

**Reference Entomology****RECOMMENDATION****1. That the NAMP Technical Committee NOTE:**

- a) Initiation of a project to develop a key to help to identify females of all species present in Australia
- b) Increasing interest in *Culicoides* as potential vectors of lumpy skin disease virus
- c) Some of the issues surrounding naming and recording of species in the NAMP Info database

**BACKGROUND****2. The functions of the NAMP reference entomology program are:**

1. Confirm identification of *Culicoides* specimens collected by NAMP;
2. Build and maintain a reference collection of Australian and important exotic species of *Culicoides* DNA barcodes and both slide-mounted and ethanol preserved specimens to assist with identification of specimens collected by NAMP;
3. Provision of mounted specimens of *Culicoides* species to NAMP entomologists on request;
4. Assisting in the preparation of identification aids for *Culicoides* species;
5. Provide advice and reports to stakeholders and clients (particularly producers, exporters, and AG-DAFF) as required;
6. Monitor NAMP entomology operations to ensure that they are effective and efficient in meeting the program objectives and report to the program manager;
7. Advise the program manager of national and international entomology issues which may affect the future focus of the NAMP;
8. Coordinate and propose to the NAMP Technical Committee, technical development of the NAMP entomology capacity as required;
9. Contribute to the maintenance of the NAMP Business and Operational Plans including ensuring that an adequate budget is proposed for agreed reference entomology activities;
10. Outsource slide mounting of *Culicoides* specimens to Biting Midge Laboratory Services;
11. Monitor succession training for the role of Reference Entomologist;
12. Facilitate the publication of technical entomology material for the NAMP as agreed by the NAMP Technical Committee.

Almost all of the NAMP reference entomology budget is used to outsource the mounting of specimens onto slides (function 10) which is required to facilitate the identification of specimens (function 1), build a reference collection (function 2), provide specimens to other entomologists (function 3), identify changes in risk posed by exotic species (function 7) and used in the production of identification aids (function 4). Where required, for example the detection of species not previously reported from Australia, confirmation of identifications is provided by DNA analysis conducted by NSW DPI (function 1) relies on data from the DNA library (function 2). A system to pay for this service is now available and part of the Reference Entomology budget is being used to support this function.

**DISCUSSION****1. Detections**

No detections of exotic species were made during 2021/2022.

**2. Identification Service**

A total of 14279 specimens from 45 collections were received for identification from Qld and 241 specimens from 177 collections from the southern states. This increase from previous

years is a reflection of the number of new staff in the program. Mounting of some of these specimens onto slides and submission for DNA barcoding continues and the reference collection is slowly becoming more comprehensive.

### **3. Identification aids**

A project to develop a key to assist with the identification of female specimens of all species present in Australia was initiated in March. A draft key will be presented to NAMP entomologists at a workshop later this year, probably in Orange. Feedback from the workshop will be incorporated into the key which will be finalized early in 2023.

### **4. Lumpy skin disease**

The encroachment of lumpy skin disease into our region has prompted a need for information on potential vectors of this virus in Australia and neighbouring countries. DAWE has funded a project investigating midge species that attack bovids in Thailand by testing blood meals of specimens, direct collection of specimens from animals and testing of specimens for the presence of the virus. Charles Darwin University is managing the contract with the bulk of the work being conducted by 2 universities in Thailand.

### **5. Undescribed and unidentifiable species naming system on NAMP Info**

The *Culicoides* fauna of Australia includes a large number of undescribed species. The picture atlas of Australasian *Culicoides* wings by Dyce et al included all of the described and undescribed species known to occur in the region and placed them into either formal subgenera or one of several informal subgeneric groups. These groups are named after the earliest described species in the group, for example, the Ornatus Group is named after *Culicoides ornatus* which was described in 1918, which is earlier than any other members of the group.

Dyce et al chose to identify the undescribed species within each group by assigning a number to each species along with the group it belongs to, for example, *Culicoides* Ornatus Group species number 6 is the 6<sup>th</sup> undescribed species belonging to the Ornatus group to appear in the atlas. This system has since been adopted by NAMP Info but appears to be causing some confusion as several records of undescribed species have been ascribed to the nominate species of the group. For example, there are numerous records of *C. ornatus* from inland NSW when in fact, true *C. ornatus* is not present in NSW and is a coastal species that is never found more than 25km from the coast. I've checked some of the NSW specimens ascribed to *C. ornatus* in the database and they in fact belong to the undescribed species *C. Ornatus* Group Species number 8. I suspect that the mistake is one with data entry rather than species identification, possibly due to confusion over the difference between *C. Ornatus* Group Species number 8, which is often abbreviated to *C. Ornatus* #8, and *C. ornatus*. These mistakes were first noticed when a team from UNE tried to publish NAMP data from the New England Tablelands which contained quite a few incorrect records and has prompted the need for us to clean up our data and check what data is being provided to external researchers.

Another pair of potentially confusing terms relate to groups of species that are difficult to identify. The informal subgeneric groups of Dyce et al are available on NAMP Info for specimens that are unable to be identified to species but are able to be placed within a group. In these cases, specimens can be recorded as belonging to, for example, the Antennalis Group or Subgenus Hoffmania etc. Similarly, there are complexes of species within a group that can be separated from other species in the group but not from each other and these can be recorded as belonging to a complex. Often they can't be identified further as the characters needed for further identification are not visible unless the specimen is mounted onto a slide or if the only characters available for separating species are in the male, rendering females as unidentifiable to species. Examples of complexes include the Nattaiensis complex, Bundyensis complex and Victoriae complex. Bear in mind that the Victoriae complex contains species which are inseparable from *C. victoriae* whereas

the Victoriae Group is a broader grouping that contains many more species, most of which can be separated from *C. victoriae*. Also worth noting that group and complex names are not written in italics as italics are only used for Genus and Species names.

I hope that the above explanation of the naming system used in NAMP Info will provide some context to the terms being used and help prevent similar mistakes from occurring. We will work towards identifying potential mistakes in the database so that future workers will know to treat these records with caution. We will also update the species lists available in NAMP Info to suit our needs.

#### **FINANCIAL IMPLICATIONS**

*Nil*

#### **CONSULTATION/COMMUNICATION**

The development of the key is progressing with considerable consultation with NAMP entomologists. Draft keys to species within some species groups as well as illustrations and distribution maps have been distributed for comment and this will continue until all end users are satisfied with the product.

#### **NEXT STEPS/ACTIONS**

*Nil*