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Introduction

The 130 hectare Ilparpa Swamp is the most productive mosquito breeding site for *Culex annulirostris* in Alice Springs and therefore of major public health concern (Kurucz *et al.* 2002; Kurucz and Whelan 2010). Although the swamp is generally dry, summer rain can flood the area and cause mosquito breeding. This is exacerbated by the discharge of treated effluent from the adjacent sewage treatment plant directly into the swamp. *Culex annulirostris* is the principal vector for Ross River virus (RRV) and Murray Valley encephalitis virus (MVEV) (Whelan and Weir 1993; Russell 1998; Russell and Dwyer 2000). Although MVEV is not considered endemic in Alice Springs, it is believed to be introduced by infected hosts (herons and egrets) and wind-blown mosquitoes when the monsoon brings rain and favourable winds from the north (Whelan *et al.* 2003).

Summer rainfall over 170mm, associated with monsoonal conditions, is correlated with seroconversions to MVEV in sentinel chickens in Alice Springs, and thus rainfall can be used as an

Figure 1: Alice Springs Ilparpa Swamp
Aerial Control 23 January 2015

Legend:
- Area inundated
- Area controlled
- Swamp A trap
- Swamp B trap
- Old Times trap
indicator for MVEV disease risk (Whelan and Weir 1993; Whelan et al. 2003; Kurucz et al. 2005). Since 1974, a total of ten MVEV disease cases have been recorded in the Alice Springs region, with four cases reported from Alice Springs town (Medical Entomology annual report 2013/14).

In 2001, extensive flooding and two MVEV disease cases led to the first aerial control of Ilparpa Swamp using s-methoprene pellets, and together with MVE cases that occurred in 2000 was the catalyst for the establishment of a drainage system. In 2002 an open unlined drain (OUD) was constructed to convey water from the lowest part of the swamp into St Mary’s Creek, near the racecourse to the south east (Figure 1) (Kurucz et al. 2002). The project was a combined effort by the Department of Lands and Planning (DLP), Power Water Corporation (PWC), Department of Health (DoH), Alice Springs Town Council (ASTC) and the traditional owners of the area. Water entering St Mary’s Creek is rapidly lost through evaporation and infiltration into the sandy creek bed. The improved drainage returned the swamp to its original state (ephemeral swamp). Since the establishment of the drainage system, mosquito numbers have remained low, with regular control required. During periods of heavy rain however, the swamp still retains water for long enough periods to trigger mosquito breeding.

Between January and March 2010, Ilparpa Swamp received 349mm rainfall in addition to a large volume of treated effluent. Although the western part of the swamp quickly drained due to the efficient drainage system, the eastern part of the swamp had extensive areas of water pooling, and subsequent mosquito breeding. Aerial control of 46 hectares was successfully carried out by DoH, with the operation jointly funded by PWC and DLP. Adult mosquito numbers remained low and no MVEV disease cases were recorded (Kurucz and Whelan 2010).

![Figure 2: Ilparpa Swamp - total female Culex annulirostris collected in weekly CO₂ baited EVS traps](image)

In early January 2015, Alice Springs again received heavy rainfall associated with monsoonal activity in the north-east, indicating a possible MVEV disease risk. DoH responded by carrying out an aerial control operation in Ilparpa Swamp once again. This report describes this latest operation.

### Rainfall and Effluent Release

Between 8 and 13 January 2015, the Alice Springs Desert Park received 236mm rainfall (Australian Bureau of Meteorology 2015). In addition, an authorised (Environmental Protection Agency) wet weather discharge was carried out by PWC, with 50ML of treated effluent released from the sewage treatment plant into the eastern part of Ilparpa Swamp. The rain, combined with the treated effluent, inundated an appreciable part of the swamp (Figure 1).

To prevent a potential MVE outbreak and increase in RRV disease cases, DoH discussed the need for immediate aerial control of Ilparpa Swamp with PWC and DLP. Both agencies agreed to jointly fund an operation to be carried out on 23 January 2015.
Mosquito Survey and Control

On 22 January 2015, DoH staff carried out ground larval survey and control operations at various known breeding sites close to Ilparpa Swamp. The sites included the tree plantation, depressions west of the primary sewage ponds, the sprinkler irrigation area and St Mary’s Creek (Figure 1). High density Cx. annulirostris breeding was found at the tree plantation, with minor breeding detected in St Mary’s Creek. Culex quinquefasciatus breeding also occurred in low densities at both sites, and was the major species breeding in the depressions west of the ponds. All sites (1.66 ha) were controlled using s-methoprene products. The OUD was still flowing, with no mosquito larvae present.

On 23 January, DoH carried out an aerial survey in Ilparpa Swamp to determine the extent of inundation and density of larval mosquito breeding. While the most westerly part of the swamp had already drained and dried up considerably, with only minor Cx. annulirostris breeding detected, the eastern part, representing the lowest point, had extensive pooling, with an average of one larva per ladle dip (approximately 90 larva per square meter).

On the same day, a total of 33 ha of breeding area was controlled with s-methoprene pellets, using a Bell 206 III Jet Ranger with an Isolair spreader. The pellets were distributed at a rate of 3kg/ha.

Results and Discussion

Adult mosquito abundance around Ilparpa Swamp is monitored by deploying weekly CO₂ baited EVS traps (Figure 1). Culex annulirostris numbers were very low prior to the heavy rainfall in early January, but started to increase at all four monitoring sites in mid-January (Figure 2).

Following the aerial and ground control operations, Cx. annulirostris numbers in the ‘Greatorex’, ‘Swamp B’ and ‘Old Timers’ traps decreased immediately. The rapid decline in numbers was assisted by the dry weather conditions unfavourable for adult mosquito survival. Numbers in the ‘Swamp A’ trap continued to slightly increase, with a peak of 178 Cx. annulirostris recorded on 4 February, before numbers decreased, with the entire swamp considerably dried up by early February (Figure 2). The elevated numbers in the ‘Swamp A’ trap were most likely due to dispersal of adult mosquitoes from the drier western part of the swamp to the wetter low-lying areas at the eastern end, where widespread pooling of nutrient rich water and subsequent mosquito breeding occurred. However, peak adult numbers remained well below the pest threshold of 600 per trap/night in all traps, showing the success of the aerial control operation.

The efficiency of the Ilparpa Swamp drainage system enabled large volumes of water to be drained out of the swamp into St Mary’s Creek. This caused most of the western end of the swamp to dry up quickly, preventing mosquito breeding and the need for extensive control.

Mosquito monitoring showed that the jointly funded ground and aerial mosquito control operations were successful in keeping mosquito numbers down and preventing a potential mosquito borne disease outbreak, with no increase in RRV and no MVEV disease cases reported in Alice Springs.

This again highlights the importance of mosquito control carried out in Ilparpa Swamp following extensive inundation, and keeping the drainage system functional, as it substantially reduces water pooling and subsequent mosquito breeding in the swamp. To achieve this, it is suggested for annual maintenance to be carried out in the OUD and finger drains.
References


Medical Entomology, DoH annual report 2013/14.


