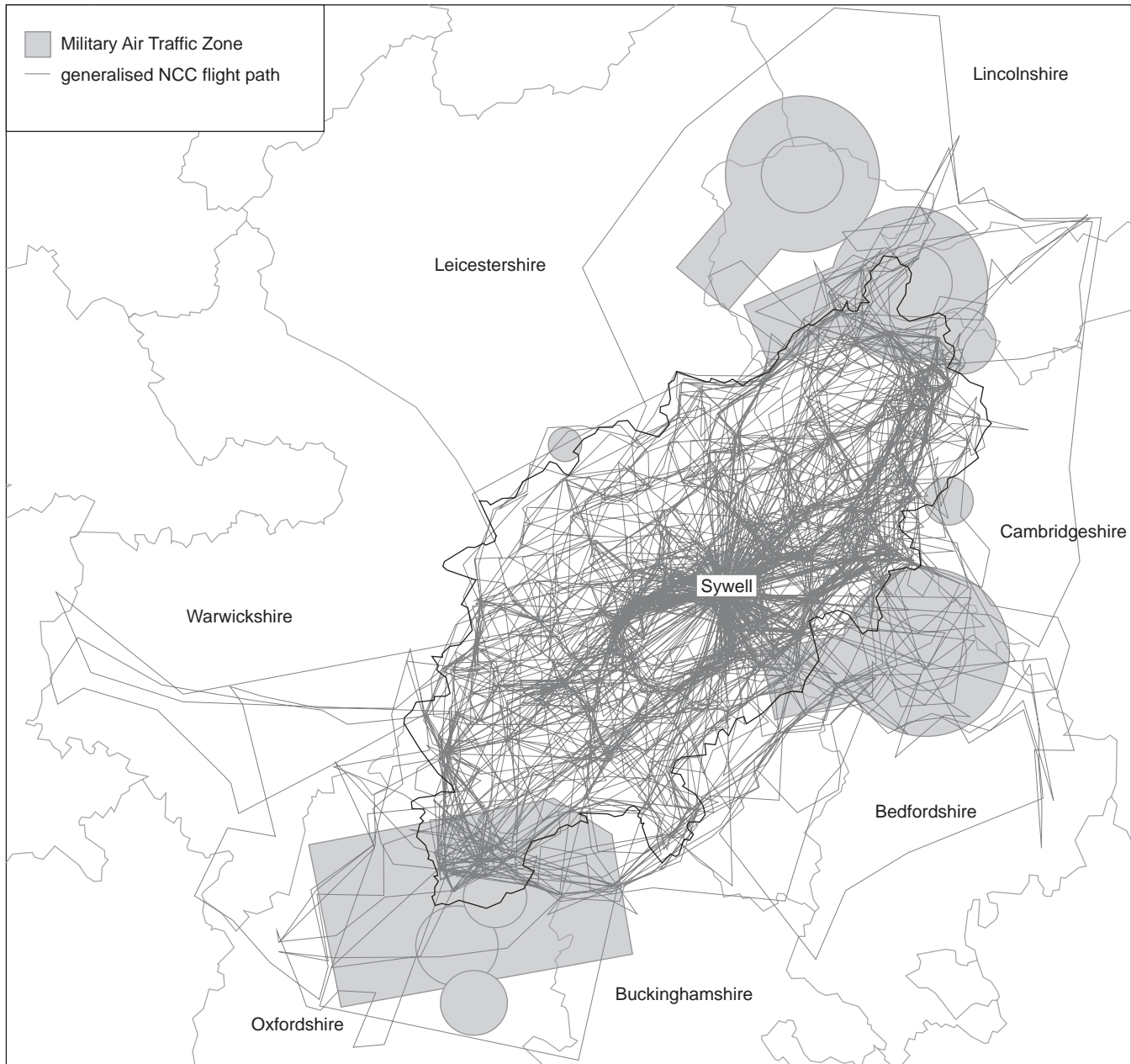


and iron industries of Rockingham and Whittlewood Forests was published in 1982 and then in far greater detail in 2001 (Foard 1982c, 2001a). The results of aerial reconnaissance in the Raunds Area, using the plotting conducted by the author in 1985, have been discussed in Parry (2006).

External funding for the reconnaissance programme was initially from the Inspectorate of Ancient Monuments (later English Heritage), and then subsequently from RCHME. These were grants for aircraft hire, ranging between £500 to £1000 in most years, while during much of the 1980s RCHME also provided additional support in

the form of photographic film, processing and printing. Throughout the period, from the initial time contributed by Cowley through to the funding of aircraft hire, equipment, film and the time of staff, NCC provided the greater proportion of the resources for the reconnaissance programme, especially after RCHME ceased to provide film processing and printing services. Funding levels in any one year from all sources are not, however, a good guide to the intensity of the flying programme, as resources were carried from one year to another where practicable in response to variable reconnaissance conditions.

*Fig 2.9
Generalised NCC flight paths 1977-1996 and the local Military Air Traffic Zones (compiled from CAA 1991).*



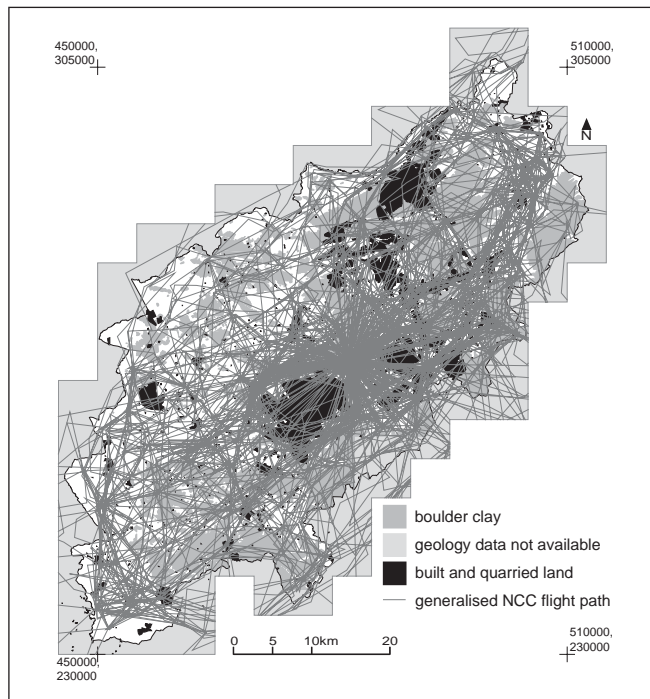


Fig 2.10
Generalised NCC flight paths
in relation to boulder clay,
built and quarried areas.

The intensity of the flying programme is best assessed through the number of minutes flown as indicated on the flight logs, which survive for almost all flights.

At first reconnaissance was restricted to Northamptonshire, but during the 1980s it extended on a modest scale during productive cropmark seasons to cover parts of adjacent counties, in north Oxfordshire, north Buckinghamshire, east Warwickshire, west Cambridgeshire, south Lincolnshire and Rutland, where this did not act to the detriment of the systematic survey of Northamptonshire (Fig 2.9). When RCHME funding declined and disappeared in later years it became necessary to restrict work once more to Northamptonshire. The main waypoints on most flights are recorded on the manuscript flight logs and these have been used to map, in simplified form, the broad coverage by flight (see Figs 2.9 and 2.10). For a small proportion of flights no log survives, but for these, and to achieve more complete detail for other flights, the location and sequence of frames recorded in the NCC photo index could be used to reconstruct the exact flight paths.

There was relatively little restriction on the spatial coverage, although for most of the period work in the far south-west of the county was limited to some degree by USAF Nether Heyford. It was usually possible to enter their zone under radar control. A similar problem existed in the

north-east of the county immediately around RAF Wittering, although it was often possible to approach close to the airfield under radar control with the most effective time being late afternoon to early evening, when the airfield was normally inactive. The only other significant restrictions were the small exclusion zones around the USAF communications centre at Croughton and, for a short time, around Molesworth airfield when missiles were based there. The immediate environs of Sywell airfield were covered adequately, both while in the circuit or by agreed over flight. Of the other airfields Sibson near Peterborough and Husbands Bosworth were rarely active enough to significantly restrict reconnaissance. Despite the lack of significant restrictions on access, the flight paths do show a high level of focussing on particular areas (Fig 2.10). The urban and quarried areas were generally avoided, but it is comparison with the geological mapping that explains much of the distribution of coverage, reflecting the negative impact of boulder clay on cropmark development and the targeting of most reconnaissance towards the permeable geologies. Notable concentrations of flights are seen along the Nene, Welland and Ouse valleys, together with the permeable geologies to the north of Northampton as well as in the north-west and especially the south-west of the county. However, there was sufficient overflight of boulder clay areas to ensure recognition of cropmark development there in exceptional years, which was then followed up by intensive survey flights when appropriate.

Flight logs survive for almost all flights 1978–96. In 1986 there was experimental introduction of a standard form for logs by RCHME for regional flyers and these were used for the remaining years of the reconnaissance programme. From 1978 to 1981 places were listed in the logs, sometimes in brackets, to indicate significant waypoints where no photography was undertaken. From summer 1981 a record was kept on the back of the log of the main places passed over, as a guide to the route taken, and this practice was maintained on the standardised logs from 1986 onward. In the early 1990s attempts were made to maintain detailed records of flight paths through the use of GPS, but these were unsuccessful, owing mainly to the use of inappropriate and unreliable GPS equipment. In 1995 the use of GPS with a moving map, including existing

digital cropmark mapping, running in GIS (MapInfo) on a laptop computer was tried. Again it was not effective, partly owing to the inadequacies of the hardware.

The flying programme was almost exclusively undertaken from Sywell airfield, Northampton, using both private aircraft and those from Northamptonshire School of Flying. Until August 1978 a low wing Robin was normally used, in the absence of a more suitable aircraft, but the photographic results were poor. From then until 1992 a Cessna 150 was the normal platform (a small, two-seat, light aircraft with a high wing giving a largely unobstructed view of the ground) (Fig 2.11). There was also occasional use of a two-seat Cessna 152 and of a four-seat Cessna 172. The 150 was a slow aircraft but it was very stable and by far the best photographic platform used. The 152s were less stable, while the 172s, although somewhat faster in transit, were much more awkward to photograph from. However, from summer 1992 onward almost all photography was conducted from a Cessna 172 to enable both aerial archaeologists in Northamptonshire Heritage to contribute to the reconnaissance programme as photographers and navigators.

The photography was all oblique, taken with hand-held cameras. Initially 35mm cameras were used for all photography. From July 1978 a larger format Bronica ETRS with 50mm lens was used for black and white photography on 220 Ilford FP4 film. This black and white photography formed the basic record, comprising some 90% of the images taken. From 1979 a 35mm Pentax ME with Vivitar 35-105 zoom lens was used for colour slides, mainly for lecture purposes. From May 1990 this was replaced by a Nikon F801 with 35-105 zoom, although its autofocus proved problematic. The majority of transparencies were on Ektachrome 200 in the 1970s and 1980s, and on Agfachrome 200 in the 1990s. The transparencies were copied by RCHME for the NMRC until the late 1980s, and all prints continued to be copied for the NMRC until the mid-1990s. Shots from flights from the late 1990s onward are the only ones for which the negatives remain at NCC and copies were not taken by NMRC.

From 1978 all photography was carried out by the author, with the exception of a few flights by Cowley and by Hannan in the late 1970s. In 1994 Phil Markham was the photographer and the author the navigator. From 1974, apart from a few flights in the



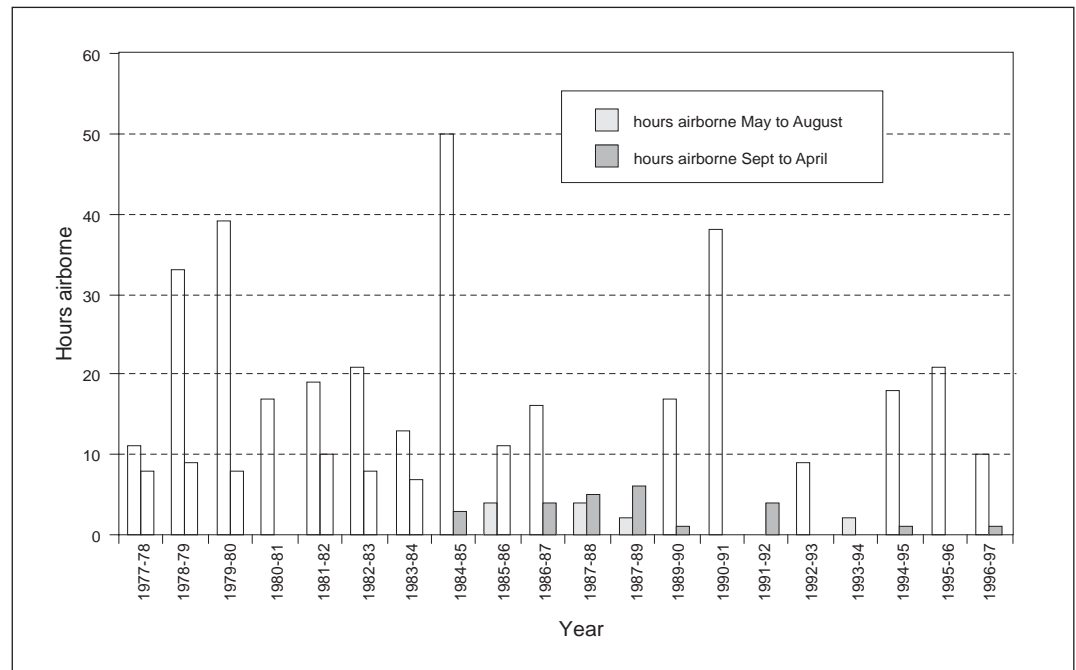
*Fig 2.11
Cessna 150 at Sywell
airfield in the 1980s
(copyright Glenn Foard).*

summer, Cowley was the pilot until forced to stop flying through ill health at the end of 1980. This was a great misfortune, for a very effective partnership had been built up over the previous years. Cowley, however, identified another private pilot, Derek Richardson, who worked with us to enable the flying programme to continue. From 1981 until 1992 Derek Richardson was pilot, other pilots occasionally standing in for a few flights in mid-summer.

1981-92 was not only the longest but also by far the most productive period of reconnaissance in the county, made possible by the close understanding and team work that developed between pilot and archaeologist. Unfortunately the team was broken up at the end of 1992 when Richardson, like several other private pilots, was barred from further aerial archaeology work by the CAA, who thereafter required the use of commercial pilots and aircraft operated with an Air Operator's Certificate (AOC). However, following successful negotiations by Gordon Maxwell in Scotland, NCC also managed to negotiate a special exemption from the AOC requirement as it would otherwise have been impossible to continue the local flying programme. This exemption was developed into a national scheme, which ran until the end of 2001.

As a result, during 1994-7 Mike Boardman, an instructor at Northamptonshire School of Flying, was the main pilot. Although an excellent replacement for Richardson, there was not time to build up the effective understanding between pilot and photographer that had existed in before 1993. But other things were also changing. There was now a full-time NMP project assistant, Phil Markham, to be brought into the flying programme. In 1993 he took over photography with the author as navigator, but there was no way that he could develop in 20 hours flying over a few months the level of experience built up in more than 400 flying hours over nearly 20 years, and so from 1995,

Fig 2.12
Hours flown by NCC in the
years 1977 to 1996.



roles were reversed. After 1996 other responsibilities for both photographer and navigator, combined with poor cropmarks seasons, brought the systematic reconnaissance programme to an end. Only a handful of flights took place between 1997 and 2002. Additional problems arose with the changing approach of RCHME, subsequently

subsumed into English Heritage, including copyright and other matters, at a time when their funding levels for regional reconnaissance had declined dramatically.

In 2002 all such work from Sywell was rendered impossible with the final removal by the CAA of the exemptions for archaeological aerial reconnaissance.

Table 2.2 Hours flown and photographs taken by NCC in the years 1977 to 1996

year	hours flown May to August	hours flown September to April	number of photographs taken May to August	number of cropmark photographs taken
1977-78	11	8	390	76
1978-79	33	9	753	553
1978-80	39	8	1233	846
1978-81	17	0	636	490
1978-82	19	10	664	590
1978-83	21	8	722	532
1978-84	13	7	376	305
1978-85	50	3	1558	1602
1978-86	4	11	201	29
1978-87	16	4	670	678
1978-88	4	5	191	31
1978-89	2	6	59	6
1978-90	17	1	124	238
1978-91	38	0	1497	1183
1978-92	0	4	0	14
1978-93	9	0	276	235
1978-94	2	0	20	0
1978-95	18	1	491	573
1978-96	21	0	1054	1143
1978-97	10	1	760	801

Reconnaissance in 1978 and 1979, although focussing particularly on cropmarks from May to August, also included a wide distribution of flights through much of the year to enable wider potentials to be more fully assessed. As a result, it was recognised that soilmark photography could make a major, if secondary, contribution and enabled the reconnaissance to settle into a more focussed pattern. However, by the late 1980s the results from soilmark photography had tailed off and reconnaissance then concentrated even more on cropmarks.

Over the 20 years of intensive work over 75% of the flying was conducted between May and August, almost solely for cropmark evidence (Fig 2.12 and Table 2.2). The remaining 25% between September and April was largely for earthwork and soilmark evidence, although a few early cropmarks and some late parchmarks were recovered in April and September, respectively.

In some years cropmark development was so poor that only a handful of flights were made to test conditions. In 1991 no cropmark flights were undertaken because very poor cropmark results were reported from other regions. In some other years many more hours were flown than normal to enable the exceptional cropmark evidence to be recorded. The effectiveness of the reconnaissance strategy appears to have

improved significantly over the years, with the number of photographs taken increasing significantly in relation to the number of hours flown, suggesting that far better targeting of flights was accomplished in the most productive periods (Fig 2.13). Large quantities of new data were recovered in exceptional years, most notably in 1979, 1984, 1990 and 1995-6. High quality results were achieved roughly once in every five years through the two decades of reconnaissance. One of the best indicators of exceptional years is the return seen on the usually poorly responsive boulder clay geology, where the years 1990, 1995 and 1996 stand out (Fig 2.14).

Reconnaissance in 1978 and 1979 showed that, particularly in the autumn and early winter, there was a high potential to recover soilmark evidence of medieval field systems and of deserted settlement remains. Systematic survey of this evidence was not, however, undertaken in subsequent years owing to the need to concentrate limited resources on cropmark and the other soilmark targets. While cropmark photography was not generally proving effective in filling in the massive gaps in our evidence of Iron Age and Roman activity on the boulder clays, soilmark photography in the formerly wooded areas proved an important way to tackle part of this otherwise apparently inaccessible

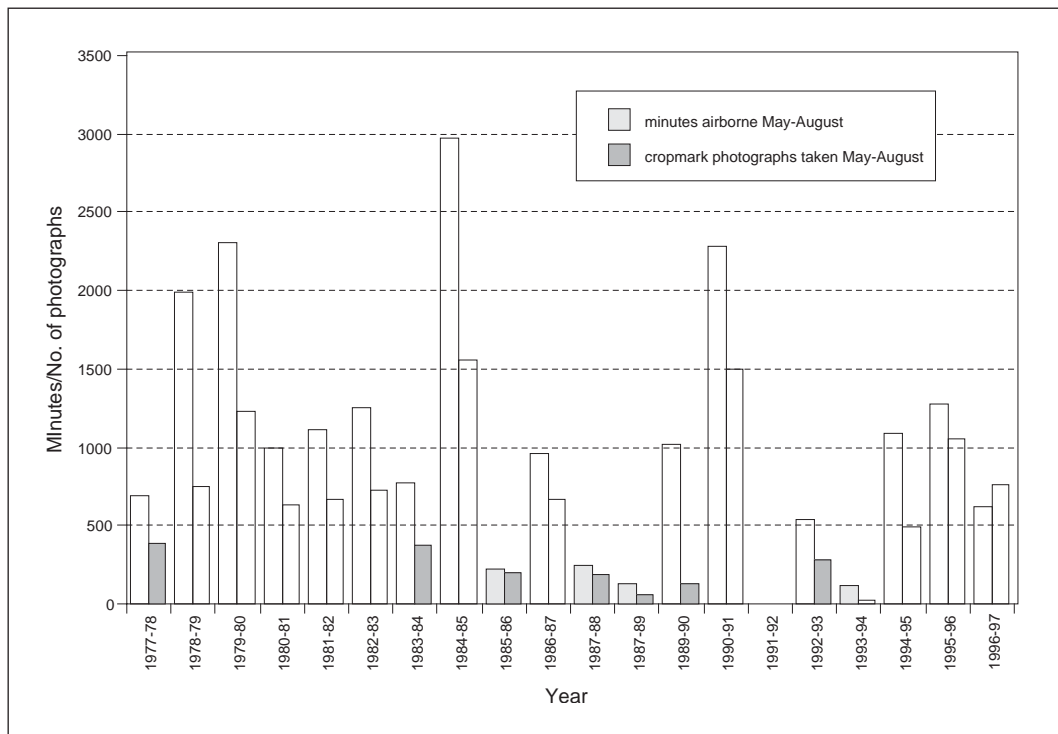


Fig 2.13
Number of NCC cropmark photographs taken relative to minutes spent airborne on the years 1977 to 1996.