Aerial mosquito control of Ilparpa swamp, Alice Springs
12 March 2010
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Abstract

Alice Springs experienced high summer rainfall between January and March 2010, resulting in the Power and Water Corporation discharging large volumes of effluent into the Ilparpa swamp. Medical Entomology carried out an aerial mosquito larval control operation in Ilparpa swamp in March and adult mosquito numbers remained relatively low as a result of this operation. This operation was assisted by the efficient drainage of rainwater and effluent out of the swamp via the main outlet drain into St Mary’s Creek. It is important to maintain this drain and to enhance the Ilparpa drainage system to ensure efficient drainage of the swamp after rain to minimise the potential for arbovirus borne disease in Alice Springs.

Key words; mosquito, arbovirus, mosquito borne disease, Ilparpa swamp.

Introduction

The Ilparpa swamp, a 130 hectare area in Alice Springs, has long been a public health concern as an extensive breeding habitat for the common banded mosquito *Culex annulirostris* during summer to autumn. This mosquito is a major vector for Murray Valley encephalitis virus (MVE) and Kunjin virus (KUN), as well as Ross River virus (RRV). The last cases of MVE or KUN disease in Alice Springs occurred in 2001 when there were 2 cases of MVE and 2 cases of KUN disease. RRV disease has been recorded in Alice Springs almost every year from at least 2000 to 2010.

The potential for mosquito borne disease in Alice Springs was reduced in 2002, when a drainage system was established in Ilparpa swamp by the Department of Lands and Planning (DLP) in liaison with Power Water Corporation (PWC), Department of Health and...
Families (DHF), Alice Springs Town Council (ASTC) and the traditional owners. This system drained Ilparpa swamp via an open unlined drain (OUD) into St Mary’s Creek near the racecourse to the south east (Figure 1).

Since the main OUD from Ilparpa and the finger drains in the swamp that feed the OUD were established in 2002, mosquito numbers in the Ilparpa area have generally remained very low.

This paper details the effect of the heavy rainfall and effluent release in the Alice Springs area from January to April 2010 on mosquito numbers and measures taken to prevent mosquito borne disease.

**Rainfall and effluent release**

Between 6 and 11 January 2010 the Alice Springs airport received a total rainfall of 136mm but no sewage effluent from the Alice Springs sewage treatment ponds was released into Ilparpa swamp.

Adult mosquito numbers in Alice Springs are monitored weekly by a combined program with Environmental Health (EH) and Medical Entomology (ME) of DHF, with 5 weekly CO2 baited (EVS) traps set near Ilparpa swamp, including the sites Ilparpa swamp A, Ilparpa swamp B, Greatorex road, Lilliecrapp road and Old Timers Residential Aged Care Facility (Figures 1 and 2). While no *Cx. annulirostris* were recorded in the mosquito traps immediately prior to the January rain, *Cx. annulirostris* numbers started to increase following the rain, with numbers peaking at swamp B (660) on 17 February, at swamp A (392) on 24 February and Greatorex road (1071) on 3 March 2010 (Figure 3). During a ME visit on 17 February, it was noticed that there were areas of pooling and potential mosquito breeding in the sprinkler irrigation area to the west of the sewage ponds (Figure 1).

**Figure. 2. Alice Springs Shooter’s Range swamp & clay pans control 12 March 2010**
Between 24 February and 2 March Alice Springs received a further 213mm of rainfall, with reports of the Ilparpa road being flooded. Due to the appreciable rainfall, the PWC carried out an authorised (Environmental Protection Agency) wet weather discharge of excess effluent from the Alice Springs sewage ponds, with an estimated 452ML of effluent discharged out of the final evaporation pond (EP10) into the Ilparpa swamp A area between 24 February and 2 March.

The combination of rain and effluent release flooded an appreciable area in the Ilparpa swamp. The already high numbers of Cx. annulirostris meant that the new flooding was likely to lead to an explosive increase of Cx. annulirostris numbers. Previous analysis of summer rain in Alice Springs indicated that this rain and flooding posed a high potential for an MVE outbreak.1,2 Medical Entomology contacted PWC to discuss a possible aerial mosquito control operation in Ilparpa swamp to reduce the potential for arbovirus borne disease. PWC agreed to partially fund the insecticide (S-methoprene pellets) and helicopter costs for a once-off aerial control operation, with DLP also contributing to the costs.

Based on an aerial control operation carried out in Ilparpa swamp in 20013, ME estimated the flooded area to be controlled and decided to use S-methoprene pellets that give 30 days larval control to allow continuous control in residual flooded areas that could persist after the control operation. The control operation was planned for 12 March to allow for some drainage of Ilparpa swamp and before mosquito larvae resulting from the rain and effluent release could reach the adult stage.

### Larval survey operation

On 11 March ME staff carried out a ground survey of the sewage ponds, the sewage pond emergency outlet area (EP10), swamp A, swamp B, the tree plantation, the nearby effluent sprinkler dispersal area, the OUD which leads into St Mary’s Creek, St Mary’s Creek itself and the white gums area along Ilparpa road, to locate any mosquito breeding and evaluate the control requirements. The sprinkler irrigation and the swamp B area were dry, while low to high numbers of Cx. annulirostris and Anopheles amictus larvae were found breeding in the remaining areas. The finger drains in the swamp A area to the OUD and the OUD were draining large volumes of water out of the swamp into St Mary’s Creek.

On the morning of 12 March ME carried out a helicopter survey of additional areas including the clay pans along Ilparpa road and the

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[Figure 3. Cx. annulirostris numbers at swamp A, B & Greatorex Rd January to April 2010]

- **Cx. (Cux) annulirostris swamp B**
- **Cx. (Cux) annulirostris swamp A**
- **Cx. (Cux) annulirostris Greatorex Rd**

![Graph showing Cx. annulirostris numbers at swamp A, B & Greatorex Rd January to April 2010](image-url)
Shooter’s Range swamp. Small areas of mosquito breeding were found in these areas. All the areas to be controlled were then reviewed with the helicopter pilot in preparation for the control operation.

Aerial control operation

Aerial mosquito control in Ilparpa swamp, the Shooter’s Range swamp and the clay pans was carried out on 12 March with a total of 58 ha controlled, as indicated in Figures 1 and 2.

A Bell 206 III Jet Ranger with an Easton bucket was used to distribute the S-methoprene pellets at a rate of 3.3kg/ha, with a total of 191 kg of pellets used during the operation.

Results

Ilparpa rural subdivision and adjacent areas

The aerial mosquito control carried out on 12 March in parts of the Shooter’s Range swamp, the clay pans, the sprinkler irrigation area and the Ilparpa swamp A area was successful, with *Cx. annulirostris* numbers reduced in the Greatorex road trap to levels less than the peak numbers in March caused by the February and March rains and effluent release, and well below the ME pest number guideline of 600 per trap/night (Figure 3). Continuation of *Cx. annulirostris* numbers in the Greatorex road trap since 31 March were probably due to continuing effluent dispersal in the Ilparpa swamp B area, sprinkler irrigation and tree plantation areas and a possible breeding site associated with the Ilparpa rural subdivision drain.

Ilparpa swamp B

In the Ilparpa swamp B area *Cx. annulirostris* numbers first increased after the initial January rain, with a peak on 17 February (Figure 3). This peak was most likely due to pooling of water as a result of the sprinkler effluent irrigation, and also due to pooling in the tree plantation and Ilparpa swamp B itself. A secondary adult *Cx. annulirostris* peak occurred on 3 March, as a result of the February rain and effluent release (Figure 3). However, numbers decreased appreciably following the aerial control, with only a slight rise in numbers in the swamp B trap by 14 April which was still well below the pest level indicator value.

Ilparpa swamp A

The Ilparpa swamp A area received most of the released effluent and was extensively flooded. However, numbers of *Cx. annulirostris* remained well below pest levels of 600 per trap/night in the Ilparpa swamp A trap between March and April 2010 (Figure 3). Adult numbers reached a peak on 24 February, most likely due to dispersal from the swamp B area, as well as probable breeding in the swamp A area itself. The lack of any appreciable rise in numbers in this area indicated the high degree of success of the control operation.

Sentinel chickens

None of the sentinel chickens of the Ilparpa or the Arid Zone Research Station flocks in Alice Springs seroconverted to MVE, despite the high summer rainfall that had previously indicated a high probability for MVE activity.

Discussion

Aerial control operation in March

Due to the Ilparpa drainage system draining large volumes of water out of the swamp to St Mary’s Creek, the Ilparpa swamp B area in the upper end of the swamp had largely dried up between the cessation of the February/March rain and the associated effluent discharge to St Mary’s Creek and the control operation. Despite the enhanced drainage of the swamp, extensive pooling still occurred in the lower end of the swamp in the swamp A area, providing suitable potential mosquito breeding areas. The adult mosquito monitoring results however, following the aerial control operation, showed low numbers of *Cx. annulirostris*, indicating the marked success of the control operation. As a result, the potential for mosquito borne disease was kept low, with no seroconversions to MVE or KUN detected in the sentinel chickens to at least late April.

Drain maintenance

During a ME OUD inspection on 17 February, it was noted that no drain maintenance had been
carried out over the last few years, and vegetation has started to grow in the main OUD, as well as in the finger drains. This will decrease the effectiveness of this drainage system in the future. Discussions are continuing with PWC and DLP regarding the ongoing maintenance of the drain.

**April rain and associated effluent release**

Alice Springs experienced an additional 41mm of rain between 6 and 12 April. ME discussed possible effluent discharge into Ilparpa swamp with PWC, and it was decided that immediate discharge would be the best option to avoid prolonged inundation of the swamp A area and take the opportunity of the continued action of the already applied insecticide pellets. Discharge took place between 12 and 14 April, with a total of 117ML of effluent released into Ilparpa swamp A area via EP10, with some also released out of Ponds C. The April rain and effluent discharge into Ilparpa swamp did not lead to increased mosquito numbers, with numbers still at very low levels in Ilparpa swamp by 27 April.

Uncertainty in regards to the timing and volumes applicable to the wet weather discharge licence from EPA remained, and the issue was discussed during a teleconference between DHF, PWC and EPA in April 2010. EPA advised that PWC could lodge an application for effluent discharge during summer when required and that a risk analysis should be carried out prior to applying for a new discharge licence, so that issues regarding the timing of effluent release and the potential for mosquito breeding and disease risk could be incorporated into the discharge licence.

**References**


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**NT malaria notifications January – March 2010**

*Merv Fairley, CDC, Darwin*

Nine notifications of malaria were received for the first quarter of 2010. The following table provides details about where the infection was thought to be acquired, the infecting agent and whether chemoprophylaxis was used.

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