The spread and potential distribution of the South African praying mantis, *Miomantis caffra*, in New Zealand

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Background

- The South African mantid, *Miomantis caffra*, was first recorded in New Zealand in 1978 in the Auckland suburb of New Lynn.
- New Zealand distribution of *M. caffra* was mapped in 1990 (Ramsay 1990).

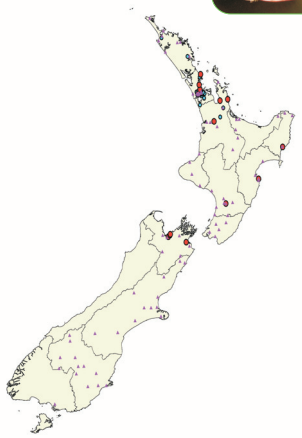

Figure 1. Distribution of *M. caffra* and the native mantid, *O. novaezealandiae* in New Zealand. Blue dots are locality records for *M. caffra* published in Ramsay (1990). Red dots are locality records for *M. caffra* collected since 1990. Purple triangles are locality records for *O. novaezealandiae* published in Ramsay (1990).

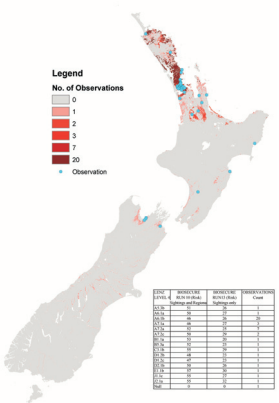

Figure 2. Number of *M. caffra* observations (locality records) in each LENZ environment (at LENZ level 4). Darker colours indicate LENZ environments with the greatest number of observations. See Leathwick et al 2002 for descriptions of each LENZ environment.

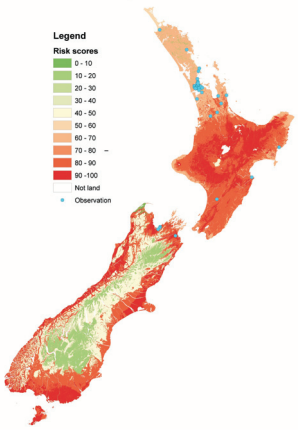

Figure 3. Similarity between minimum temperature (°C) in areas of South Africa (native range) where *M. caffra* is present and minimum temperature throughout New Zealand. Risk scores are a similarity ranking, higher scores (red) are regions of New Zealand most similar to the native range of *M. caffra* in terms of minimum temperature and therefore at highest risk of establishment by M. caffra. Dots are locality records for *M. caffra* in New Zealand.

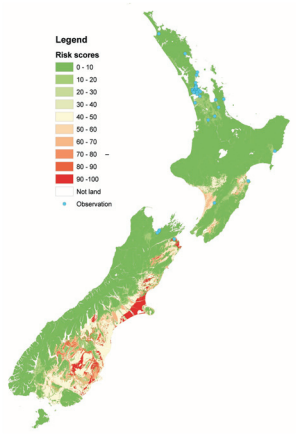

Figure 4. Risk scores (for *M. caffra* establishment in New Zealand) based on similarity between mean annual precipitation (mm) at locality records for *M. caffra* in South Africa (native range) and mean annual precipitation (mm) throughout New Zealand. Risk scores are a similarity ranking, higher scores (red) are regions of New Zealand most similar to the native range of *M. caffra* in terms of mean annual precipitation. Dots are locality records for *M. caffra* in New Zealand.

Our research

Current distribution

- 17 new locality records of *M. caffra* in New Zealand were collected from various sources to determine the spread of *M. caffra* since 1990 (Figure 1).
- The LENZ (Land Environments of New Zealand) environments currently occupied by *M. caffra* (A6.1, A7.1 and A7.2) are typical of Northland, Auckland and parts of Waikato, with warm conditions and relatively high rainfall (Figure 2; Leathwick et al. 2002). There is likely to be further spread within these environments, which are climatically suitable for establishment. *M. caffra* typically occurs in open habitats rather than closed canopy, forest habitats.

Potential Distribution

- Latitude and longitude locality records from the native range of *M. caffra* (obtained atitude and longitude locality records from the native range of *M. caffra* (obtained f module (developed by Landcare Research) to determine the potential range of *M. caffra* in New Zealand based on similarities in climate variables between the native and introduced ranges.
- The minimum temperatures experienced by *M. caffra* in its native range overlap substantially with those throughout New Zealand (Figure 3). Female *M. caffra* are able to survive winters in Auckland as adults more readily than the native mantid, *Orthodera novaezealandiae,* and temperature may not be as important in *M. caffra* egg development and hatching as it is in *O. novaezealandiae* (Ramsay 1990). *O. novaezealandiae* is established in some of the coldest regions in New Zealand (Figure 1) and therefore, *M. caffra* would be expected to survive in colder, southern regions of New Zealand if ootheca were transported to those regions.
- *M. caffra* has established in relatively wet areas of New Zealand compared to the drier environments experienced in its native range (Figure 4).

Conclusions

- *M. caffra* has established in wetter areas of New Zealand than would have been predicted from climatic conditions in its native range. Based on overlap of minimum temperatures between its native range and New Zealand, *M. caffra* would be expected to establish throughout much of New Zealand.
- *M. caffra* is in the early stages of range expansion and is not yet occupying its full distribution potential in New Zealand.
- Current distribution is likely to be primarily the result of dispersal limitation, rather than unsuitable environmental conditions in regions where it does not occur.

References:

Leathwick, J., Morgan F., Wilson, G., Rutledge, D., McLeod, M., Johnston, K. 2002. Land Environments of New Zealand: A Technical Guide. Ministry for the Environment, Wellington.

Ramsay, G. 1990. Fauna of New Zealand: Mantodea, DSIR Publishing, Wellington

Future research

- Systematic surveys are required to further delimit the distribution of *M. caffra* in New Zealand.
- How do climate variables (temperature, precipitation, humidity, etc.) affect development & survival of *M. caffra* adults and ootheca?
- Is the current distribution a result of spread within New Zealand from the initial Auckland site of establishment or have multiple border incursions occurred via human-mediated dispersal and transportation of ootheca?

Acknowledgements:

This research was supported by an Auckland University summer studentship and Landcare Research. Thanks to Janice Willoughby (LENZ), Robert Gibb (BIOSECURE), Fraser Morgan (GIS), Janie Jansen (Graphics), Grace Hall (NZAC), Darren Ward and Jacqueline Beggs (Auckland University), Stephen Moore (mantid photos) and all those that helped with mantid records, particularly members of the New Zealand Entomological Society.