

## THE ALIEN CHINESE MITTEN CRAB, *ERIOCHEIR SINENSIS* (CRUSTACEA: DECAPODA: BRACHYURA), IN THE THAMES CATCHMENT

PAUL F. CLARK, PHILIP S. RAINBOW\*, RONI S. ROBBINS, BRIAN SMITH\*,  
WILLIAM E. YEOMANS†, MYLES THOMAS‡ AND GINA DOBSON

The Natural History Museum, Cromwell Road, London, SW7 5BD. \*School of Biological Sciences, Queen Mary & Westfield College, University of London, London, E1 4NS. †Environment Agency, Biology Laboratory, Reading, RG2 0SF. ‡Environment Agency, Apollo Court, 2 Bishops Square Business Park, St Albans Road West, Hatfield, Herts, AL10 9EX

*Eriocheir sinensis*, the Chinese mitten crab, is a native of east Asia and predominantly lives in freshwater but migrates seawards to breed. In 1912 a specimen was collected in the River Aller, a tributary of the Weser, Germany and now this exotic species has a European distribution from Finland to the Atlantic coast of southern France. In the UK, the mitten crab has been reported from the Humber, Medway and Thames catchments. Although the population in Thames had remained low, recent evidence suggests it is increasing, which has potential environmental implications.

### INTRODUCTION

The Chinese mitten crab, *Eriocheir sinensis* H. Milne Edwards, 1854, originates from the Far East, with a native distribution from the Province of Fukien, China, ~26°N northwards to the Korean Peninsula ~40°N. Mitten crabs are catadromous, spending most of their life in freshwater, returning to the sea to breed. Males and females move downstream during late summer and attain sexual maturity in tidal estuaries. According to Panning (1939), the females are thought to continue seaward after mating, overwintering in deeper water before returning to brackish water in the spring to hatch their eggs. Larval development probably occurs in the lower estuary, with juvenile crabs gradually moving upstream into freshwater to complete the life cycle.

*Eriocheir sinensis* was introduced into Germany in 1912 (Panning, 1939) and has spread subsequently throughout northern Europe. Its present estimated distribution ranges from Finland (Haahtela, 1963), through Sweden, Russia, Poland, Germany, the Czech Republic (Prague), Netherlands, Belgium and England to France. The southernmost Atlantic coast record is the Golfe de Gascogne (Vigneux et al., 1993), France, but the crab has extended its range via the Garonne canal system to Sigeau (Petit, 1960), Languedoc-Roussillon, southern France. The crab has also been reported from North America (Nepszky & Leach, 1973; Horwath, 1989; Cohen & Carlton, 1997).



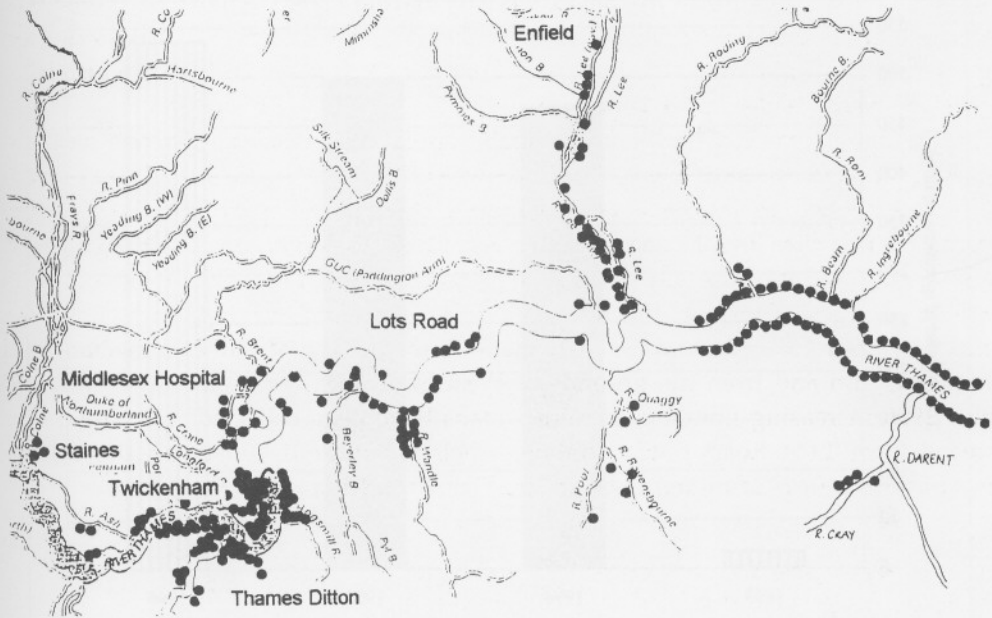


Figure 2. Distribution of *Eriocheir sinensis* in the Thames catchment from information received between 27 August 1996 and 15 November 1996.

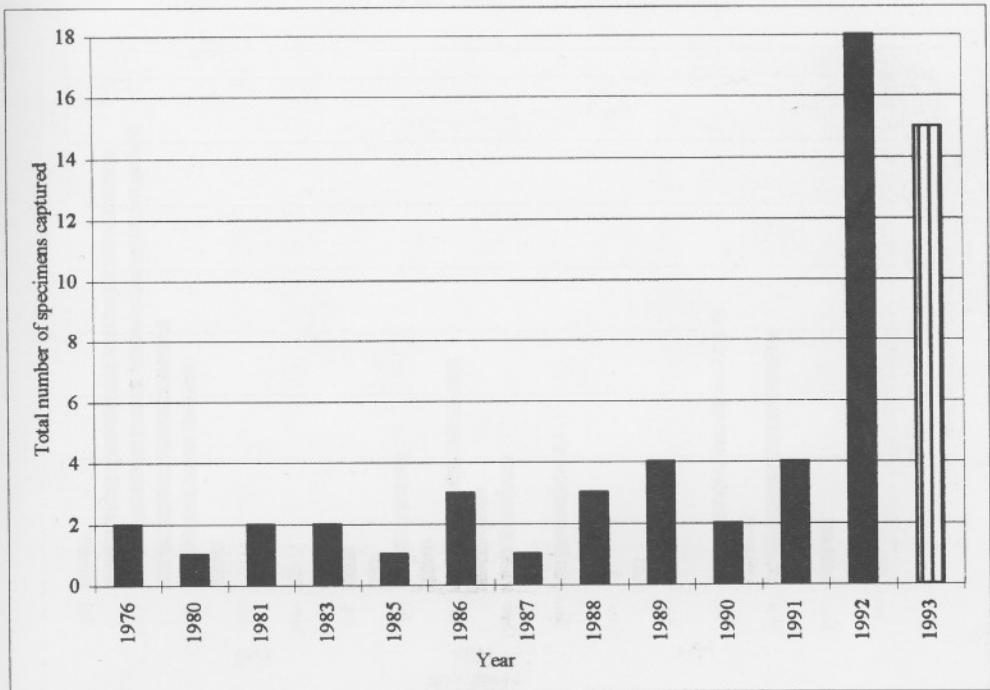


Figure 3. Numbers of *Eriocheir sinensis* collected at West Thurrock Power Station from 1976 to 31 March 1993 (incomplete data hatched) when electricity generating ceased.

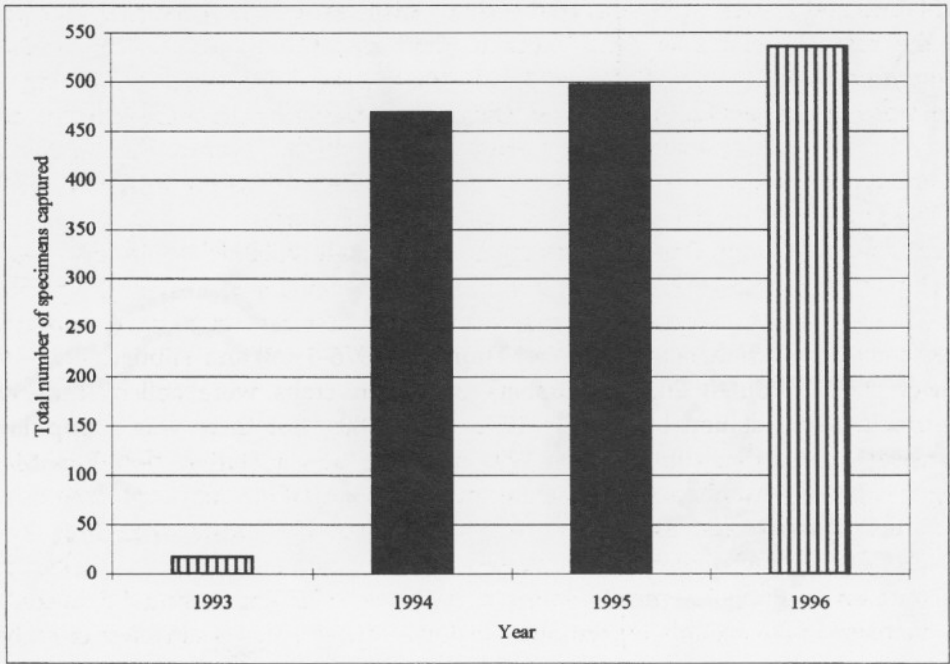


Figure 4. Numbers of *Eriocheir sinensis* collected annually at Tilbury Power Station from October 1993 (incomplete data hatched) to June 1996 (incomplete data hatched).

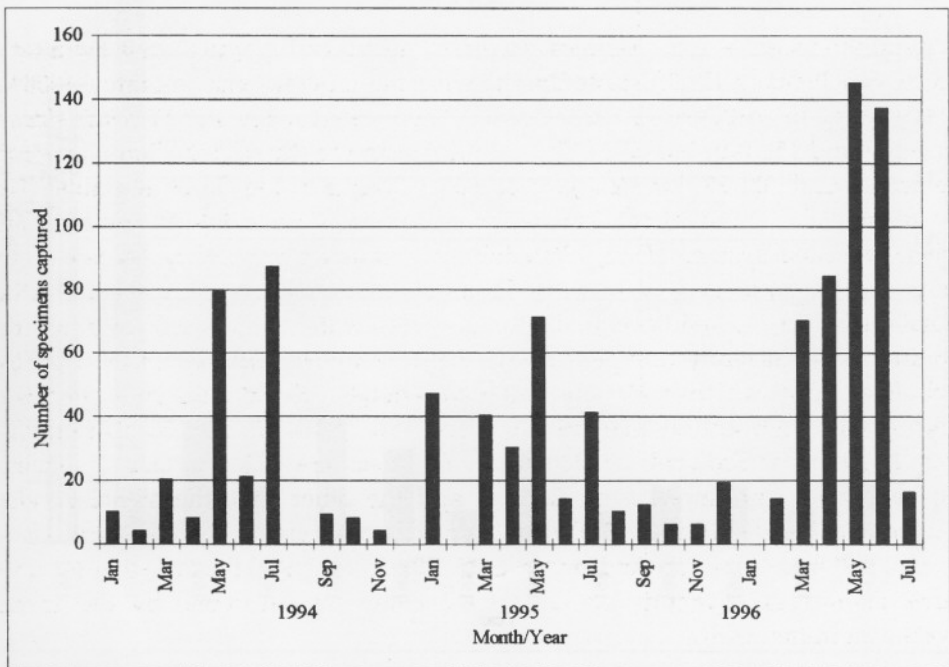


Figure 5. Monthly captures of *Eriocheir sinensis* from the intake screens at Tilbury Power Station (average number in four hour collections at two week intervals) from January 1994 to July 1996.

at Staines and is present in most of the Thames tributaries downstream of this point. In the east, the crab has been found in the Cray, Darent, (C. Dutton, personal communication) Quaggy, Pool and Ravensbourne. In the north-east, sightings are common in the rivers Roding and Lee. The most northerly report of *E. sinensis* is in the River Lee at Enfield, some 15 km upstream of the River Thames. The survey also recorded *E. sinensis* in every tributary from Chelsea upstream to Chertsey. The furthest upstream record at Staines is ~65 km from Tilbury.

The population of *Eriocheir sinensis* is now firmly established in the Thames catchment and, since 1992, has been increasing in numbers as well as geographical range. Environment Agency records include data on the total number of crabs collected from the filter screens at West Thurrock (1976–1993) and Tilbury (1993–1996) power stations. Small annual numbers of mitten crabs were collected at West Thurrock power station in the late 1970s and 1980s, but there was a population increase in 1992 that continued in 1993 until the power station closed in March (Figure 3). Large numbers of crabs were collected from Tilbury power station in 1994 and 1995 with at least as many in the first half of 1996 when collecting ceased (Figure 4). Figure 5 presents data in terms of the numbers of crabs collected in separate 4 h counting periods at Tilbury from 1994 to 1996. The averaged data confirm the increase in crab numbers continued in 1996. The seasonal occurrence of crabs at Tilbury corroborates the view that crabs are migrating through the estuary. Peak numbers appear at Tilbury in May.

## DISCUSSION

The sudden increase in the Thames catchment mitten crab population is a matter of concern. Schellenberg (1928) states that juvenile mitten crabs can migrate ~1000 km while growing to adult size. Furthermore, Adema (1991) notes that *Eriocheir sinensis* has been found 1500 km inland in China, and that in the River Elbe, Germany, crabs have been found 700–780 km upstream as far as Prague in the Czech Republic. This indicates that the whole of the Thames river system is accessible to invasion and dispersal via canal systems (Petit, 1960) linking catchments is a reality. Moreover, the crab is also capable of crossing dry land to enter new river systems. Further population expansion could eventually threaten freshwater habitats and communities including those currently occupied by the native crayfish *Austropotamobius pallipes* (Lereboullet, 1858) which is already under considerable threat from four species of foreign crayfish introduced into British rivers. Two of these, the Turkish crayfish *Astacus leptodactylus* Eschscholtz, 1823 and the European crayfish *A. astacus* (Linnaeus, 1758) have been introduced from Europe, and the other two, the signal crayfish *Pacifastacus leniusculus* (Dana, 1852) and the red swamp crayfish *Procambarus clarkii* (Girard, 1852) from America. Andrews et al. (1982) documented the macrofauna of the Thames Estuary and components of this too could be threatened by the annual migration of mitten crabs.

A further concern is that *E. sinensis* is also a burrower (Panning, 1939) which could threaten unprotected engineering earthworks – and which resulted in the banning of live mitten crab imports (see Horwath, 1989) into California in 1987 and subsequently the whole of the US in 1989.

In the Far East *E. sinensis* is the second intermediate host of the oriental lung fluke, *Paragonimus westermanii* (Kerbert, 1878), and if the crab is eaten uncooked the parasite can infect humans, causing the disease paragonimiasis. However, establishment of this lung disease in Britain is thought unlikely because *P. westermanii* is specific to a primary intermediate host of aquatic snails assigned to the Thiaridae, and the climate in Britain is too cold for members of this gastropod family.

The population of mitten crabs in the Thames Estuary has increased since 1992 from a previously relatively constant background number. The distribution of *E. sinensis* in the Thames catchment now extends from Staines in the west and northwards to Enfield with records from most tributaries east of Staines. This alien species has the potential to upset the balance of the resident ecosystems in the Thames and it may compete with the native crayfish in freshwater. Finally, the annual migration of thousands of crabs could affect the macrofaunal community of the estuary.

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