No significant differences in presence, density or size of fairy shrimp populations were evident between sites treated for 3 years with methoprene and untreated sites. The population dynamics of *E. bundyi* are notoriously unpredictable (Daborn 1976) and it could be argued that trends of reduced size and density in treated sites existed in this study, so more research should be done.

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# PREDICTING THE SPRING EMERGENCE OF *COQUILLETTIDIA PERTURBANS*[1]

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Many models have been developed to describe the influence of temperature on insect growth rates (Logan et al. 1979). Although a number of these are non-linear (Hilbert and Logan 1983), linear degree-day (DD) models are still often employed successfully (Pruess 1983).

The majority of predictive models have been used with agricultural pests, although some have been applied to biting insects such as black flies (Ross and Merritt 1978) and mosquitoes (Clarke and Wray 1967). A simple, or historical DD model was used in the current study to predict the emergence of hibernating *Coquillettidia perturbans* (Walker) in central Florida. The species is a nuisance in much of North America and hibernates in the larval stage attached to the roots of aquatic plants (Allan et al. 1981).

Investigations were carried out from February through April in 1984 and from February through June in 1985. During 1984, samples were taken at 2 sites where thick mats of floating vegetation were known to harbor *Cq. perturbans* larvae (Lounibos and Escher 1983). Observations made prior to the current study indicated that the water temperature was extremely stable, and in the interest of making the technique practical for an operational mosquito control agency, temperatures were recorded once a week. The degree weeks (DW) were calculated in the same manner as degree days, that is; DW = [Tmax + Tmin]/2 − threshold temperature (°C) × weeks (Ross and Merritt 1978). A threshold of 10°C was chosen an arbitrary baseline (Pruess 1983), and eclosion was noted using 2 emergence traps per site (Slaff et al. 1984).

During 1985, the study was repeated on a larger scale. Temperatures were taken at 2 stations within a single mat site, and 3 emergence traps were placed around each temperature station. Five additional temperature stations were established in 2 shallow maidencane (*Panicum hemitomon* Shult.) marshes. The maidencane habitat provided far greater temperature fluctuations for comparison to the stable mat site. Four traps per temperature station were employed to monitor *Cq. perturbans* emergence. The study began on the first of February each year.

The DW accumulations for 1984 are shown in Table 1. The total DWs were nearly identical at both sites when the first adult *Cq. perturbans* were captured in the emergence traps. Results from 1985 (Table 2) are very consistent between sites, but the DW totals are slightly higher than those seen the previous year. A possible explanation may be that water temperatures prior to the first samples were higher in 1984 than in 1985, and that an earlier starting date may be in order. Even so, the differences between years would still yield a predication accuracy within 2 weeks.

Collections were made beyond the initial surge of *Cq. perturbans* until what appeared to

Table 1. Degree-Week accumulation and the emergence of adult *Coquillettidia perturbans* during 1984.

| | Site number | |
|---|---|---|
| Week | 1 | 2 |
| 1 | 3.75 | 2.50 |
| 2 | 7.50 | 5.00 |
| 3 | 14.00 | 11.00 |
| 4 | 18.25 | 17.00 |
| 5 | 22.25 | 21.00 |
| 6 | 27.75* | 27.25* |
| 7 | 34.75 | 35.00 |

* First adult *Cq. perturbans* captured.

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Table 2. Degree-Week accumulation and the emergence of adult *Coquillettidia perturbans* during 1985.

| | Site Number | | | | | | |
|---|---|---|---|---|---|---|---|
| Week | 1 | 2 | 3 | 4 | 5 | 6[a] | 7[a] |
| 1 | 6.00 | 6.50 | 6.50 | 5.00 | 5.00 | 3.50 | 4.00 |
| 2 | 11.50 | 12.00 | 11.75 | 10.00 | 10.00 | 7.25 | 10.25 |
| 3 | 12.50 | 14.25 | 14.25 | 11.25 | 11.00 | 8.75 | 13.25 |
| 4 | 18.00 | 20.50 | 20.00 | 17.00 | 16.00 | 13.00 | 17.75 |
| 5 | 26.25 | 30.00 | 27.50 | 24.75 | 23.25 | 19.00 | 24.25 |
| 6 | 36.25* | 40.00* | 35.50* | 33.00 | 31.50 | 26.50 | 32.75 |
| 7 | 44.00 | 47.50 | 42.25 | 40.00* | 38.50* | 34.25* | 40.75* |
| 8 | 52.00 | 55.25 | 48.75 | 46.75 | 45.00 | 42.50 | 48.25 |
| 9 | 59.75 | 63.00 | 56.50 | 54.00 | 52.75 | 49.00 | 55.50 |
| 10 | 68.75** | 72.00** | 63.25** | 61.00** | 60.00 | 55.75 | 62.50 |
| 11 | 75.75 | 79.75 | 70.00 | 68.25 | 67.75** | 62.50 | 69.25** |
| 12 | 86.00 | 92.00 | 82.00 | 78.00 | 76.75 | 70.25 | 77.25 |
| 13 | 98.00 | 103.50 | 92.25 | 88.75 | 86.50 | 79.50** | 87.25 |

[a] These were at the same location as site 2 in 1984.
* First adult *Cq. perturbans* captured.
** 50% of adult *Cq. perturbans* captured.

be the entire overwintering generation had emerged during 1985. The DW mean for 50% emergence at all sites was 68.79 + 6.02 S.D. All but one station fell within this range, indicating the potential use of DW to determine when the bulk of the *Cq. perturbans* population had emerged from hibernation.

Additional collections are needed to determine if DW are: 1) consistent from year to year, and 2) more accurate than simple calendar averages for predicting *Cq. perturbans* emergence. These questions may be better answered in climates that have greater annual temperature variability, since successive years are likely to have very different rates of DW accumulation.

Despite some unanswered questions, further investigations into the use of DW to predict *Cq. perturbans* bear undertaking. In addition, DW monitoring to predict the spring emergence of other mosquito species that hibernate as larvae, e.g., *Culiseta melanura* (Coq.), may be of value to the mosquito control community.

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