

IMPACT OF CRAYFISHERY ON THE RIVER THAME

Progress report for the period January - March, 1996

M T Furse, BSc

A T Ibbotson, BSc, PhD, Grad IPM, MIFM

Report to : National Rivers Authority, Thames Region

IFE Report Reference No. : T04073N7/3

IMPACT OF CRAYFISHERY ON THE RIVER THAME

Progress report for the period January - March, 1996

M T Furse, BSc

A T Ibbotson, BSc, PhD, Grad IPM, MIFM

Project leader : M T Furse
Report date : March 1996
Report to : National Rivers Authority
IFE report reference no. : T04073N7/3

INTELLECTUAL PROPERTY RIGHTS

CONFIDENTIALITY STATEMENT

"In accordance with our normal practice, this report is for the use only of the party to whom it is addressed, and no responsibility is accepted to any third party for the whole or any part of its contents. Neither the whole nor any part of this report or any reference thereto may be included in any published document, circular or statement, nor published or referred to in any way without our written approval of the form and context in which it may appear"

Institute of Freshwater Ecology
River Laboratory
East Stoke
WAREHAM
Dorset BH20 6BB

Tel:01 929 462314
Fax:01 929 462180

1 TECHNICAL PROGRESS

1.1 Objectives

This progress report covers the first three months of the main study into the environmental impacts of signal crayfish. The **overall** and *specific* objectives together with the methods of approach of this study are as included in the original tender document.

- to assess the environmental impact of signal crayfish on an area of the River Thames between Cuddesdon Mill and Stadhampton.
- to determine the environmental impact of signal crayfish on the flora and fauna of the River Thames.
- to establish the likely effects of the fishery on native crayfish populations.

1.2 Methods of approach

The method of approach being adopted for the full study includes the following elements:

- to undertake a literature review of the ecology and distribution of the signal or American crayfish and its impact upon the native or white-clawed species.
- to determine the distribution of crayfish in the lower reaches of the River Thames and its tributaries and to obtain information on comparative numbers and size structure in the different reaches.
- to undertake detailed studies of the microhabitats, macrophytes and macro-invertebrates of three separate study reaches of the River Thames: a reach containing the commercial fishery, a reach outside the commercial fishery which supports a population of signal crayfish and a reach which has no crayfish present.
- to conduct a detailed study of crayfish populations, if any, in each of the three study reaches.
- to determine the distribution of crayfish at each site in relation to the distribution of microhabitats.
- to undertake mark-recapture experiments in order to estimate population sizes and growth rates of native and alien species.
- to collate the commercial fishery statistics for the impact reach.
- to report promptly to the NRA on the findings of the study.

1.2.1 Literature review

The literature review of the ecology of the signal crayfish *Pacifastacus leniusculus* and its impacts upon the white clawed crayfish *Austropotamobius pallipes* was completed in the previous quarter.

1.2.2 Distribution survey

A distribution survey of signal and white clawed crayfish in the Thame catchment was conducted in November 1995.

1.2.3 Macro-invertebrate and micro-habitat surveys

Detailed studies of microhabitats, macrophytes and macro-invertebrates of the three study reaches are due to begin during April or May 1996.

1.2.4 Crayfish population studies

The detailed study of the crayfish populations commenced at the beginning of 1996. Three reaches; one containing the commercial fishery; one outside the commercial fishery; and one containing no crayfish were trapped in January, February and March.

Three trap sizes were used to select for all size classes of crayfish present. All crayfish captured have been measured and marked variously with streamer tags and/or date coded uropodal clips. At each trapping site information has been collected on distance from the bank, depth, substratum and amount of macrophyte cover.

1.2.5 Commercial fisheries statistics

Under the terms of the IFE tender for this project, as subsequently incorporated as Schedule 5: "Plan of Approach" of the contract between the National Rivers Authority and the Natural Environment Research Council, it was stipulated that commercial fisheries statistics will be supplied by the NRA and summarised by the IFE. To date, no progress has been made in obtaining commercial catch statistics from the NRA and it is doubtful whether any are currently held.

In order that IFE may report on this matter it appears necessary that the Environment Agency take further steps to secure this information from the commercial fishermen.

1.3 Outputs produced.

1.3.1 Literature review

The following report has been submitted to the NRA:

Ibbotson, A.T. & Furse, M.T (1995) Literature review of the ecology of the signal crayfish *Pacifastacus leniusculus* and its impacts upon the white clawed crayfish *Austropotamobius pallipes*. A Preliminary Report to the National Rivers Authority, 27pp.

1.3.2 Distribution survey

The following report has been submitted to the NRA:

Ibbotson, A.T., Furse, M.T. & Dewey, K. (1995) The distribution and baseline survey of the crayfish populations in the River Thame. A Preliminary Report to the National Rivers Authority, 9pp + Annex.

2 INTERIM RESULTS

In each month that the three reaches were trapped a larger number of crayfish were captured in the reach outside the commercial fishery, than in the reach which is commercially fished (Table 1). No crayfish have been captured in the other reach.

Table 1. Numbers of signal crayfish captured in each month at each of three sites on the River Thame.

Month	Reach outside commercial fishery	Reach of commercial fishery	Reach without signal crayfish
January	243	21	0
February	92	30	0
March	154	13	0

It is difficult to draw any firm conclusions from the data collected to date because the population is much less active during the cooler months that surveys have been completed in so far. We would expect to capture significantly more individuals in the following months.

However, it has been observed that the mean size of crayfish captured in the reach outside the commercial fishery has been greater than the reach of the commercial fishery (mean carapace lengths 5.1 ± 0.76 mm; 4.3 ± 1.22 mm). The ratio of males to females captured in the reach outside the commercial fishery is also greater (3.1 : 1; 1.6 : 1). These results, probably reflect the selection for the larger males by the commercial fishery.

During the visit in February the river was in severe flood conditions and this may have impacted on the ability of crayfish to forage effectively and explain the low numbers in the traps that month.

In the same month some crayfish were taken by the NRA from the traps set in the site outside the commercial fishery. This was for an initial study on the diet of crayfish and whether diet could be accurately recorded using crayfish taken from traps, or whether they would need to be collected by hand (see Section 7 for further details).

To date recovery of tagged or marked crayfish has been low, with only one being recaptured during March. This would tend to suggest that the crayfish population is very large, but this should become more clear once the summer commences. If the catches of marked individuals continues at a very low level, then efforts to catch a greater proportion of the population will be made with larger traps and nets.

As previously stated we would expect catches of crayfish to increase dramatically once the weather becomes warmer. The commercial fisherman does not start trapping seriously until May when the eggs have hatched and the juveniles have left the females. At this stage, we should see greater mobility of the animals and recolonisation of the reach containing the commercial fishery. The commercial fisherman believes that he will take numbers of crayfish which have moved upstream from the unfished reach and this will undoubtedly include some of our tagged and marked animals. We would re-iterate our belief that this study would gain considerably if we could be present during the commercial fishing to ensure these animals are accounted for (see Section 7 for further details).

3 PLANS FOR THE NEXT REPORTING PERIOD

Regular monthly sampling of the crayfish populations of the three study reaches will be maintained throughout the forthcoming quarter.

Sampling of macrophyte and macro-invertebrate communities and instream and riparian habitat features will be undertaken in either April or May according to river conditions. Macrophyte and habitat surveys will be based upon the River Habitat Survey (RHS) techniques widely employed by the NRA (Environment Agency). However the features recorded will be adapted to take account of a recent study on *Austropotamobius pallipes* populations in the Wye and Severn catchments. (Smith, G.R.T., Learner, M.A., Slater, F.M & Foster, J. (1996) *Habitat features important for the conservation of the native crayfish Austropotamobius pallipes in Britain. Biological Conservation 75, 239-246*).

Macro-invertebrate sampling will be based upon the procedures used by the NRA during the 1995 General Quality Assessment (GQA).

The low return of tagged crayfish is an important issue. Trials of alternative tagging procedures initiated during the March sampling programme, in which streamer tags and uropodal clipping were separately employed, will be continued. Subject to the necessary conditions and the availability of suitable students, the IFE plan to conduct tag retention and mortality rate trials using caged signal crayfish in flowing water channels. The recovery rate of tagged crayfish may be increased by monitoring commercial catches. A recommendation to this effect is made in Section 7. If funds are made available quickly, this programme can begin during the forthcoming quarter.

4FACTORS WHICH MAY AFFECT THE ATTAINMENT OF ANY TARGETS OR TIMESCALES.

The work is currently on schedule and it is expected that targets and timescales will all be met.

5 FINANCE

The work conducted to date has been generally within budget. A financial summary for the reporting period and end-of-year out-turn may be obtained from the IFE Finance Office approximately two months after the end of the period/financial year in question.

6 REASONS FOR ANY LIKELY UNDER OR OVERSPEND OF BUDGET

Some overspend has occurred when the IFE has been obliged to undertake tasks allocated to the NRA in Schedule 5 of contract. These were obtaining the appropriate licences and permissions to access private land for sampling. In addition, obtaining dredging data from the NRA took much more of the IFE's time than anticipated.

The total time spent on these additional tasks was four days, amounting to a cost of £720. A commensurate increase to the contract budget, in order to meet these extra costs, is requested.

The full budget allocated to trap acquisition has now been spent. Enough traps have been obtained for normal sampling and a small reserve stock is also held. However, it has become clear that some tampering with and pilfering of traps can be expected. IFE request that, should more traps be lost than can be covered by our reserve stock, these are purchased by the Environment Agency.

7 OTHER MATTERS

In a project progress meeting between the NRA Project Leader, Julie Bywater, IFE Project Manager, Mike Furse and the project lead scientist, Anton Ibbotson, held at the IFE River Laboratory on Tuesday, 10th January, a series of options for further work were raised.

7.1 Feeding studies

The NRA were interested in the possibility of extending the research programme to include feeding studies. They requested IFE to provide estimates of the cost of undertaking a suitable programme. IFE submitted two proposals. One was based on obtaining specimens from the traps during normal monthly sampling. The other involved separate collection of specimens directly from the river. The latter was recommended on the grounds that the diet of trapped fish would be atypical because a) the food was likely to be well digested after the crayfish had been up to 12 hours in the trap and b) because the variety of food eaten when in the trap might be restricted in comparison with free-ranging feeding.

As a result of these discussions the NRA initiated a trial programme, undertaken by one of their employees, Claire Gladdy, in which the diets of trapped and non-trapped Thame specimens were compared. As part of this programme the IFE provided Ms Gladdy with a day's training in crayfish stomach analysis at the IFE River Laboratory on Tuesday 13th February. IFE also provided practical field assistance for the programme and have offered advice on alternative methods of obtaining non-trapped specimens. The training course has been funded under a separate NRA budget.

7.2 Summer distribution survey

At the progress meeting IFE proposed that the NRA (Environment Agency) considered funding a second distribution study in the summer months of 1996. This was because the initial distribution study, of November 1995, was held at a time when populations of crayfish in general, and *Austropotamobius pallipes* in particular, were becoming seasonally quiescent. A survey during the months of greatest activity will be more likely to provide definitive information on whether white clawed crayfish populations still occur in the Thame catchment.

7.3 Monitoring of commercial catches for tagged specimens

The IFE believe that the greatest return of tagged specimens in the commercially fished reach will be found in the commercial catches themselves. It is unreasonable to expect the commercial fisherman to spend time examining his catch for marked specimens and recording their size and tag number. At the progress meeting the IFE therefore proposed that the NRA (Environment Agency) provide additional funds to enable the former to monitor the commercial catches at the time and point of capture or in the fisherman's local holding tanks.

8 ACKNOWLEDGEMENTS

During the reporting period, scientific support for the project was provided by Dr Jessica Winder, Dr Gloria Tapia, Mr Peter Scarlett and Miss Kate Dewey.

DISTRIBUTION SHEET

To be completed by all Project Leaders completing commissioned research project reports. Please bind a copy of this distribution sheet as the final page in all internal (IFE) copies of the report.

1.	Title: Impact of crayfishery on the River Thames Authors: M T Furse Report ref: T04073N7/3 Master copy held by: M T Furse Report access code: C		
2.	DISTRIBUTION LIST [A)-H) standard, I) other]	No.copies	Date
A)	Contract customer:	5	31-3-96
B)	Director - Prof A.D. Pickering	1	31-3-96
C)	Asst Director - Dr J. Hilton (title page and abstract only)		31-3-96
D)	River Laboratory Library	1	31-3-96
E)	Windermere Library	1	31-3-96
F)	Diana Morton (title page only + no.pages for adding to publication list)		
G)	Project leader: M T Furse	3	31-3-96
H)	Other (list below and indicate no.copies in RH column)		
1.	M T Furse	1	31-3-96
2.	A T Ibbotson	1	31-3-96
3.	J M Winder	1	31-3-96
4.	G Tapia	1	31-3-96
	Total number of copies made	15	

REPORT ACCESS CODES

SIn strict confidence - restricted access - Access to named customer(s) - (could be named restricted access individuals), IFE Directorate, Project Leader and all authors.

CIn confidence - restricted access - Access to customer, IFE Directorate, Project Leader, all authors, and IFE staff with permission of Project Leader.

N'Normal' access - Access to customer and all IFE staff. Access to visitors and general public with permission of Project Leader.

GGeneral access - General access to anyone as required.