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Non-native flies in sewage treatment plants on King George Island, South Shetland Islands

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A Working Paper submitted by the Republic of Korea, the United Kingdom, Chile and Uruguay

Summary

Non-native flies have colonised several station sewage treatment plants on King George Island, South Shetland Islands. The Republic of Korea, United Kingdom, Chile and Uruguay recommend that the CEP: (1) promotes a co-ordinated international response by encouraging Parties with stations on King George Island to check their sewage treatment plants for non-native invertebrate infestations and, if present, join collaborative research to identify and determine the origin of these species; and (2) asks COMNAP to report on the extent of sewage treatment plant infestations across the Antarctic Treaty area and investigate practical methods of infestation prevention, monitoring and response.

Background

Until recently the Antarctic continent and Peninsula have been little impacted by non-native species, compared to other regions of the Earth. However, reports of species introductions are increasing as awareness of biological invasions as a major conservation threat, within the context of increased human activities and climate change scenarios, has grown within the Antarctic community (ATCMXXXVIII – IP46; Newman et al., 2014; Hughes and Frenot 2015).

While most Antarctic non-native species have been found in the natural environment, non-native species have also established populations within Antarctic buildings, sewage treatment plants and hydroponic facilities (ATCM XXXV – WP 25 rev.1; Hughes et al., 2005). The CEP Non-native Species Manual (endorsed by the ATCM through Resolution 6 (2011) and under revision during the 2015-16 intersessional period) recommends, as a key guiding principle, that *‘to be effective, responses to introductions should be undertaken as a priority, to prevent an increase in the species’ distribution range and to make eradication simpler, cost effective and more likely to succeed’*. Therefore the successful management of non-native species, including those within station buildings, should be a priority.

Non-native flies in sewage treatment plants on King George Island

Within the past decade there have been reports of sewage treatment plant infestations by flies at three research stations around Maxwell Bay, King George Island, all of which lie within 10 km of one another (see Table 1). The infestation that has received the greatest scientific study is the case of the boreal trichocerid fly *Trichocera maculipennis*, first discovered in the sewage system of the Uruguayan Artigas station (Volonterio et al. 2013; Figure 1A). Following eradication attempts, this species recolonised the Artigas sewage tanks. The origin of the recolonizing flies is not known, but flies resident in another local station sewage treatment plant may have recolonized the Uruguayan sewage treatment plant. Alternatively, a greater concern is that this fly species may have established a currently undetected source population in the natural environment of King George Island. As this northern hemisphere species is pre-adapted to cold environments, flies resident in the natural environment may have recolonized the station. *Trichocera maculipennis* is already a persistent non-native species in the natural environment of some sub-Antarctic islands (Frenot et al., 2005).

The flies within the Chilean Frei station sewage facility have yet to be formally identified, but those that have colonised King Sejong station sewage treatment plant in 2013/14 are the same species as found on neighbouring Artigas station (i.e. also *Trichocera maculipennis*; see Figure 1B). During October 2015, the Republic of Korea undertook measures to clean the sewage treatment plant and remove the non-native fly. However, by December the fly had recolonized the sewage treatment plant. This is the third example of

attempted fly eradication from sewage treatment plants in different stations located across Antarctica, all of which have failed.

Potential for international collaborative research

Given the scale of non-native species colonisation in King George Island stations and the capacity of non-native flies to disperse around the local area, and the risk of further distribution, collaborative research and management action by all affected Parties is likely to produce the best outcome, in accordance with Annex II of the Protocol. The Republic of Korea is willing, therefore, to co-ordinate this collaborative work with other interested Parties. The work will:

- identify the non-native flies present in the local area;
- determine their local distribution and origin; and
- identify practical and co-ordinated management responses for fly eradication or control.

Recommendations

The Republic of Korea, United Kingdom, Chile and Uruguay recommend that the CEP:

- promotes a co-ordinated international response by encouraging Parties with stations on King George Island to check their sewage treatment plants for non-native invertebrate infestations and, if present, join collaborative research to identify and determine the origin of these species; and
- asks COMNAP to (1) report on the extent of sewage treatment plant infestations across the Antarctic Treaty area and (2) investigate practical methods of infestation prevention, monitoring and response, in accordance with the key guiding principles of the CEP Non-native Species Manual.

Supporting documentation

Frenot, Y., Chown, S.L., Whinam, J., Selkirk, P., Convey, P., Skotnicki, M., Bergstrom, D. 2005 - Biological invasions in the Antarctic: extent, impacts and implications. *Biol. Rev.*, 80, 45–72.

Hughes, K.A., Frenot, Y. 2015 - Status of known non-native species introductions and impacts. Antarctic Environments Portal Information Summary Version 1.0. <https://environments.aq/information-summaries/status-of-known-non-native-species-introductions-and-impacts/>

Hughes, K. A., Walsh, S., Convey, P., Richards, S., Bergstrom, D. M. 2005 - Alien fly populations established at two Antarctic research stations. *Polar Biol.*, 28, 568-570.

Newman, J., Coetzee, B.W.T., Chown, S.L., Terauds, A., McIvor, E. 2014 - The introduction of non-native species to the Antarctic. Antarctic Environments Portal Information Summary Version 1.0. <http://environments.aq/information-summaries/the-introduction-of-non-native-species-to-antarctica/>

Peter, H.-U., Braun, C., Janowski, S., Nordt, A., Nordt, A., Stelter, M. 2013 - The current environmental situation and proposals for the management of the Fildes Peninsula Region. German Federal Environment Agency, Dessau. <https://www.umweltbundesamt.de/sites/default/files/medien/461/publikationen/4424.pdf>

Volonterio, O., de León, R.P., Convey, P., Krzeminska, E. 2013 - First record of Trichoceridae (Diptera) in the maritime Antarctic. *Polar Biol.*, 36, 1125-1131.

Tables and Figures

Table 1. Flies that have colonised sewage treatment plants of station around Maxwell Bay, King George Island^a

No.	Species	Station	Date introduced	Notes	References
1	<i>Trichocera maculipennis</i>	Artigas Station, Fildes Peninsula, King George Island	2006?	Early eradication attempt unsuccessful. Species observed in the surrounding environment	Volonterio et al. (2013)
2	Unidentified fly	Frei Station, Fildes Peninsula, King George Island	Pre-2009/10 season	Larvae still persist in the sewage treatment plant.	V. Vallejos, pers. comm., quoted in Peter et al. (2013), Sect. 3.1.4.
3	<i>Trichocera maculipennis</i>	King Sejong Station, Barton Peninsula, King George Island	2013/14	Eradication initiated in October 2015, but following facility cleaning the flies were detected again in December 2015	J. H. Kim, pers. comm.

^a The fly *Lycoriella ingenua* persists in the sewage treatment plant at Casey Station, Budd Coast, Wilkes Land, despite eradication attempts.

Figure 1A: The fly *Trichocera maculipennis* that has colonised the sewage treatment plant at the Uruguayan Artigas Base (Photo: O. Volonterio). B: *Trichocera maculipennis* collected in a UV trap at King Sejong Station (Photo: D. Kim)

