

## NEW NATURE RESERVES IN ENGLAND

THE Nature Conservancy has announced the establishment of five new nature reserves in England, at Hickling Broad, Norfolk; Bure Marshes, Norfolk; Thetford Heath, Suffolk; Weeting Heath, Norfolk; and Knocking Hoe, Bedfordshire.

Hickling Broad comprises about 700 acres of shallow water surrounded by extensive reed-beds, fen, alder-wood and grass marshes characteristic of the Norfolk Broads. The history of the Broad as a bird sanctuary goes back to about 1911, when the late Lord Lucas, having bought the Whiteslea half of the Broad, approached a Hampshire friend and neighbour, Col. J. D. Mills (father of the present owner), of the Hickling half, who willingly agreed to let his part of it to form the sanctuary. Jim Vincent was appointed keeper. After the death of Lord Lucas, the ownership of one half and the lease of the other passed to the late Lord Desborough, who maintained the sanctuary at considerable personal expense with Jim Vincent's invaluable help.

The newly created National Nature Reserve, which lies 10 miles north-west of Great Yarmouth and covers an area of about 1,204 acres, has been established under Nature Reserve agreements with the owners, the Norfolk Naturalists' Trust and Major J. M. Mills.

The aquatic plant *Najas marina*, found in Britain only in certain Broads, is abundant at Hickling, together with many other rare plants, which are found in the marsh communities. The rich flora also supports some notable insects, of which the most outstanding is the swallowtail butterfly. The bittern, which re-established itself as a British breeding species on the nearby Sutton Broad in 1911, has bred at Hickling again since 1912, and the marsh harrier, which was also virtually extinct as a breeding species, returned rather later. To-day, harriers, bearded tits and bitterns are flourishing, together with several species of ducks, waders and other interesting birds.

The coypu, a large South American rodent which is now widespread in the Broads area, was first recorded at Hickling in 1950. It eats large quantities of vegetation and has in places eliminated much of the lesser reed-mace. The increase of open water by eating out and breaking up encroaching plant life seems, on balance, so far to have been beneficial.

Those accustomed to visit the area will find no change as regards access, and the declaration as a reserve will not in any way affect the use of the Broad for sailing and fishing. Applications to visit the adjoining sanctuary area and for permits to collect specimens of plants and animals should be sent to the Secretary, Norfolk Naturalists' Trust, The Assembly House, Theatre Street, Norwich. Inquiries regarding proposed researches should be addressed to the Regional Officer for East Anglia, The Nature Conservancy, Government Offices, Bishopgate, Norwich.

The problem of the evolution and future of the Norfolk Broads is of considerable scientific and economic interest. Recent research has shown that many Broads were man-made in the Middle Ages and has partly explained why so many have become unnavigable lately. The Nature Conservancy has been asked to make a long-term scientific investi-

gation of this problem, but as, unfortunately, no money could be found for it a start has not yet been possible. In addition to money and specialist staff, experimental areas are essential on which the scientists can work. These have now been provided through the generous co-operation of the Norfolk Naturalists' Trust and Col. Harry Cator and Mr. John Cator, of Woodbastwick, who have entered into Nature Reserve agreements on 734 acres of marshes and small broads (stretching some 2 miles from Ranworth to Decoy Broad, on the right bank of the Bure), which now comprise the Bure Marshes Nature Reserve.

Ranworth and Cockshoot Broads were given in 1949 by Col. Cator to the Norfolk Naturalists' Trust, who, with the support of the Conservancy, will continue to manage these Broads and marshes. Management of the privately owned Woodbastwick area also remains in the hands of its owners, and there will be no change as regards use or access.

The Breckland of south-west Norfolk and north-west Suffolk is an area of sandy heaths of the greatest importance for research on plant and animal populations in arid conditions resulting from its semi-continental climate and conjunction of sandy and chalk soils. Agricultural reclamation, afforestation, defence needs and other development have made great inroads into the unspoilt Breckland during the past thirty years. Thetford Heath, Suffolk, which lies 2½ miles south-west of Thetford and covers 225 acres, has been protected by the Norfolk Naturalists' Trust since 1949, and this reserve is now being declared under an agreement with the Trust.

Breckland birds in special need of conservation are well represented, and the breeding species include stone curlew, woodlark, wheatear and ringed plover. Most of the typical Breckland plants are to be found on Thetford Heath, which has, however, a stony broken ground surface with an incomplete covering of vegetation over a considerable area. During the 1930's parallel stripes of heather were observed, but it was not until recent years that this was connected with collections of flints in long parallel lines—the stone stripes revealed after the removal of a small area of surface soil during the Second World War.

Applications to visit and for authority to collect specimens of animals and plants should be made to the Regional Officer for East Anglia, The Nature Conservancy, Bishopgate, Norwich.

Weeting Heath, Norfolk, which has a wide range of Breckland heath vegetation types and consequently a flora and fauna of considerable interest, was purchased and presented to the Norfolk Naturalists' Trust in 1941, and a further area was added in 1944. Weeting Heath lies west of Brandon and covers 338 acres.

Typical Breckland birds, such as stone curlews, woodlarks, wheatears and a few pairs of ringed plovers (which rarely breed so far inland), are to be found. In the mid-section there is a wide area of bracken, and the reserve is separated from afforested land on the west by a well-defined stretch of ancient earthworks known as the Devil's Dyke. The absence of the rabbit from Weeting during the past two years has enabled uncommon plants to flower which had

not been recorded there for many years. The northern section of Weeting Heath consists largely of chalky grassland forming a thick turf with pine trees scattered in groups. The more barren parts of the heath have yielded a very rare spider (*Oxyptila scabricula*), and another spider (*Philodromus collinus*) occurs only at two other places in Britain.

Applications for permits, which will be necessary for those who wish to visit the reserve, to undertake research and to collect specimens of animals or plants, should be addressed to the Regional Officer for East Anglia, The Nature Conservancy, Bishopgate, Norwich.

Knocking Hoe in Bedfordshire is a small relic of a particular type of close-grazed chalk downland turf,

which is rapidly disappearing under the present system of land use in Britain. The turf is thought to be of very ancient origin, and has probably remained undisturbed by cultivation at least throughout historic times. There is a rich flora of low-growing chalk downland species. The reserve has been established under a Nature Reserve agreement with the owner, Mr. L. T. Franklin. It will continue to be used for sheep grazing, as this is considered to be the best way to preserve the present composition of the sward. Access to the reserve will be by permit only, of which only a very limited number will be issued. Applications can be made to the Regional Officer for the South-East, The Nature Conservancy, 19 Belgrave Square, London, S.W.1.

## POPULATION STUDIES OF THE COMMON EARWIG

**D**URING the summer of 1956, there was a plague of the common earwig (*Forficula auricularia* Linn.) in the garden of 28 Yarborough Road, Lincoln. Traps were erected to catch the earwigs and large numbers were caught. P. F. Baker (*Trans. Lincolnshire Naturalists Union*, 14, No. 2; December 1957) made a study of the relative numbers of males and females in the population and of the percentage of the population consisting of the variety with large elliptical forceps, known as form *forcipata* Steph. Later, it was decided to investigate the distance moved by different individuals in the population; this was done by a marking experiment.

The final total of 337 males and 332 females showed that during August and September 1956, in the earwig colony studied, males and females were present in almost equal numbers.

The males were found to be the most variable: the commonest varieties being those in which one-half of the calipers differed markedly in curvature from the other. This was found in both typical and form *forcipata* males. Two specimens were caught which from their external appearance seemed to be gynandromorphs.

Previous work on population statistics had led to the belief that earwigs were migrating from one part of the garden to another and it was decided to assess the movements of separate individuals in the population. To investigate movement an evenly

spaced network of traps was set up over the area so that each trap was about one yard from its immediate neighbours. Separate pots were labelled and all insects caught in any particular pot were marked on the elytra with oil paints of a colour characteristic of the pot.

To mark the insects during a period of relative quiescence—from general observations the earwig seemed to be active at night and inactive, or nearly so, during the daylight hours—an actograph was used. This relied on a displacement of equilibrium as the insect moves in a cage; a mark is registered on a drum. In this way the earwig was shown to be entirely nocturnal, commencing activity at dusk and continuing to dawn. For this reason removal of the insects from the traps was carried out in the daytime; these earwigs were then marked with oil paint and released at the base of the trap in which they were caught. The marking, to be recognizable, usually lasted for one re-trapping only; other earwigs ate the oil paint off their fellows.

Recaptures of marked individuals made up 12 per cent of the whole.

The results showed small daily migratory trends. In this case conditions were ideal and food was not scarce. It is known, however, that the common earwig will, under special environmental conditions or when food is scarce, migrate in thousands in search of new grounds.

## DIRECTING YOUNG SALMON

**R**ESearch on the methods of guiding young Pacific salmon while migrating downstream have recently been described by J. R. Brett and D. F. Alderdice (Fisheries Research Board of Canada. Bulletin No. 117: Research on Guiding Young Salmon at Two British Columbia Field Stations. Pp. viii + 75. Ottawa: Queen's Printer, 1958. 75 cents).

The first experiments, in 1953, were performed in a large divided trough using captive sockeye yearlings. These tests were intended to survey broadly the possibilities of using various techniques, including light, sound, air bubbles, curtains of hanging chain, odours, dye releases and differences in water velocity as means of guiding young fish. Significant deflexion resulted from the use of a relatively large area of

illumination at night, a band of rising air bubbles or bursts of dark dye during the day, and strands of chain hung vertically during both day and night.

Further trough experiments, in 1954, on the use of hanging chain demonstrated that the maximum distance between strands which produced a deflexion of 75 per cent or more fish through an angle of 45° was 4 in. Apart from its light-reflecting quality, the type of chain was found to be unimportant. The sensory stimulus causing the avoiding reaction was found to be primarily visual. Slow oscillation of the chain increased the deflexion of sockeye. Coho yearlings were not significantly deflected.

In conjunction with the trough experiments, a limited number of field tests using a 56-ft. oscillating chain deflector (144 oscillations a minute) in the