised based on detecting the calls of male frogs to estimate absolute densities (density of calling/ breeding males) in forest sites. This provides an opportunity to compare densities to the estimates of the other methods, therefore assess their effectiveness.

AIMS

- Determine the absolute density of *Platymantis sp* in the central area of the watershed forest
- Determine if density changes with distance from agriculture and distance from core forest
- Investigate the effect of forest edge on *Platymantis sp* abundance
- Compare relative abundance for *Platymantis sp* with timed counts and transect estimates
- Produce conservation recommendations based on the results

Methods

Transects were walked along a chosen set navigable route and the distance recorded. For every *Platymantis* sp heard, the distance along the transect and the perpendicular distance to the location of the calling frog was recorded. Initially transects were completed along a gradient, from outside the watershed reserve amongst coconut plantation, towards the centre of the watershed reserve and the potentially least disturbed forest. Transects that entered the watershed from different directions were completed to try and omit any landscape directional gradient biases. Later transects were completed in central sites in the watershed to compare with forest edge estimates. Totally random placement of transects was impractical. Original transect routes were repeated and numbered ribbons were tied to branches within 1m of calling frogs, therefore on a subsequent transect the position could be recognised again.

The Programme DISTANCE (Laake *et al*., 1993) was used to estimate density. Four different estimator models were used, and the optimum model, with the best fit and the lowest Akaike information criterion (AIC) was selected by DISTANCE. The histograms for best fit of the detection function were examined for potential problems (e.g. input errors, heaped and spiked data) (Brady.L 1993). The forest transects have been split into different sections appropriate to their distance from agriculture, and densities calculated to assess whether densities change with distance from the edge.

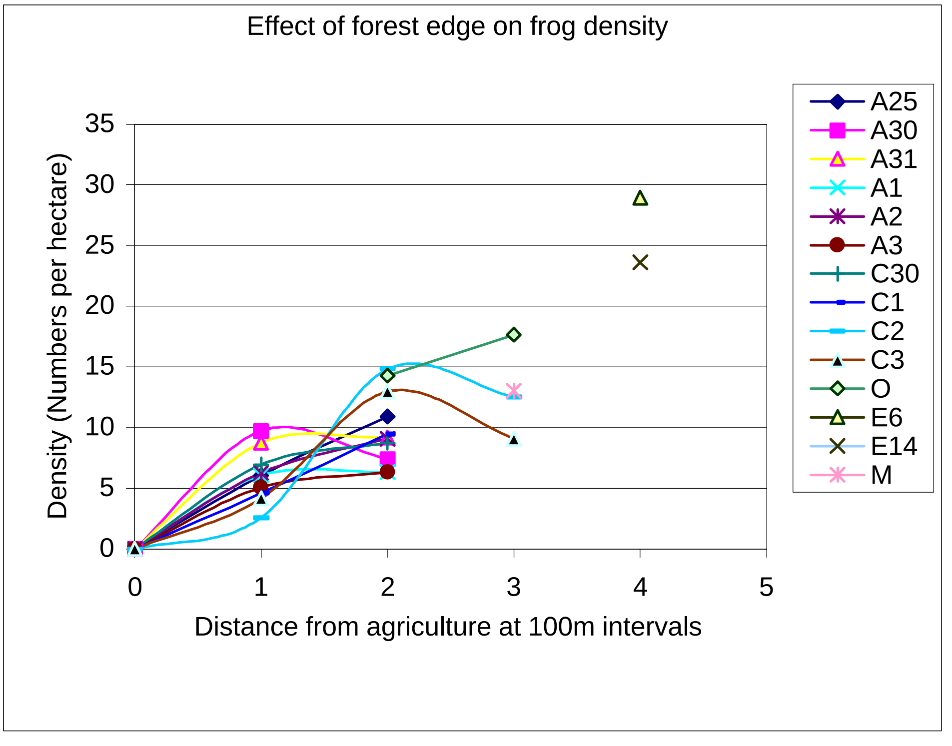
RESULTS

Density estimates are given in individuals per hectare.

Graphs (see appendices) show the distribution of frogs encountered on transects. Clusters of points from different transect nights often correspond to the same calling location, it is not possible to determine if the same frog was calling from that location. The 'edge' transects have been analysed from where the first *Platymantis* sp starts calling from, although the transects started several hundred metres before, to ensure no frogs were overlooked. The third edge transect starts from where fewest frogs were heard calling, because of time constraints.

Forest edge transect A density estimates ranged from 5.2 to 11.8 per hectare (mean 7.85, n=6). Forest edge transect C density estimates ranged from 3..8 to 6.2 per hectare (mean 5.15, n=4). Central forest transect estimates were 13 (transect M, n=1) and 26.2 (transect E, n=2).

Splitting the edge transects up into 200m blocks revealed that densities tended to increase with distance into forest (see appendix for the 1st, 2nd and 3rd 200m density estimates which are also illustrated in the graph below).



Distance from agriculture is plotted by approximate distance from agriculture. The distance to the edge of the forest is used approximated to the nearest 100m , with the edge transects divided up into sections 200m long (see appendix). Each transect is labelled by site (A, C, M, O, E) and by the date (25/8/99, 30/8/99, 3/9/99 etc. For full dates see appendix). Repeated transect nights and transect sites are therefore displayed together. The data legend therefore corresponds to the transect and the day of the month the transect was completed.

Discussion

Highest densities of *Platymantis* sp are found in the central forest areas, in particular site E. This site had the highest diversity indices and was predicted to be the most pristine habitat by all other assessments. *Platymantis* sp were absent in agriculture and found at their lowest densities where forest meets coconuts, with increasing densities with distance from agriculture.

The data set was relatively small and it would be expected that the detection function for an aural cue (such as a calling *Platymantis* sp) would be different to a visual cue. However the chance of detecting a calling frog was high and all transects contained reasonable numbers of frogs such that sensible confidence limits and well fitting detection models were applied. All suggesting the model selected by DISTANCE is realistic.

The densities calculated for one site varies from one transect night to the next. All lie within the appropriate confidence levels of the estimates except for one (see appendix) and most estimates are very similar. This suggests the frog activity changes from night to night, but a reasonable estimate of total density of calling males at a site can be made from one transect night.

Absolute population size cannot be estimated, because male and female survivorships may not be related and because maximum counts of calling males may not be constant proportions of the adult population (Zimmerman 1994). Therefore densities estimated by the aural transects are only for male frogs and are an underestimate of total population densities, whereas males, females and juveniles where found using the timed counts and transects.

Disagreement exists on whether edge has important effects on tropical amphibians (Duellman 1978; Zimmerman & Rodrigues 1990 vs. Gambold & Woinarski 1993; Culotta 1995). My results suggest a significant edge effect whereby frog density does not reach maximum levels until at least 200m or more from the forest edge. The highest densities recorded reach up to 28 frogs per hectare. None of the edge transects reach these densities despite travelling at least 600m into the forest. However other central forest sites (such as site M, density =13 frogs/ hectare), do not approach such high densities. The edge transects A and C are very suitable for this kind of study, but not necessarily typical, because when the forest stops, there is a definite boundary where agriculture replaces forest. Edge transect O is not so clear cut, agriculture and small forest patches are interspersed, which explains the immediately higher densities of frogs at transect O than A and C.

Forest fragments are often much smaller than the 200 edge threshold required to reach maximum densities and so presumably support lower densities than larger forest tracts. The importance of forest for the survival of this species is essential. Individuals were heard calling outside forest (on the 3 hour walk from Polillo town 45 different frogs were heard calling. All were heard in isolation and only amongst patches of trees), but this species is highly restricted to forest habitat. Amphibians vary in dispersal ability (Sinsch 1990), which suggests that species may exhibit differential success in surmounting barriers created by habitat fragmentation (Pearman 1997). The dispersal powers of this frog are unlikely to be large. This species clearly prefers living above 2m from the ground with at least some canopy cover. Without linked patches of forest this species is likely to decline due to isolation and reduced densities resulting from edge effect on small forest patches.

When the frogs are in lower densities calling sites seem to be more constant, as can be seen from the diagrams of transects A and C (see appendices) i.e. nearer to forest edge than in core forest. At high densities there is still evidence for favoured calling sites. It is not possible to say whether the same frogs are calling from the same position on consecutive nights. Possibly lower densities of calling males reduces competition for calling positions. Favoured calling sites may be due to a lack of suitable calling positions sites at edge sites compared to core forest. Pinpointing individual frogs was more accurate when frogs called at low densities, compared to high densities where it takes longer. Reduced clustering of calling positions on consecutive transect nights in forest may be due to increased inaccuracy of pinpointing locations. The labelled ribbons showed that relocating an identical calling position can result in discrepancies in measurements of more than 5m.

Densities per hectare calculated for *Platymantis* sp from the transect data are:

	O	N	M	L	K	J	H	G	F	E	D	B	A
Psp	0	0	0	83	42	0	0	0	0	63	21	0	0

There is no distinction between forest and edge sites from the above data. Some of the central forest sites have densities of 0, whilst some of the edge sites have densities of 83 (affected by finding a frog repeatedly in exactly the same position on two consecutive nights by independent observers). However averaging the densities and assuming all the forest sites have the same densities produces an average density of 26.1 per hectare. Considering that females and juveniles are calculated in that estimate it is probably a reasonable comparison to the estimates generated by DISTANCE. This suggests that transect data would approach accurate density estimates if the sample size increased greatly. However from this study the density estimates from transects are not reasonable, because too few frogs were found.
Platymantis sp is spatially separated from the other *Platymantis* which are all ground dwelling or found amongst shrubs and bushes up to a metre above the ground. The other frogs frequently found above 2m (*P.leucomystax,R.pardalis,R.everetti*) all depend on water to breed and are usually found clustered at the edges of water bodies, whereas the DISTANCE data shows *Platymantis* sp are found at a distance from water.