

# Status and distribution of river otters in Kinmen, Taiwan

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*Surveys of river otters *Lutra lutra* on Kinmen and Little Kinmen islands were carried out in 1992 and 1993. In order to record sightings of otters in the past, 12 Kinmen residents who had seen or caught otters before were interviewed. Interview results indicated that the otter is a resident, breeding species on Kinmen. Survey results indicated presence of otters throughout Kinmen and in many sites on Little Kinmen. However, habitat degradation, including pollution and drought, may pose serious threats to the continued existence of the species on both islands.*

## Introduction

The river otter *Lutra lutra* was once widely distributed in Europe and Asia. However, due to habitat destruction, pollution, overexploitation and other forms of human disturbance, its populations have been depleted in many areas. Therefore, it is important to determine their current distribution and status in order to plan the conservation and management of this threatened species (Foster-Turley *et al.*, 1990). Information on the otter in Europe has been accumulated for many years and the species has been well studied there (Foster-Turley *et al.*, 1990). However, information on the species in Asia is scanty and more is needed (Sivasothi and Nor, 1994).

The river otter is known to have been formerly distributed throughout mainland China (Gao *et al.*, 1987) and Taiwan (Chen and Yu, 1984) but populations are declining (Foster-Turley *et al.*, 1990). In Taiwan otters were once found along streams and rivers below 1500 m throughout the island. However, there have been scarcely any sightings in recent years (L.-L. Lee, pers. obs.) and the species has been declared endangered locally.

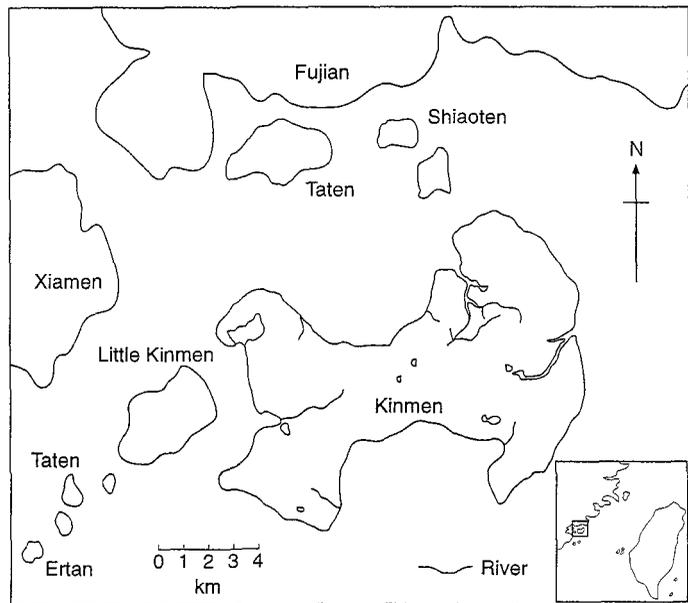
Kinmen is an island off the coast of Fujian Province. Despite its proximity to mainland China, it is within the political boundary of Taiwan. Due to its sensitive geographical location, it has been a military restricted area since the 1940s and its fauna is poorly known.

However, the county almanac recorded otters on Kinmen and subsequent interviews with the local people confirmed the existence of otters since at least 50–60 years ago. With the recent termination of the military administration in Kinmen, it was possible to conduct a survey on the distribution and status of otters there.

## Study sites

Both Kinmen and Little Kinmen, a smaller island about 2 km to the south-west of Kinmen, were surveyed. Kinmen (134 sq km) is about 10 km to the west of Xiamen, Fujian Province (Figure 1). The highest point of the island is Mt Taiwu (253 m). Little Kinmen covers about 15 sq km, the highest point being Mt Chi-lin (116 m). The topography on both islands is generally flat. There are seven short streams on Kinmen and two on Little Kinmen. The water level of these streams is usually low and stretches sometimes dry up.

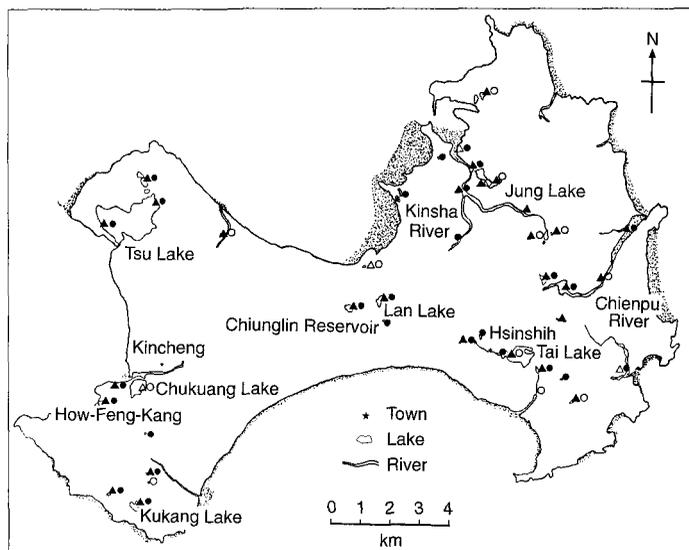
Kinmen has a subtropical monsoon climate, with more fog and rain between April and September, and strong north-east winds during the rest of the year. Typhoons bring in more rain in summer and autumn. Mean annual temperatures are 21.1°C (12.8–28.8°C) and annual precipitation is c. 986.9 mm. Evapotranspiration usually exceeds precipitation due to sunshine and wind. As a result,



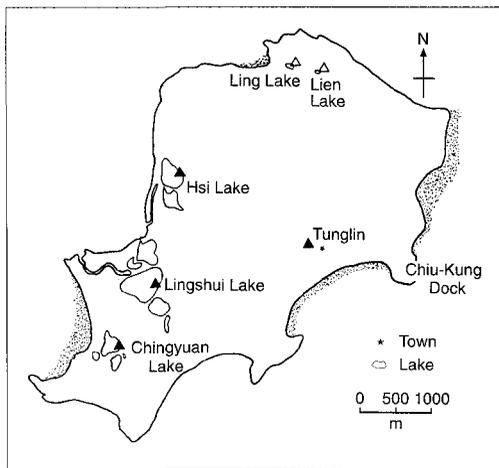
**Figure 1.** Location of Kinmen and Little Kinmen islands.

both islands are in general dry and often experience water shortages. To solve the water shortage problem, many reservoirs, artificial lakes and fish ponds have been constructed to store water, raise fish, and for irrigation and recreation. There is a natural and an artificial network of waterways leading to the coast in most parts of the two islands.

The natural forest of Kinmen has been depleted during its history and the land has suffered from erosion and sand storms for c. 200 years. It was not until 40–50 years ago, when a great effort was put into nurturing plantations, that forest was re-established. Today both islands are covered mostly by plantations of *Acacia* spp. and *Casuarina* spp. and non-



**Figure 2.** Survey results of otter presence in Kinmen. ▲, sites surveyed in December 1922; ●, sites surveyed in May and June 1993. ▲ and ●, presence of otter signs; △ and ○, absence of otter signs.



**Figure 3.** Survey results of river otter presence on Little Kinmen in January 1993. ▲, presence of otter signs; △, absence of otter signs.

intensive agriculture. Less disturbed areas are covered with thorny scrub, the predominant species being *Scolopia oldhamii*, *Maytenus diversifolia*, *Sageretia thea* and *Litsea glutinosa*. There is little industry and residential construction is, in general, localized. Therefore, a considerable amount of wild land remains.

Previous surveys (L.-L. Lee, unpubl. data) indicated that, although there are feral dogs and cats, otters are the only wild carnivores extant on Kinmen.

## Methods

The first survey was carried out on Kinmen in December 1992 during the dry season, and again in May and June 1993 during the rainy season. Little Kinmen was visited only once, in January 1993. During each survey we searched for otter spraints and tracks along streams, lakes, reservoirs and ponds to which we were allowed access. At lakes, ponds and some reservoirs we were able to search the entire bank but at some reservoirs we were only able to search the more accessible areas. We searched different sections along each stream and walked for at least 200–300 m at each section. Access to the coast was still restricted.

We recorded presence and absence of otter

signs at each site. The condition of spraints was assessed, based on texture, colour and degree of decomposition, and recorded as new, medium or old. Spraints that were dark in colour and still relatively soft and moist were considered new, those that were dark in colour and a little decomposed were considered medium, and old spraints were those that had turned white and were obviously decomposed. We measured otter tracks and recorded their length and width if the tracks were clear.

In order to record past otter sightings we also interviewed 12 Kinmen residents who were known to have seen or caught otters.

## Results

### Interviews

The results of interviewing 12 people who had seen otters in Kinmen before our surveys indicated that otters existed in Kinmen at least 50–60 years ago. Although they are sometimes considered pests because they raid fish ponds, few otters are caught intentionally by local people. People estimated that about seven or eight otters had been caught in the last 10 years, including four – one adult male, one adult female and two pups – that were caught several years ago when they were stranded in a ditch leading into a large lake. S. J. Chuang, a teacher from Kinmen High School, showed us the carcass of an otter that had been given to him by a student. This proved to be a male *L. lutra* with the following measurements: head and body length, 600 mm; tail length, 385 mm; hind foot, 103 mm and ear length, 19 mm.

### Surveys

Spraints of otters were found at 29 of the 33 sites (88 per cent) visited in Kinmen in December 1992 (Figure 2). Eleven of the 29 sites (37.9 per cent) had new otter spraints. Thirty of these 33 sites and 10 new sites were visited in May 1993 (Figure 2) and only 27 (67.5 per cent) had signs of otters. However, new spraints were found at 22 of the 27 sites

(81.5 per cent). Fifteen sites had signs of otters in both surveys. The sites at which signs of otters were found were widely distributed throughout Kinmen, along almost all the waterways and round most of the lakes. Several sites were near villages and small towns, or among houses.

Otter tracks were seen clearly only on banks with soft, bare soil or mud. The sizes of tracks recorded were  $5.8 \pm 1.0$  cm long (including claw length) and  $5.6 \pm 0.6$  cm wide. The tracks generally had short digits and the claw and webbing could usually be seen if the soil or mud was soft enough. However, there were two sets of tracks that were narrower in width: 5.8 and 6.4 cm long, and 4.0 and 4.7 cm wide, respectively. The digits of these tracks were longer than the rest and no obvious claws and webbing were visible.

Six sites in Little Kinmen were surveyed in January 1993. Four (66.7 per cent) of these had signs of otters, with one site having fresh otter spraint (Figure 3). Again, otter signs were found at most lakes and along most waterways. The two lakes where no otter signs were found were both at the northern end of the island.

## Discussion

Several otter species, for example *L. lutra*, *L. perspicillata* and *Aonyx cinerea*, are known to occur in southern China (Foster-Turley *et al.*, 1990). Specifically, Gao *et al.*, (1987) reported that both *L. lutra* and *A. cinerea* had been recorded in Xiamen and Taiwan. According to Kruuk *et al.*, (1993, 1994), the tracks of these two species are readily distinguishable. The footprints of *L. lutra* are larger, have shorter digits and the claws and webbing can often be seen. The footprints of *A. cinerea*, on the other hand, are smaller, with longer digits and no visible claws or webbing. The majority of the tracks found in this survey belonged to *L. lutra* but there were two sets of tracks that bore more resemblance to those of *A. cinerea*. The presence of *A. cinerea* on Kinmen needs further investigation.

Survey results indicated that otters are

widely distributed on Kinmen and Little Kinmen. Possible reasons contributing to this distribution are as follows. First, artificial reservoirs, lakes, ponds, ditches and irrigation canals, along with natural streams, form a complex network of waterways, which can easily be used by otters to travel around on both islands. Second, there are fish in all these waters. Third, there are still many places with little human disturbance, providing secure resting sites.

The interview results indicated that otters have existed on Kinmen for at least a few decades and that they breed and produce cubs there. This, together with the survey results that abundant and fresh otter signs could be found in both the rainy and dry seasons, indicated that the otter is a resident species on Kinmen. Because of the small land area and length of waterways, we predict that the number of otters on Kinmen may not be very large. However, otters are also widely distributed in Xiamen and mainland China (Gao *et al.*, 1987), although numbers may have declined in recent years (Zhan, 1985). Interchange between the islands and the mainland is likely to occur, which may affect the population on Kinmen.

Otters on Kinmen are protected by the domestic Wildlife Conservation Law, and to date there has been little poaching. However, habitat alteration, pollution and drought may affect the future survival of *L. lutra* on the two islands. Now that military control has ended Kinmen is changing rapidly. New construction works are altering the land-use pattern fast and dramatically: several wetland areas have been drained and infilled to make land for building. Houses and cabins are being built along reservoirs and waterways. The capacity of the sewage system and water pollution controls are inadequate to handle the large amount of waste generated by tourists flooding on to these islands. With a serious drought in summer 1993 and low water levels, the problem of water pollution in lakes and waterways became even more serious. This may affect the otter directly by destroying its habitat and indirectly by affecting its food sources. Conservation measures, such as habitat protection and pollution control, are

needed to ensure the persistence of the otters on Kinmen.

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