International response under the Antarctic Treaty System to the establishment of a non-native fly on the South Shetland Islands

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**Information Paper by the United Kingdom and Uruguay**

***Summary***

The United Kingdom and Uruguay present information relevant to the potential development of an internationally agreed non-native species management plan for the non-native fly *Trichocera maculipennis* in the South Shetland Islands and the wider maritime Antarctic region.

***Background***

Antarctica currently has few non-native species, compared to other regions of the planet, due to the continent’s isolation, extreme climatic conditions and the lack of habitat. However, human activity, particularly the activities of national governmental operators and tourism, increasingly contributes to the risk of non-native species transfer and establishment in terrestrial ecosystems of the region.

The CEP Non-native Species Manual (Edition 2019) Annex ‘*Guidelines and resources requiring further attention or development*’ highlights the need to identify potential non-native species that present a high risk to Antarctic environments. *Trichocera (Saltitrichocera) maculipennis* Meigen, 1888 is a non-native fly originating from the Northern Hemisphere that was unintentionally introduced to King George Island in the maritime Antarctic South Shetland Islands around 15 years ago, since when it has been reported within or in the vicinity of several research stations. It is not explicitly confirmed that *T. maculipennis* has established in the natural environment, but life-history characteristics make this likely, thereby making potential eradication or control a challenge.

***Recent developments***

In the CEP XX Final Report (para. 190), referring to this species, the Committee encouraged Parties to ‘develop coordinated standardised monitoring and eradication programmes to effectively control the spread of the flies’. Working and Information Papers concerning different aspects of the fly’s introduction, establishment and dispersal have been submitted to the CEP by several Members and Experts in recent years (ATCMXXXIV IP50; ATCMXXXIX WP52; ATCMXL WP26; ATCMXLII IP20; ATCMXLII IP38). Antarctic Treaty Parties active in the region are developing a coordinated and expanding international response to monitor and control *T. maculipennis* within and around stations in the affected area (see Figure 1). However, there remains no overarching non-native invasive species management plan for *T. maculipennis* in the South Shetland Islands, or for the wider maritime Antarctic region that shares similar environmental conditions and habitats.

Options towards the development of an internationally agreed non-native species management plan are presented in the academic publication attached to this Working Paper (Attachment A: Remedios-De León, M., Hughes, K. A., Morelli, E., Convey, P. (2021) [International response under the Antarctic Treaty System to the establishment of a non-native fly in Antarctica](https://link.springer.com/article/10.1007/s00267-021-01464-z). Environmental Management 67: 1043-1059), which resulted from a SCAR Fellowship and is a contribution to the SCAR Ant-ICON (Integrated Science to Inform Antarctic and Southern Ocean Conservation) research programme.

Suggested measures that Parties may wish to consider are presented in Table 1, and include potential measures on education, monitoring, reporting, reduction of fly dispersal, prevention of reintroduction, international cooperation and coordination and fly eradication. It should be noted that *Trichocera maculipenis* is winged and can fly, and therefore its arrival at further research stations could plausibly be through ‘natural/unaided’ dispersal from existing colonised stations.

***Potential policy needs to support Parties’ responses to non-native species introductions***

The development of a non-native species management plan for the fly *T. maculipennis* may be supported by the development of policy guidelines clarifying:

* the use of pesticides, in accordance with Annex III to the Protocol, in order to reduce the risk of conflicting interpretations by Parties attempting to eradicate non-native species.
* the level of acceptable environmental damage caused by an eradication attempt (see Annex II, Article 4(5)) and the range of endorsed methodologies available. Such information may also help Parties complete the mandatory environmental impact assessment process before commencing any eradication or control activities (Annex I to the Protocol).
* which introduction events may trigger unilateral, multilateral or all Treaty Party responses. Sharing of information and receiving early warming of expanding non-native species distributions may allow Parties to amend their practices accordingly, or join international efforts to monitor, control or eradicate the species as coordinated by COMNAP, CEP or any locally formed management groups.

***Conclusions***

The development of an internationally agreed non-native species management plan for the fly *T. maculipennis* may help deliver co-ordinated management of this increasing widespread non-native species. Further work by the CEP to provide guidelines on non-native species management may help in the on-going delivery of a timely and effective response to *T. maculipennis* and potentially other introduced species.

Figure 1. Map indicating the locations of research stations in the vicinity of the *Trichocera maculipennis* introduction area. The stations are classified as follows: stations undertaking or planning monitoring, where evidence of flies has been found (red squares), stations undertaking or planning monitoring with no evidence of fly colonisation (yellow squares) and stations not yet involved in a fly monitoring programme (green squares). The red square indicates the area first colonised by the fly.

***Mapa

Descripción generada automáticamente***

Table 1. Potential practical control measures to reduce the population size and further distribution expansion of *Trichocera maculipennis*

|  |  |
| --- | --- |
| No. | Measures |
|  |  |
|  | *Education of station personnel and those arriving on King George Island* |
| 1 | Implementation of effective educational and training practices. Posters and information leaflets should be placed at the entry points to Antarctica and at each station on King George Island informing visitors of the presence of the invasive species and the efforts that are being made to eradicate it from Antarctica. Educational information should also be disseminated at Punta Arenas airport and other points of entry from the South American mainland. |
| 2 | Station personnel should be made aware of the importance of cleanliness of rooms and common spaces to ensure locations for flies to shelter or reproduce are minimized. |
|  |  |
|  | *Monitoring* |
| 3 | Monitoring activities should be put in place, or existing monitoring maintained, across the stations on King George Island, and potentially beyond. To quantify fly numbers, sticky traps and ultraviolet traps should be deployed in potential breeding areas within stations, with these methods also having the benefit of reducing flying adult population numbers. |
| 4 | To track the potential spread of the *T. maculipennis*, monitoring should also be undertaken at research stations and in the natural environment, in areas beyond the known distribution of the fly. |
| 5 | To ascertain the environmental requirements of *T. maculipennis* in Antarctica, water treatment chamber and field environmental temperatures should be recorded. This would allow a comparison of temperature vs. survival rates, thereby informing management practices applied to the sewage system that may make them less favourable for reproduction and survival of the species. |
|  | *Reporting* |
| 6 | Personnel on stations in the South Shetland Islands should report immediately the presence of flies on station or in the natural environment to their station leader and those responsible for environmental management and protection. Steps should be taken to minimize the likelihood of inadvertent dispersal of the fly to other locations/buildings. |
|  |  |
|  | *Steps to reduce dispersal of the flies from colonized stations* |
| 7 | Sewage systems should be airtight or, failing that, be supplied with a fine mesh grid to prevent movement of adult flies. Grills should be placed in ventilation ducts to prevent the entry and exit of adult flies. Frequent cleaning of the sewage systems should be considered, for instance monthly. |
| 8 | Storage areas for materials under areas under buildings should be removed to reduce the availability of shelter locations for adult flies. |
| 9 | To prevent dispersal of the flies, vehicles entering and leaving stations should be rigorously cleaned, which may require a dedicated cleaning location. |
|  |  |
|  | *Steps to prevent re-introduction of* T. maculipennis *or introduction of other invertebrates from outside Antarctica* |
| 11 | Biosecurity measures should be implemented by all national Antarctic programmes and the tourism industry to ensure the risk of non-native species introductions is minimized. Biosecurity guidance and information can be obtained from the CEP *Non-native Species Manual* (Edition 2019) and the SCAR and COMNAP *Inter‐continental checklists for supply chain managers of the national Antarctic programmes for the reduction in risk of transfer of non‐native species* (version May 2019). |
|  |  |
|  | *International cooperation and coordination* |
| 12 | National Antarctic programmes should meet (either physically or virtually) at least annually to review progress in addressing the fly introduction and to plan further action. |
| 13 | Science: National Antarctic programmes should continue to work together in a coordinated manner, using comparable methodologies to monitor fly population numbers, and sharing scientific information. |
| 14 | Environmental management: National operators should develop common methodologies to control the fly and reduce dispersal through inter-station movement. |
|  |  |
|  | *Eradication* |
| 15 | Earlier experiences at Artigas and King Sejong stations have shown that unilateral eradication of *T. maculipennis* from research stations has been followed by rapid recolonization. Stations where the fly has been eradicated may be rapidly recolonized from populations resident in other stations or in the natural environment. Therefore, it is essential that national Antarctic progammes coordinate their eradication activities so that all populations within stations are eradicated simultaneously, thereby reducing the opportunity for re-colonization. |