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A NEW SAMPLING METHOD FOR FRESHWATER SHRIMPS

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SUMMARY

Macrobrachium *(Palaemonidae, Decapoda, Crustacea) communities have been sampled in the rivers of Nuku-Hiva Island (French Polynesia) using small traps made with mineral water bottles. Experiments were made to test the effect of trap density in a pool, the effect of sampling duration, and to determine the trap selectivity in terms of species and size.*

The number of shrimps caught was neither related to the density of traps, nor to the duration of the experiment. The main limitation of this passive catch-trap was in relation to the shrimp size. The sampling efficiency is estimated to about 50%.

KEY-WORDS : Decapoda, Communities, sampling, Tahiti

RÉSUMÉ

Les peuplements de Macrobrachium *(Palaemonidae, Decapoda, Crustacea) ont été étudiés dans l'île de Nuku-Hiva (Polynésie Française) à l'aide de petites nasses faites à partir de bouteilles d'eau minérale. Différentes expériences ont été réalisées pour tester l'effet de la densité des nasses dans une vasque, l'effet de la durée d'échantillonage, et pour essayer d'estimer la sélectivité des nasses en terme d'espèce et de taille.*

Aucune relation n'est apparue entre le nombre de crustacés capturés et la densité des nasses ou la durée de la capture. La principale limitation de cette méthode de capture passive apparaît liée à la taille des individus. L'efficacité de l'échantillonage a été estimé à environ 50 %.

MOTS CLÉS : Décapodes, peuplements, échantillonnage, Tahiti

INTRODUCTION

Nuku-Hiva is a small island located in the middle of the Pacific Ocean (8°56'S-140°5'W, Marquesas Island, French Polynesia). The rivers of the island will be treated with an insecticid for a tentative eradication of the blackfly, *Simulium buissoni,* which is a scourge for local human populations and a serious problem for tourism development (Séchan *et al.* in print). The only non-target species of economic importance is *Macrobrachium lar,* a freshwater shrimp (Crustacea, Decapoda) commonly fished and a local culinary speciality (Fossati, Gibon, in print). A reliable sampling method for freshwater macrocrustacea had first to be established in order to monitor the *Macrobrachium* communities during and after the treatment. Nuku-Hiva Island (340 km^2) is a high volcanic island, less than 6 million years old with tropical-humid climate (Brousse *et al.* 1978). The two mains rivers have more than 600 l/s discharge at sea level during dry season and a huge number of streams have a minimum discharge between 5 to 100 l/s (minimum estimate: 473 km of river-bed). Because of steep slopes, these streams are very sensitive to rainfalls which induce rapid elevations of water level and production of turbid waters. The substrates of the rivers are generally very coarse, dominated with boulders. The rivers are torrential, with steep riverbeds often broken by small pools where finer substrate (sand) can be found (Fossati, Gibon, in print).

The three dominant species of *Macrobrachium* found in Nuku-Hiva have a different spatial distribution. *M. latimanus* dominates upstream of waterfalls and in upper locations, *M. australe* is found in the lower parts of the rivers. *M. lar* can be

M. aemulum is found in Tahiti, in the downstream reaches, instead of *M. australe* (Marquet 1988). *Macrobrachium* species are more abundant in small pools (usually less than 50 cm depth), where water velocity is low, than in faster flowing water.

Large traps are commonly used to sample *Macrobrachium* populations (e.g. Lévèque 1974 ; Horne-Beisser 1977 ; Anderson 1983 ; Odinetz-Collart 1987 ; Mashoko 1990), but cannot be used in small pools. Kubota (1972), Gillet (1983), Schonbee *et al.* (1988) and Marquet (1988) used electric

The new method to be developed had to be inexpensive, easy to use by one person alone and suitable for the type of habitats found in the rivers of Nuku-Hiva.

SAMPLING METHODS AND SAMPLING SITES

Plastic mineral water bottles were used by cutting the upper part and inverting it inside the other part in order to prevent the shrimps escaping from the trap (fig. 1). The 1.5 l bottles

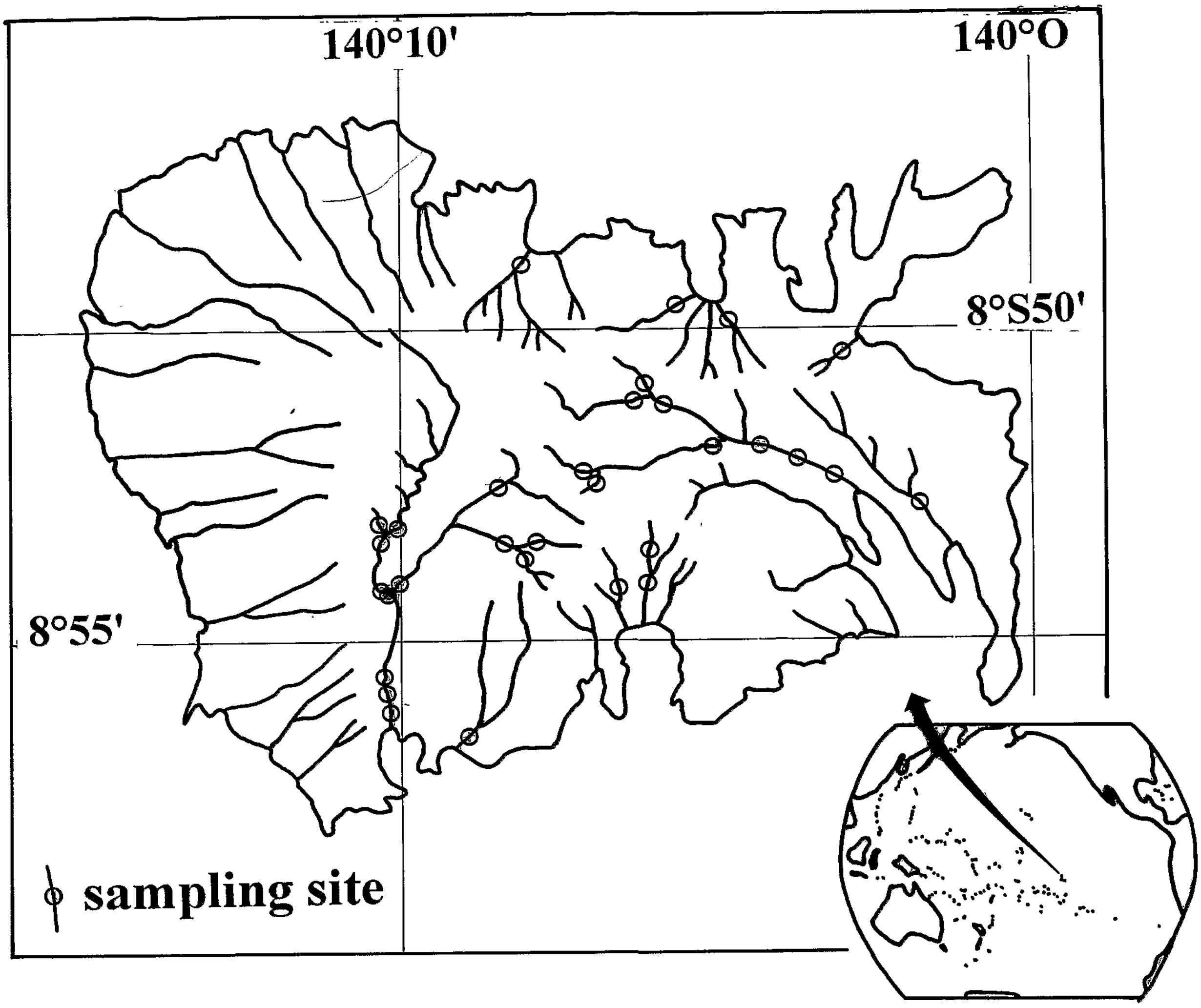

Figure 2: Map of Nuku-Hiva Island with sampling sites indicated.

August 1991). The 5 m² pool chosen was shallow, with regular bottom and the water was very clear and still in the pool.

RESULTS

Trapping susceptibility

Percentages of individuals of each sex show that, except for *M. latimanus* (51% males), more males are caught than females (*M. australe:* 79% males; *M. lar:* 69% males). As the males grow bigger than females, this might not be related only to the trapping device. Hence, althought the traps are a passive capturing device, the trapping succes may involve the behaviour of the shrimps.

Comparisons between traps and electricity fishing confirm that males are more numerous than females: 82 ± 12% and 73 ± 7% for *M. australe*, respectively in the traps and with electricity fishing; 76 ± 7% and 60 ± 11% for *M. lar.*

Efficiency of the sampling

A pool was sampled with different bottle densities. The river had an estimated discharge of 3 l/s. The surface of the pool was 6.72 m² and its depth less than 40 cm. *M. lar* dominated the community. Mortality and number of animals per bottle were lower with higher bottle density (more than 5/m²) but the total number of shrimps caught was not affected by the density of the bottles, from 4 to 10/m2 (tabl. I).

Some bottles were laid for two nights in order to compare trapping with a one night sampling (same pool as above, tabl. II). Mortality and number of shrimps caught by traps laid for one or two nights were not statistically different (Student T = 0.51 and 0.86; ddl = 104).

In the Papenoo River (Tahiti), the traps caught 39% (*M. aemulum*), 50% (M. lar), and 79% *(M. latimanus)* of the *Macrobrachium* present. The shrimps collected by electric ishing were often damaged by autotomy of the claws (reaction to the electric shock), or damaged during capture, while the shrimps caught in the traps were in good condition.

DISCUSSION

The biggest shrimps fished were, respectively, 92, 111 and 105 mm long. Compared to the data given by Holthuis (1980: 105,181 and 125 mm), these figures show that the larger indi

Table I: Shrimps caught in traps laid for one or two nights.

	1 NIGHT	2 NIGHT
Macrobrachium per trap	3,25 + 2,42	2,70 + 3,75
dead *Macrobrachium* per trap	0,40 + 0,99	0,41 + 1,0

Table II: Mortalities and numbers of shrimps for different densities of trap in the same pool.

Number of traps	28	30	39	63
Trap density	[illegible]	[illegible]	[illegible]	[illegible]

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