Call for Small Proposals – Climate Impact Data Sets

ARC ESS Network – Biological Physical Impacts Nodes

TITLE: Developing an alpine species database from museum and historical records

PROPOSER: Dr John Morgan, Department of Botany, La Trobe University, Bundoora
3086. Email: J.Morgan@latrobe.edu.au

Aim: To compile information on plant species distribution and flowering from alpine areas using historical datasets contained in naturalists journals, botanists notebooks/diaries and herbarium collections. These datasets provide the opportunity to create a baseline from which changes in species distribution and flowering over the last 60-150 yrs can be quantified, and from which future changes can be assessed.

Project Description: Many historical sources of information exist about the distribution and flowering of plant species from very early after Australia’s settlement by europeans. These sources include naturalist and Royal Society journal articles held in libraries, diaries of early explorers held in museums, and herbarium collections in state herbaria. These sources are important (and largely overlooked) respositories of information for assessing temporal change in the distribution and flowering of plant species (Primack et al 2004). Because they provide insights over the scale of decades or even centuries, they should assume an important role in assessing biological responses to climate change, particularly where these changes may be slow to occur and influenced by seasonal variability.

Mountain tops and, in particular, alpine areas, are important locations to assess impacts of climate change on native species because they represent the thermal limits for
many species and hence, are expected to be one of the first places changes in species composition due to global warming can be detected. Because of the short growing season, and with many species dependent on temperature for flowering, shifts in the timing of flowering may also be detected. Importantly, alpine areas are often well-defined locations where confusion in unlikely to occur about the naming of the place (e.g. Mt Feathertop relates to a discrete peak) and, because they are above the treeline (i.e. the thermals limits of growth by trees), they often represent well-defined areas where search effort is likely to have been concentrated. Hence, false absences (i.e. failure to detect a species when it is actually present) are likely to be lower than in more timbered or dense vegetation. Of great significance is the fact that mountain-tops have long held a fascination with naturalists and biologists (the world over) and hence, there are many very early botanical expeditions to these peaks which can serve as useful references to detect future changes. For example, Baron von Mueller first ascended Mt Buller in 1853 and made a collection of herbarium specimens that totaled more than 100 plant species. Many of these now reside in the National Herbarium of Victoria and could serve as a resource for revisitation studies to this mountain peak to assess which species have survived these last 150 years.

By collating species lists and phenological observations of mountain-top plants from historical records into a single database, there is an important opportunity to use such information as the basis for revisitation studies. Such information is likely to be useful because it (a) spans many decades, (b) currently exists in a fragmentary nature and (c) could focus future work on the assessment of phenological and distribution shifts of alpine species.

**Budget:** To undertake this project, I need to employ a Research Officer (10 weeks @ $765 per week plus 26% on-costs) to develop the database framework (using Microsoft
Access). They would also be responsible for conducting an extensive literature search, as well as herbarium searches for early botanical specimens. I also need to provide a budget for Inter Library Loans costs (approx. $400). Total budget requested to develop the database: $10000

**Outcomes:** A database containing species lists relating to defined alpine peaks (probably concentrating on Victoria to start with) and phenological data (including dates of flowering based on herbarium specimens). These data would then be made widely accessible to researchers, possibly by having them available on the Web. It is envisaged that the dataset would provide the impetus to conduct revisitation surveys of alpine peaks to assess species presence/absence, as well as phenological studies.