ECOSUMMARY

A Report by the Surface Water Assessment and Monitoring Program (SWAMP)

#97-006

Recolonization of the Baker/Pemberton Creek watershed following the termination of Aerial Spraying for the Medfly Eradication Program

I. Field Biorecons

Purpose

The USDA Medfly Eradication Program began aerial application of malathion on June 5, 1997, in the Baker Creek, and on June 17 in Pemberton Creek. The entire watershed of Baker/Pemberton Creek was contained within the spray zone, and was subject to repeated flights north and south on a weekly basis. On July 9 and 13, severe perturbation to the Baker/Pemberton Creek ecosystem was observed (SWAMP Ecosummary #97-005). Elevated levels of malathion were documented, and the invertebrate fauna was extremely depleted. Environmentally sensitive species were virtually absent.

Spraying ended in the two spray zones containing the Creeks on 8/12/97. On 8/15/97, monitoring began in order to document the recolonization of the invertebrate fauna in Baker Creek (Fig.1). Field biorecons were performed, and sediment core samples were collected, on a weekly basis. Hester-Dendy artificial substrate samplers were deployed, to be collected in sequential weeks.

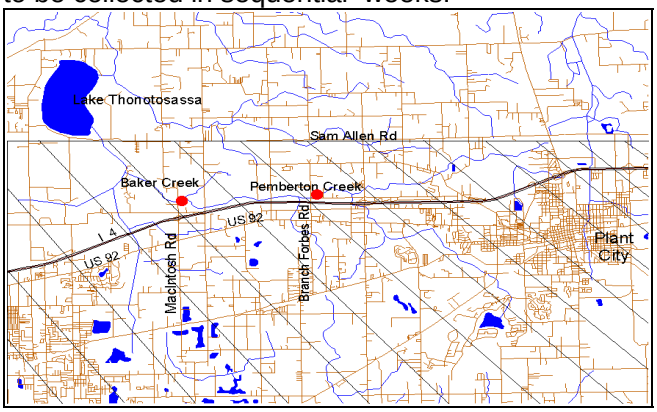


Fig. 1. Site location. Spray zone is in hatchmarks.

Results

Water collected for malathion analysis on July 15 during a spraying event, revealed a level of 37 ug/l, which is in excess of State Standards.

Physicochemical readings were within normal ranges during the study period (Fig. 2). Dissolved oxygen tended to decrease after daily rainfall ceased and water level velocitiy decreased.

	7/9	8/15	8/25	9/2	9/8	9/15	9/23
DO (mg/l)	6.36	6.86	6.35	5.95	5.20	4.25	4.14
pH (SU)	6.96	7.46	6.61	6.92	7.02	7.45	6.97
Cond (umhos/cm)	323	317	365	384	386	410	390

Fig. 2. Physicochemical measurements.

Field Biorecons are based on three measures of the aquatic invertebrates present in a stream: the total number of different species (Total Taxa), the number of good water quality ("Florida index") indicator species, and the total number of Ephemeroptera (mayfly), Plecoptera (stonefly), and Trichoptera (caddisfly) species present ("EPT"). A stream scoring above the threshold value for two or all three of these measurements is considered healthy. If less than two threshold values are reached, an impacted condition is suspected.

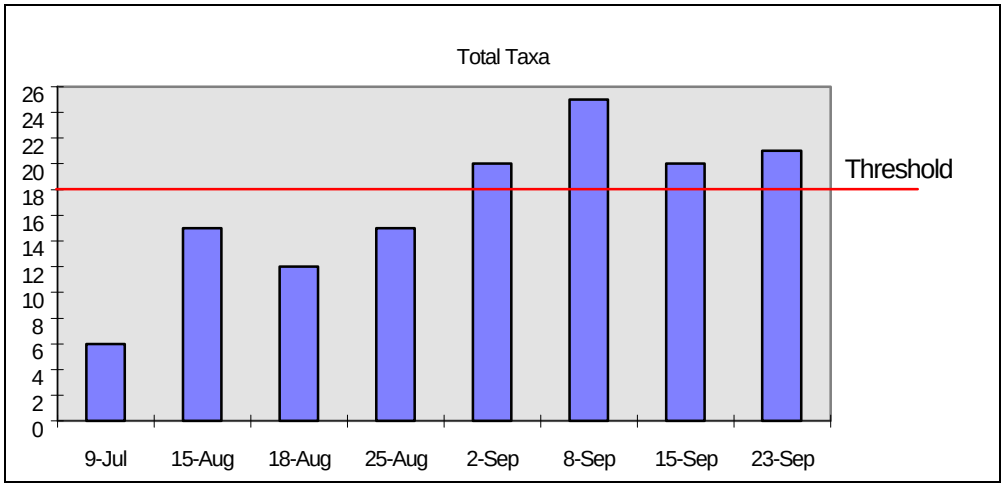
Results are summarized in Fig. 3, on the following page. Baker Creek continued to fail the Biorecon until 9/2/97, 21 days after spraying had ceased. It wasn't until 9/23/97, 42 days after the last spraying event, that all 3 measurements passed their thresholds.

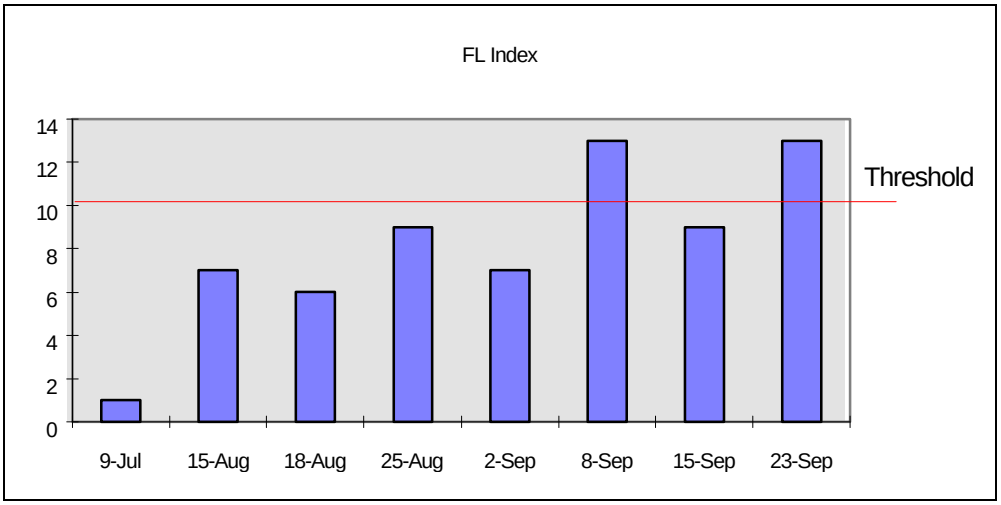
Significance

Malathion, and its by-product malaoxon, are extremely toxic to aquatic invertebrates. ECs (concentration in which 50% of the test animals are adversely effected in chronic toxicity bioassays) for various invertebrates range from 1 ug/l to 1mg/l (Extension Toxicology Network[1]). The State standard for malathion is 1 ug/l. The results of the water chemistry and Biorecons indicated that Pemberton/Baker Creek received elevated levels of malathion that may have resulted in a toxic effect on the stream macroinvertebrate community. However, recolonization of the stream was fairly rapid.

Suggestions

FDEP recommended that a buffer zone for spraying be observed for Pemberton/Baker Creeks in order to prevent aquatic toxicity and violation of State Surface Water Standards. However, the Medfly Eradication Program (USDA) deemed this technically impossible for a stream of such small size. In addition, the Creeks were located near to medfly sightings, thus avoiding the stream would hinder the successful treatment of possible infestations. In future medfly situations, flight plans should be developed to decrease direct spraying of small streams.





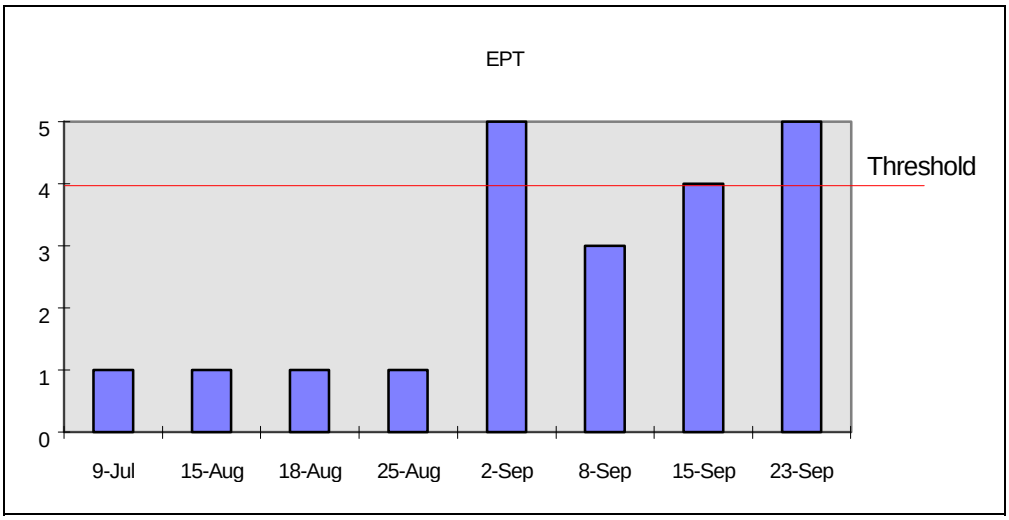


Fig. 3. Values for Biorecon measurements.

References

[1]Extension Toxiology Network. Pesticide Information Profile: Malathion. Pg. 3

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