

# FISHTRAPS IN THE MIDDLE SEVERN ESTUARY: AIR-PHOTOGRAPHIC EVIDENCE FROM THE MID-TWENTIETH CENTURY

by J.R.L. Allen

Department of Archaeology, School of Human and Environmental Sciences, University of Reading, Whiteknights, Reading, RG6 6AB, U.K.

*Air photographs dating from 1945-7 and 1969 are used to identify the location, form in plan, and relation to local topography of historical fishtraps at the intertidal rock platforms known as Hayward Rock, Hills Flats, Oldbury Flats, Aust Rock and English Stones-Gravel Banks on the eastern side of the middle Severn Estuary. The photographs depict some structures apparently wholly of wood, many in which the use of wood and stone seems to have been combined, and a few which appear to be solely of stone. In plan the traps range from straight to bow-shaped, tick-shaped, and bucket- or ladle-shaped. Putchers were in use at some traps but most appear to have been the site of rows of the large, tripartite, conical baskets known as putts. The air-photographic evidence complements documentary sources and (commonly illustrated) descriptions from ground level of some of the fisheries. The traps represent a long-lived and substantial coastal industry that is now for a variety of reasons essentially defunct.*

## INTRODUCTION

The material evidence for intertidal and inshore fishing must take a substantial place in any balanced account of coastal archaeology in Britain. So far as the Severn Estuary-inner Bristol Channel and its hinterlands are concerned, that evidence includes small, portable equipment such as lead net/line sinkers (Rippon 2000; Allen 2001a, 2003), a diversity of stationary fishtraps ('fixed engines') for white fish but especially salmon preserved in palaeochannel deposits or on open shores (McDonnell 1980, 1994; Langham 1983; Aston and Dennison 1988; Stuckey and Evans 1988; Allen and Fulford 1992; Godbold and Turner 1992, 1994; Kay and Davies 1993; Allen

and Rippon 1997; Hildich 1997; Riley 1998a, 1998b; Townley 1998; Allen and Bell 1999; Nayling 1999a, 1999b; Bell *et al* 2000), and assemblages of fishbones/teeth at activity/occupation sites within or influenced by the coastal zone (Smith *et al* 1983; Leach 1984; Jones *et al* 1987; Bell 1990; Yorkston 1996; Nayling and Caseldine 1997; Sadler 1997; Cox 1998; Price and Ponsford 1998; Locock 1999; Bell *et al* 2000). In date these finds cover the period from the Mesolithic to modern times, and they can be matched from other coastal locations in Britain and Ireland (eg Steane and Foreman 1991; Fulford *et al* 1997; Gilman 1998; O'Sullivan 2001, 2003; Davidson 2002; McErlean *et al* 2002; Milne 2003). Closely allied to the catching of finned fish in the area is the intertidal harvesting of epifaunal-infaunal shellfish, represented archaeologically by concentrations that range from small assemblages up to large middens (Rutter 1948; Boon 1978; Smith *et al* 1983; Balaam *et al* 1987; Burchill *et al* 1987; Bell 1990; Benson *et al* 1990; Hughes 1996; Yorkston 1996; Marvell and Owen-John 1997). These various direct indicators of the inclusion of marine resources in diet are now being complemented by analyses of stable isotopes (especially carbon) in human hard tissues (eg Richards and Hedges 1999; Sealy 2001).

The interpretation of fishtraps preserved in the Severn Estuary-inner Bristol Channel is greatly helped by accounts of intertidal fishing by these means, as it was observed in the mid-late twentieth century (Matthews 1934; Waters 1947; Neufville Taylor 1974; Brown 1980; Wilshire 1980; Jenkins 1991; Salisbury 1991; Green 1992; Rowbotham 1993; Godbold and Turner 1994; Awre Millennium Committee 2001). Similar

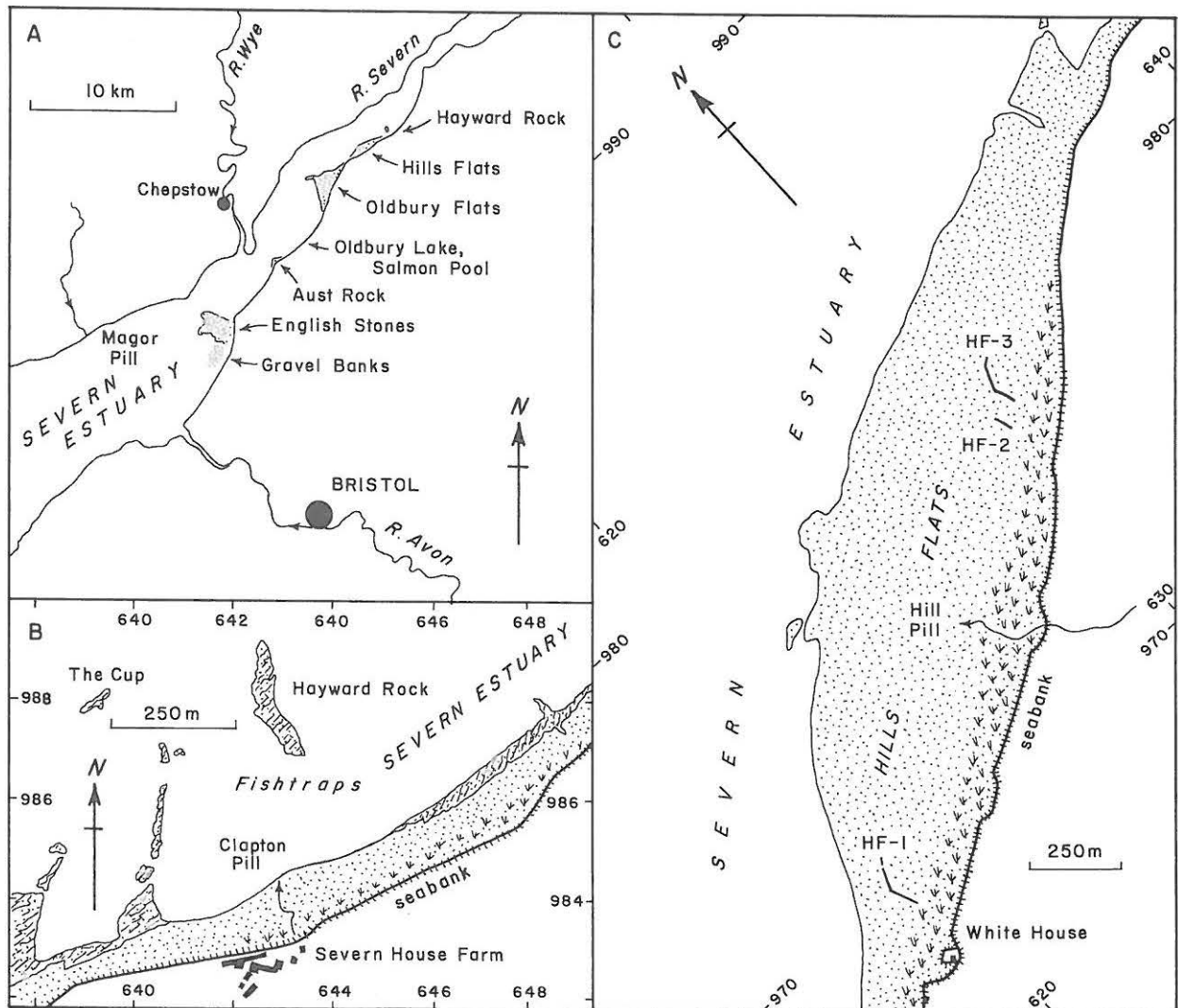


Figure 1: Fishtraps in the middle Severn Estuary (intertidal zone stippled). A, Distribution of intertidal rock platforms with fishtraps. B, Hayward Rock. C, Hills Flats and its fishtraps.

evidence is reported by James and James (2003) from the Carmarthen Bay estuaries. Typically, these reports describe and illustrate from ground level something of the detailed character of the traps then in use, and may include anecdotal evidence garnered from the fishermen whose living it was (eg Wilshire 1980). What they generally do not reveal, as is also true of Bradshaw's (1966) documentary study, is the overall scale and design of the fishtraps and their specific topographic context on the shore. Here air-photographic evidence has an important role to play, as is demonstrated below from places on the eastern shores of the Severn Estuary - Hills Flats, Oldbury Flats, Aust Rock, English Stones and Gravel Banks (Figure 1A) - where geological

conditions have favoured the development of extensive rock platforms, accessible on foot or by small boat, in the low-mid tidal frame. The most useful of all are sorties flown by the Royal Air Force immediately after the Second World War and a later set of 1969 made by the Ordnance Survey (see Appendix). Their evidence is doubly valuable because the Severn fisheries are now effectively defunct, on account of declining fish populations, changes in social-religious customs and regulation-licencing, and physical developments such as the Oldbury Nuclear Power Station (Oldbury Flats) and the Second Severn Road Bridge (English Stones). What traces of the fisheries remain on the ground are rapidly being degraded and destroyed, and many are no longer

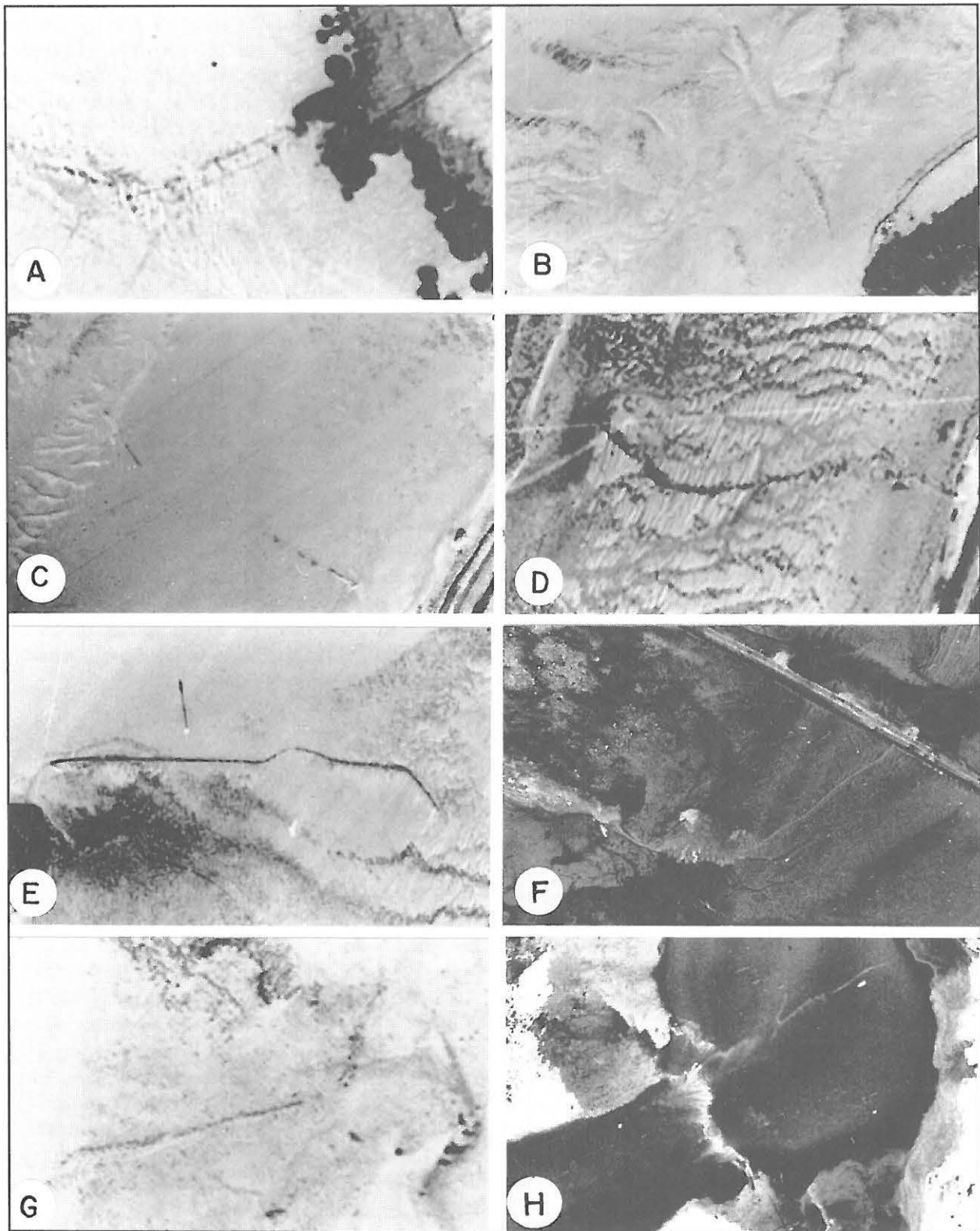


Figure 2: Fishtraps in the middle Severn Estuary. A, Hills Flats, HF-1 (scale c. 1:2500); north toward left. B, Hills Flats, HF-2, 3 (scale c. 1:5100); north towards upper right. C, Oldbury Flats, OF-4 (scale c. 1:3950). D, Oldbury Flats, OF-5 (scale c. 1:2800). E, Oldbury Flats, OF-8 (scale c. 1:4000). F, English Stones, ES-2 (scale c. 1:5500). G, English Stones, ES-3 (scale c. 1:2900). H, English Stones, ES-4, 5 (scale c. 1:5700).

safely accessible. However, as McErlean *et al* (2002) have noted, air photographs have one limitation as a means of prospection for fishtraps: they generally fail to register the simpler wooden ones where these have been eroded down to or near ground level.

Fishtraps in the Severn Estuary-inner Bristol Channel are not exceptional in being made of whatever suitable materials could be procured locally. Examples can be found in stone, others in wood, and some in a combination of the two. The sequences of dated fishtraps described by Godbold and Turner (1994) and Nayling (1999a) from the Welsh bank of the estuary point to a slow technological change in trap design over the last millennium or so (see also Salisbury 1991). Broadly, the oldest (largely medieval) devices seem generally to have been wooden, post-and-wattle weirs of V-shaped plan, either singly or in a row across the tidal stream, with some kind of basket or holding chamber at each apex, typically arranged to trap fish on the ebbing tide. Used toward the end of this phase, but more so later, were the large, conical, tripartite basket traps *c.* 4 m long known as putts (eg Waters 1947; Jenkins 1991; Godbold and Turner 1994). These were arranged in a single row across the tidal stream and attached to upright posts, either driven into the rock or sediment exposed on the shore or arranged on top of a low platform built of stone. They vary considerably in scale and plan, according to the local topography of the intertidal zone, and may be accompanied by stone or post-and-wattle weirs serving as leaders. In modern times another type of basket trap began to be used at the same time as putts, especially for salmon. These are the putcher or putcheon ranks, composed of woven, conical baskets *c.* 2 m long arranged in long rows one above the other in a framework of wooden or steel scaffolding (eg Waters 1947; Jenkins 1991; Godbold and Turner 1994). In plan these are very simple and typically straight.

### HAYWARD ROCK-HILLS FLATS

Hayward Rock is a small, narrow outcrop of Triassic mudrock that lies a short distance out in the estuary to the north of Severn House (Clapton) Farm in Ham and Stone parish (Figure 1A, B). Between it and the mainland is a broad, shallow

depression in which lay a group of closely spaced fishtraps, active as late as the mid twentieth century (Wilshire 1980). A fishing licence issued to Lord Fitzhardinge in 1866, reproduced by Bradshaw (1996), gives some details of these together with a thumb-nail sketch. The largest fishtrap, in plan bucket-shaped and open on the upstream short side, was a rank of 300 putchers, in perhaps three to four rows. Leaders, presumably of post-and-wattle as they are described as 'hedges', extended for *c.* 137 m upstream from each end of the rank to form the almost-parallel long sides. Nearby in the depression were a separate but smaller putcher rank and a row of 20 putts.

Hills Flats to the southwest of Hayward Rock is a large but narrow, triangular platform of Triassic mudrocks and sandstones, overlain in the hollows by Holocene silts and peats, that lies in the low-mid tidal frame (Figure 1A, C). The documentary sources for fishing here were explored by Jenner-Fust (1931). Leases were granted in 1448 and in 1743, and a manorial survey of 1728 entered the whole of the intertidal zone of Hills Flats as a fishery.

The configuration of the upper shore at Hills Flats has changed substantially over the last few centuries (Allen and Fulford 1996), and little material evidence of any kind for fisheries has survived (Figure 1C). In modern times there was a fishtrap at White House (HF-1) in the form of a putcher rank as much as *c.* 80 m long with what was probably a post-and-wattle leader that extended obliquely upstream for a similar distance along the outer edge of a rock shelf (Figure 2A). All that can be seen on the shore today are the stumps of lines of poles. Toward the northeastern end of the outcrop, air photographs (Figure 2B) reveal an open V-shaped feature which coincides on the shore today with a thin scatter of weedy lumps of stone (HF-2). The short arm, nearest the shore, measures *c.* 50 m in length and the long one at least *c.* 120 m. The feature seems to be the remains of a fishtrap partly or wholly in stone that operated on the ebbing tide. Roughly 75 m to the southwest (Figure 2B) is a partly similar but much shorter feature (HF-3), perhaps of the same origin but abandoned before HF-2 was built, as it lies downstream. Both features are discordant to the strike of the Triassic and Holocene beds exposed

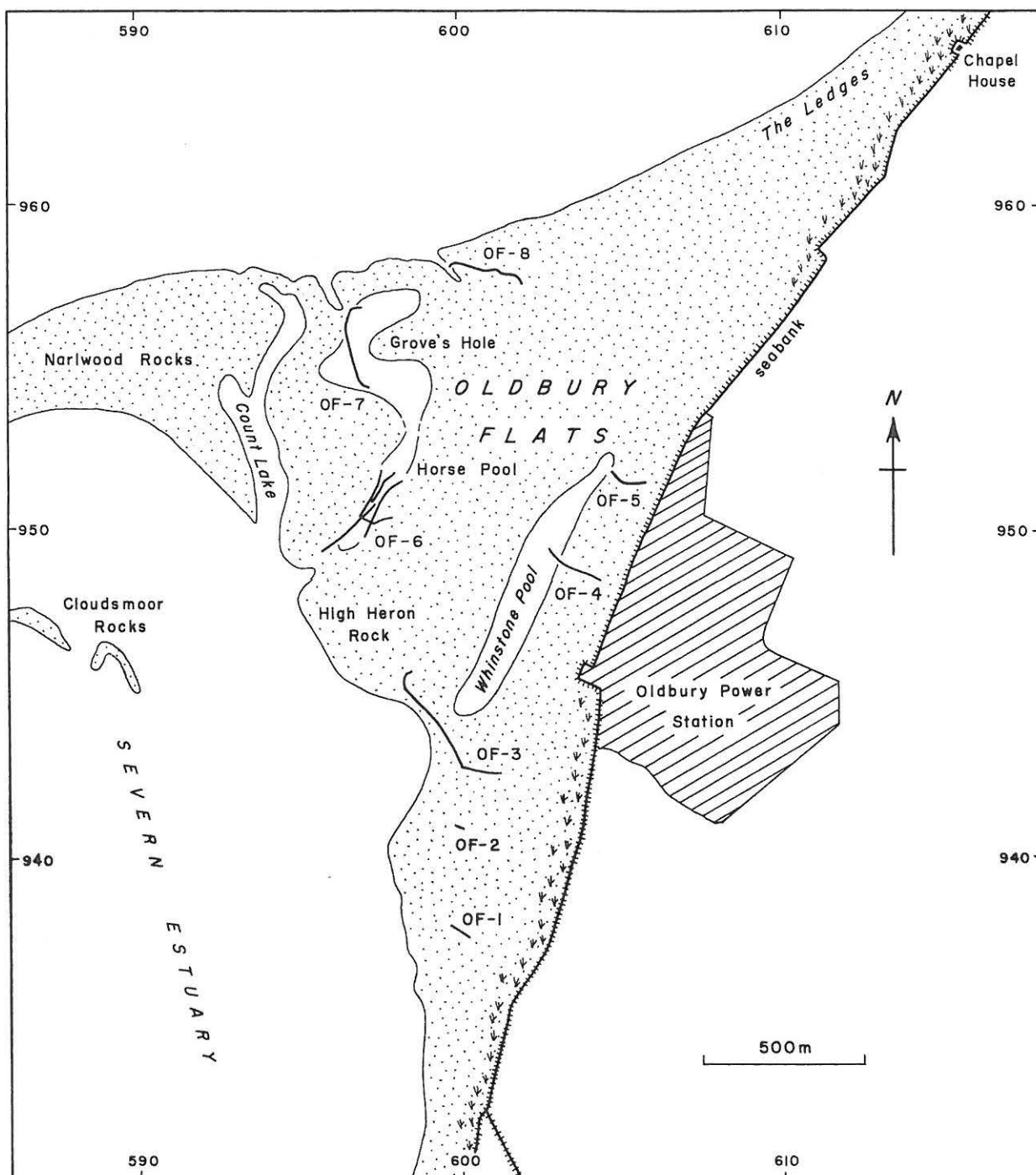


Figure 3: Oldbury Flats and its fishtraps (intertidal zone stippled).

on the platform and cannot be confused with them.

### OLDBURY FLATS

The intertidal rock platform to the southwest of Hills Flats known as Oldbury Flats (Figure 1A) is much larger and divided by a number of shallow

depressions that furnished channels or pools (Figure 3). Again broadly triangular in plan, it is underlain chiefly by Triassic mudrocks and thin sandstones, with a cover of Holocene silts and peats appearing at the southern end, where they begin to expand into the palaeovalley of Oldbury Pill (Allen and Fulford 1992). Some of the shallow depressions and channels that wind across

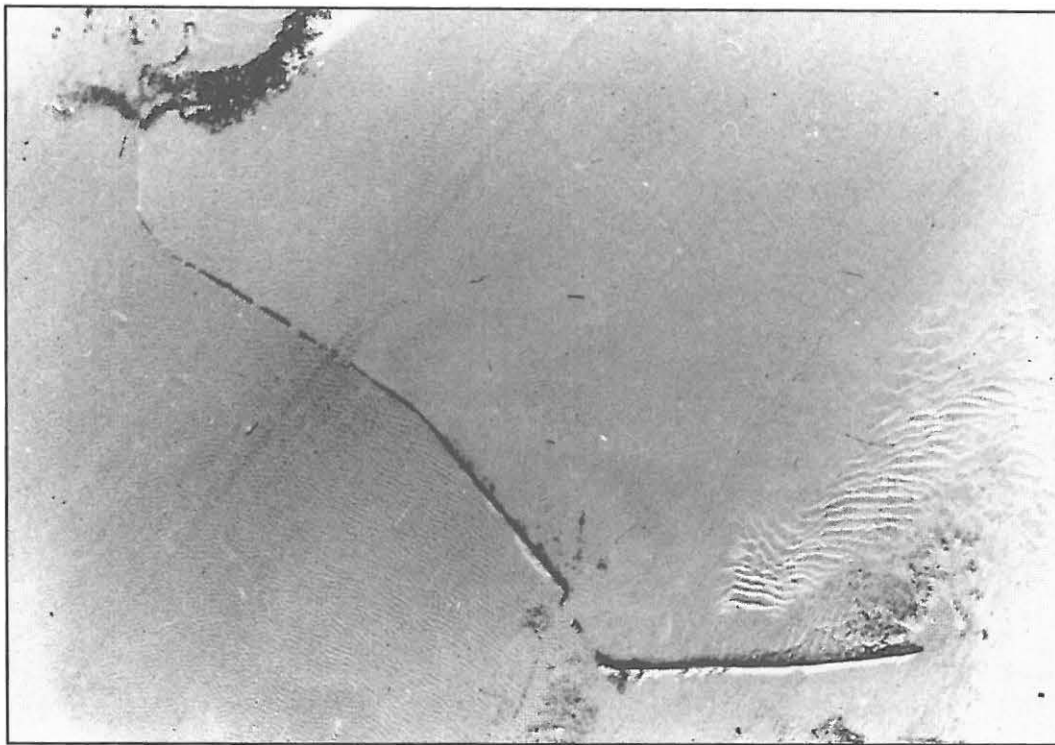


Figure 4: Oldbury Flats, fishtrap OF-3 (scale c. 1:3300).

the rockhead preserve the lower of these Holocene deposits. There are also indications of considerable shoreline change here.

Air-photographic evidence of fisheries at Oldbury Flats is especially valuable because almost nothing can be seen on the ground there today, on account of the construction in the 1960s of a tidal reservoir for the Oldbury Nuclear Power Station, permanently drowning almost all of the platform. At Chapel House, at the northeastern end of the rock platform, a 'fish weir' is mentioned in 1590, 1646 and again in 1743 (Jenner-Fust 1931). Bradshaw (1996) established from documentary sources the presence and approximate location of at least seven fisheries that were active in the 1860s, including that at Chapel House. This considerable enterprise continued into the mid twentieth century (Wilshire 1980), when the construction of the tidal reservoir extinguished all fisheries.

The southernmost identifiable fishery (Figure 3, OF-1) has no air-photographic registration. Riley (1998a) mapped it as an almost

straight, double row of wooden stakes, eroded down almost to ground level, 65 m long and 1.3 m wide which is visible when the intertidal zone is clear of mobile sediment. At the (extrapolated) seaward end a low jumble of blocks of rock can be seen in the field. The row of poles is best interpreted as a putcher rank; the jumble of rocks may either have helped to anchor it or provided a 'standing' for a net fisherman. Also without air-photographic registration, but recorded by Riley (1998a), is another double row of posts 20 m long and 1 m wide (OF-2). This is also likely to be the remains of a putcher rank.

What can be identified with Bradshaw's (1996) 'Carley Weir' of the 1860s is a complex fishtrap, the largest recorded herein, that lies concave to the ebb stream across the broad, lower end of the shallow depression that holds Whinstone Pool (Figure 3, OF-3). A number of broad features are apparent from the air photograph (Figure 4). The east-west section c. 120 m long nearest the shore appears to be a substantial leader; it has a wide, continuous drift of pale-toned sediment (?sand) downstream to

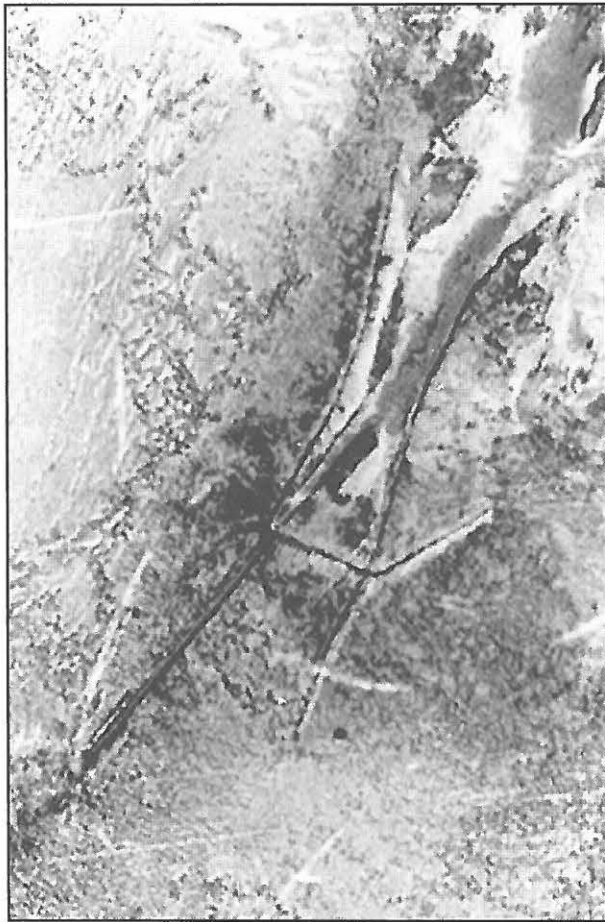


Figure 5: Oldbury Flats, fishtrap OF-6 (scale c. 1:3300).

leeward, and may therefore have been a construction partly or wholly of stone, rather than of pole-and-wattle alone. Where this leader turns sharply northeastward there is short, slightly embayed section of c. 30 m which appears to have contained a row of putts, of which three are visible in the photograph. There is a further c. 100 m of leader with a similar sediment drift before the main row of putts is encountered. About 50 of these baskets are recognisable, but there are a number of substantial gaps in the photographed structure. In the 1860s a total of 83 were under licence (Bradshaw 1996). The fishtrap is completed on the raised rock surface at the northwestern end by a short, hook-shaped leader, again strongly registered and possibly stone-built.

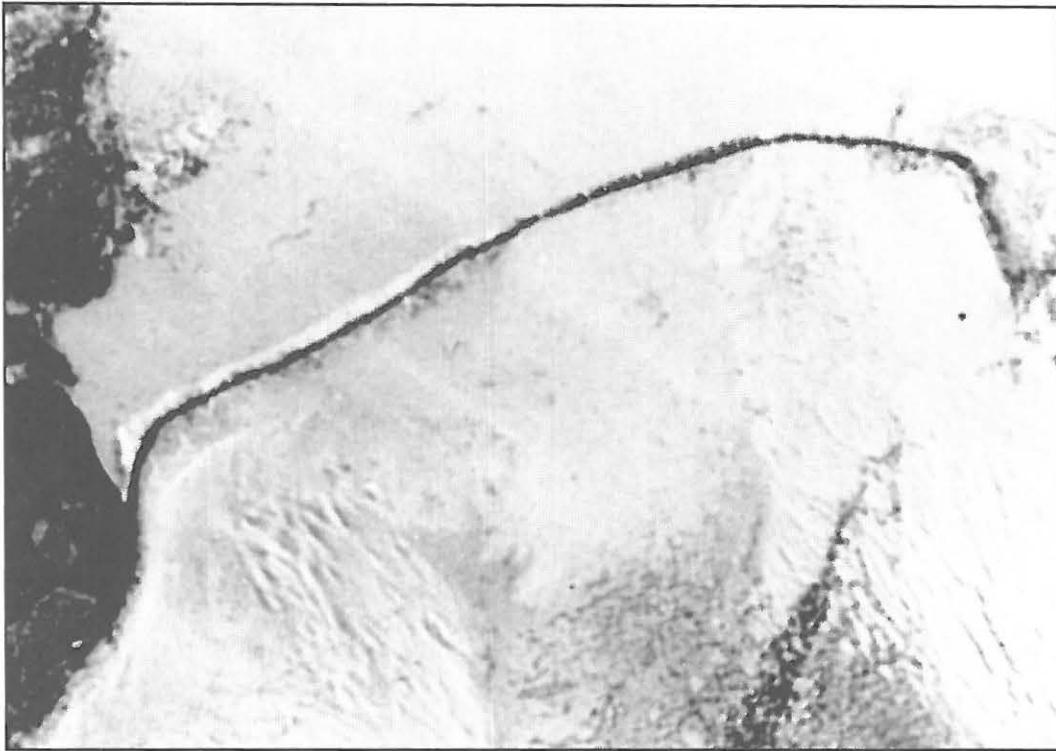
Two other fishtraps occur in Whinstone Pool, in the middle and upper reaches (Figure 3),

neither being licenced in the 1860s (Bradshaw 1996). One is a broken, slightly curved line of dark features almost 200 m long (OF-4) which may be interpreted as abandoned putts and short sections of degraded post-and-wattle (Figure 1C). The other (OF-5) is shorter, more curved and better defined, and there are suggestions that putts are present (Figure 2D). Both of these features would have trapped fish on the ebb. At the time of the sortie there was much mobile sediment in Whinstone Pool, apparently sand in the form of dunes shaped by the tidal stream and also spreads of mud.

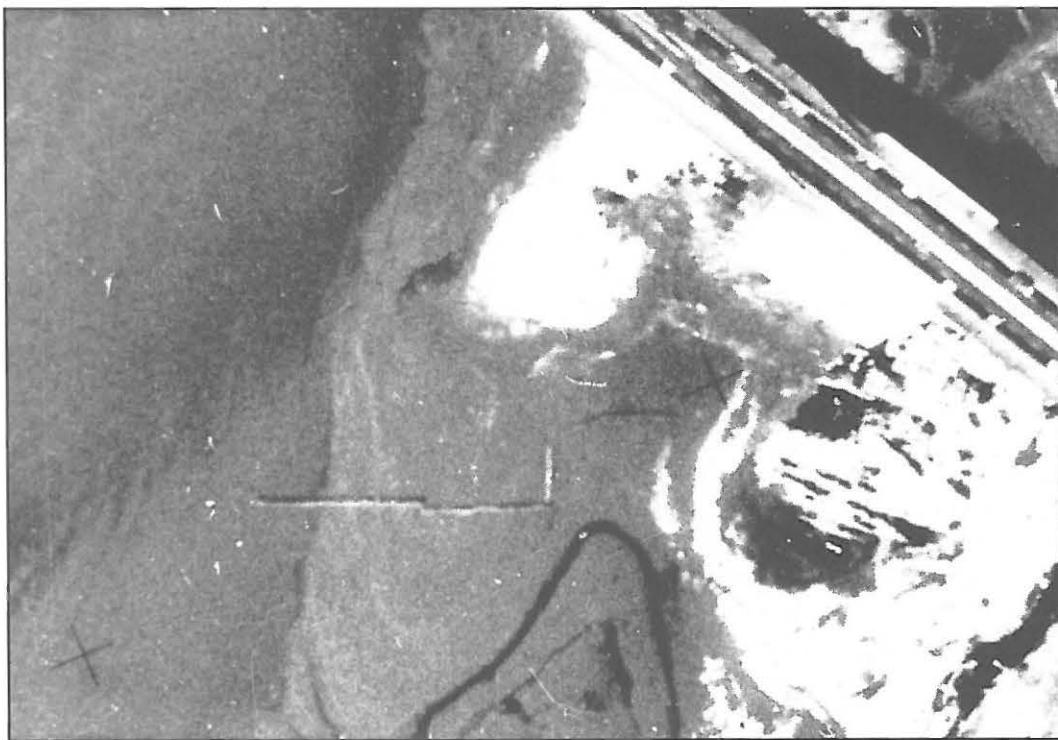
The fishtrap sited at Horse Pool (Figure 3, OF-6), one of the seven identified by Bradshaw (1996), is in two phases (Figure 5). Surviving from the first phase are three (possibly four) closely-spaced, subparallel leaders aligned roughly northeast-southwest. Each is strongly registered and together they define a long, slightly waisted, corridor-like space. The leader on the southeast side is slightly sinuous and c. 200 m long. That to the northwest is shorter and composed of two substantially overlapping parts with some evidence of a third to the north. The air-photograph reveals no sign of a cross-structure, for example, a line of baskets, at the waist or at either end of the space. The more recent trap, partly embracing the earlier one, is a roughly ladle-shaped structure concave to the ebb in which a straight row of putts can be seen to stretch across Horse Pool. Two unequal leaders are registered quite strongly in this phase, and there is a noticeable sediment drift downstream of that to the southeast.

At Bradshaw's (1996) site of Grove's Hole, on the northern edge of Oldbury Flats (Figure 3), there is another large fishtrap (OF-7). This structure (Figure 6) is c. 250 m long, with short leaders at the sharply turned ends, and functioned as the tide ebbed westward off the rock platform into Count Lake. The way the feature registers in the original air-photographic print suggests the presence of many putts. There is no photographic evidence for Bradshaw's (1996) 'New fish weir' of the 1860s in Count Lake.

Further to the east along the northern edge of Oldbury Flats (Figure 3) lies another large fish trap (OF-8), identifiable with Bradshaw's (1996)



*Figure 6: Oldbury Flats, fishtrap OF-7 (scale c. 1:1630; north to right).*



*Figure 7: Aust Rock, fishtrap AR-1 (scale c. 1:2300)*



'Whinstone weir'. This is *c.* 225 m long and almost straight, except for short, sharply turned ends and an almost central, bastion-like projection (Figure 2E). It would have functioned as the tide ebbed northward off Oldbury Flats. There appear to be putts to the east of the projecting part.

There is no evidence of a fishtrap at the historic site at Chapel House at the northeastern end of Oldbury Flats. Siltation has ensured that there is also no air-photographic evidence from the 1940s and 1960s for the important fishery concentrated in the long depression known as Oldbury Lake-Salmon Pool, also known as Load (s) Pool, between Oldbury Pill in the northeast and Littleton Pill in the southwest (Figure 1A). This fishery is known to have existed from at least the late seventeenth century (Gloucestershire Record Office D6803/1; PC 97; PC 742; D537/T7). In the 1860s no less than 19 fish weirs and standings for net fishermen were present (Bradshaw 1996). Today, however, traces of these weirs can be seen only when storms clear mobile sediment from parts of the bedrock and the younger Holocene silts that form the floor of the depression. They include a sequence of V-shaped post-and-wattle weirs with apical baskets/holding chambers, which from their design are likely to be of medieval date.

The air photographs mainly afford evidence for the scale and overall plan of the numerous fishtraps that existed at Oldbury Flats in the middle of the twentieth century. An intriguing glimpse into the construction of one of them, however, is provided by Wilshire (1980), who visited the area at this time and published a photograph of part of one installation. It depicts a single row of putts tied to short roundwood posts that stand on a raised platform *c.* 1.5 m high faced with rough stone walling that is pierced by a rectangular, timber-framed sluice. Although the site of these putts is unknown, the fact that they are placed on top of a dam-like feature suggests a location in a comparatively deep pool or channel in the rockhead, perhaps Horse Pool. By contrast, the line of ten or more putts illustrated by Jenkins (1991, 31) from Shepperdine at the northeastern end of Oldbury Flats is pegged directly into the ground at a comparatively level, open site. His photograph is possibly of OF-7.

## AUST ROCK

Below Aust Cliff, the site of the First Severn Road Bridge, is a small intertidal platform known as Aust Rock, composed as at Hills Flats and Oldbury Flats of Triassic mudrocks and some sandstones, but also with some dolomitic Carboniferous Limestone (Figure 1A). A small fishery existed here from at least the early eighteenth century (eg Gloucestershire Record Office D3806/3/9), and is recorded by Bradshaw (1996) as functioning up until 1994. Within recent memory there was a putcher fishery on mudflats just to the north of Aust Rock, some of the scaffolding of which is occasionally exposed. James and James (2003) allude to a seventh-century Saxon charter in which a fish weir is recorded off Aust, although this fishery need not have been located on Aust Rock itself.

The air-photographic and field evidence are limited to a single fishtrap (AR-1) immediately to the south of one of the bridge piers. It is a fairly well-preserved but deteriorating putcher rank encumbered by little mobile sediment which reveals many details of the mode of construction of these particular engines. The trap consisted of two ranks of putchers, one short (*c.* 45 m) and the other long (*c.* 85 m), joined by a short north-south leader (Figure 7). The eastern rank is formed of stout, upright poles up to 2 m in height and spaced a similar distance apart arranged in two rows at a separation of 1.0-1.1 m. Using a packing of flat stones and timber, each pole is secured within a circular pit *c.* 0.35 m in diameter that had been cut into the soft rock. A few horizontal, transverse members survive as lighter poles secured with binder twine between the uprights. The western rank has a short offset about half-way along where the western half of the post-setting had been repositioned northward a little. It consists of stout, upright poles as much as 2.75 m tall set in pits and arranged in two rows spaced *c.* 1.25 m apart. In each row the poles lie at a spacing of *c.* 2.8 m, and some retain transverse members on which the putcher baskets would have rested and been secured. The leader that connects the two ranks is *c.* 19 m long, consisting of a single row of stout posts spaced *c.* 0.7 m apart and *c.* 2 m tall. Nets could have been tied to these posts, but they are also sufficiently close for it to have been convenient to weave rough wattle between them (see Salisbury 1991, fig. 11.7).

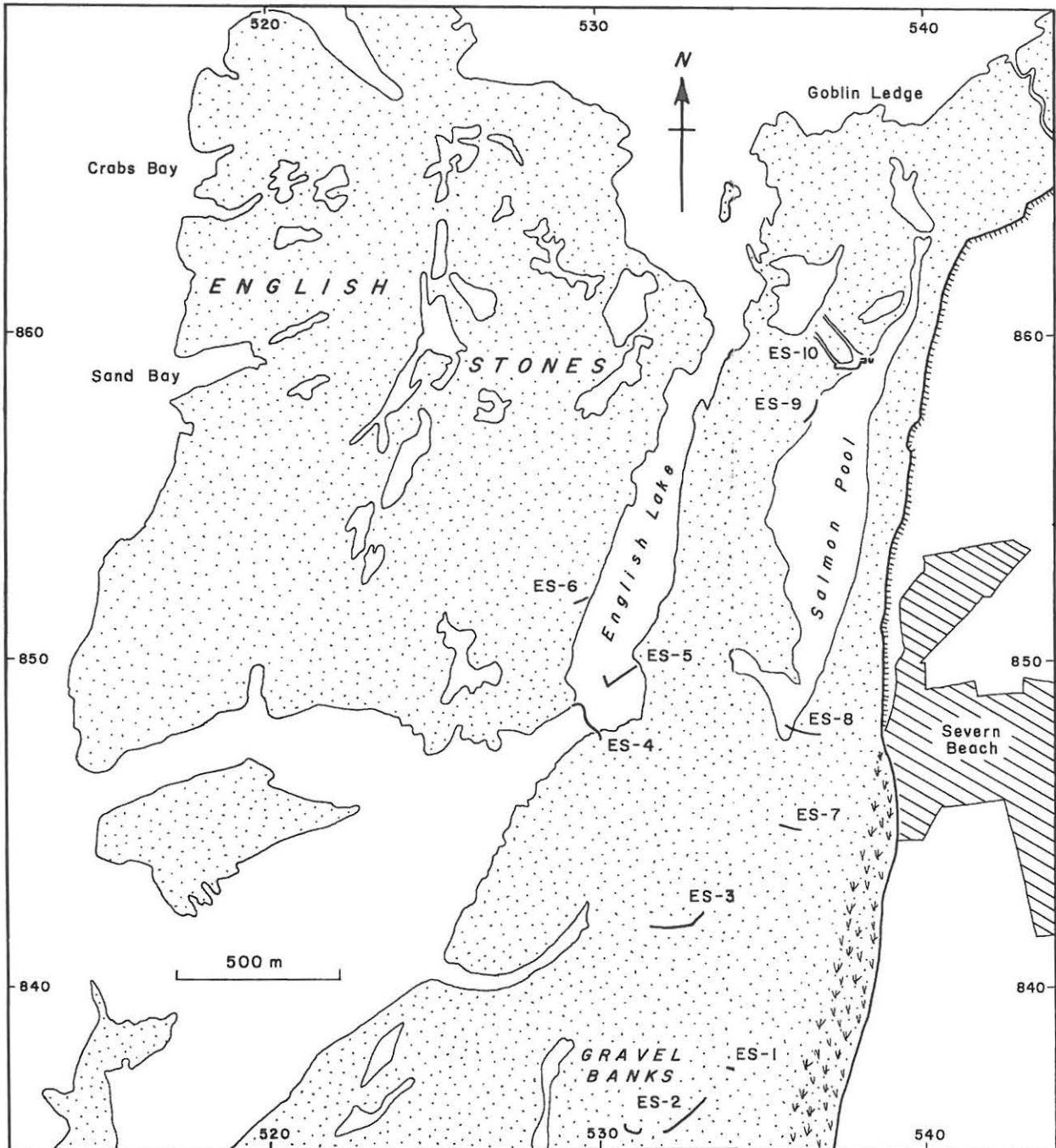


Figure 8: English Stones and Gravel Banks and their fishtraps (intertidal zone stippled).

### ENGLISH STONES AND GRAVEL BANKS

This complex intertidal platform, dotted with tidal ponds, occurs toward the head of the outer estuary and is the largest in the system as a whole (Figures 1A, 8). The easternmost two-thirds is

underlain by a sequence of comparatively soft Triassic mudrocks and thin sandstones similar to those at Oldbury Flats and Hills Flats (Welch and Trotter 1961). However, a hard, massive-bedded, dolomitic sandstone (Sudbrook Sandstone), also Triassic, underlies the western one-third. To the south of English Stones, and much less large, occurs a low-lying, mainly gravelly area known as Gravel Banks, where silts and intercalated peats

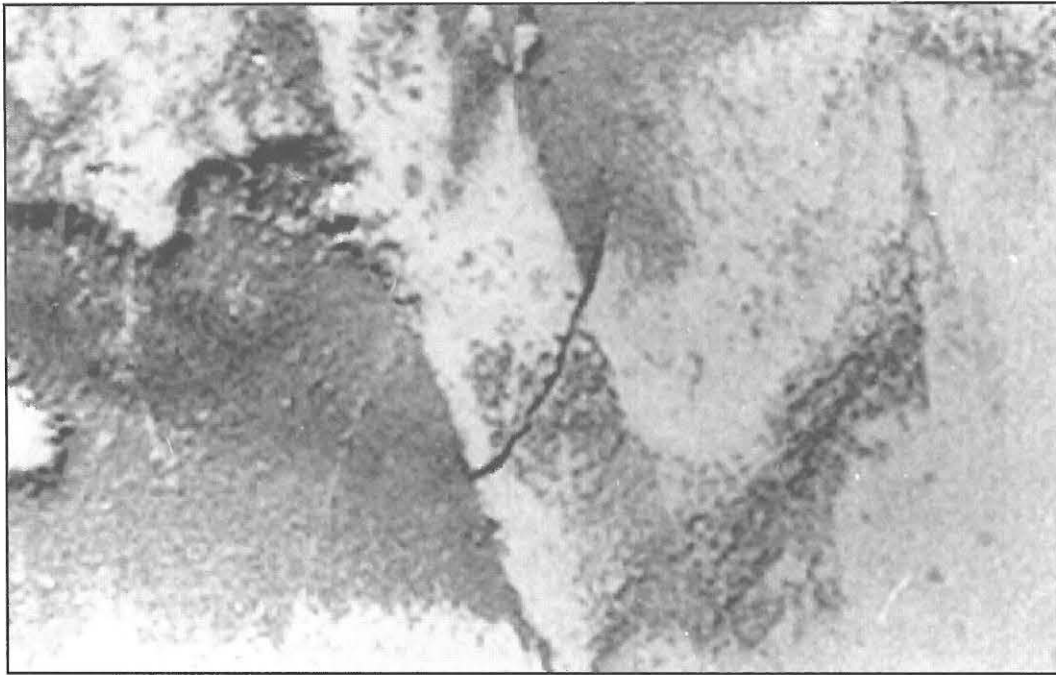


Figure 9: English Stones, fishtrap ES-9 (scale c. 1:2000).

low in the Holocene sequence have been found to be exposed (Gilbertson *et al* 1990; Riley 1998b), with the rockhead close below. Considering their size, English Stones and Gravel Banks have been less intensively exploited for fishing than Oldbury Flats, probably because they are more difficult to access, particularly the western side of the former.

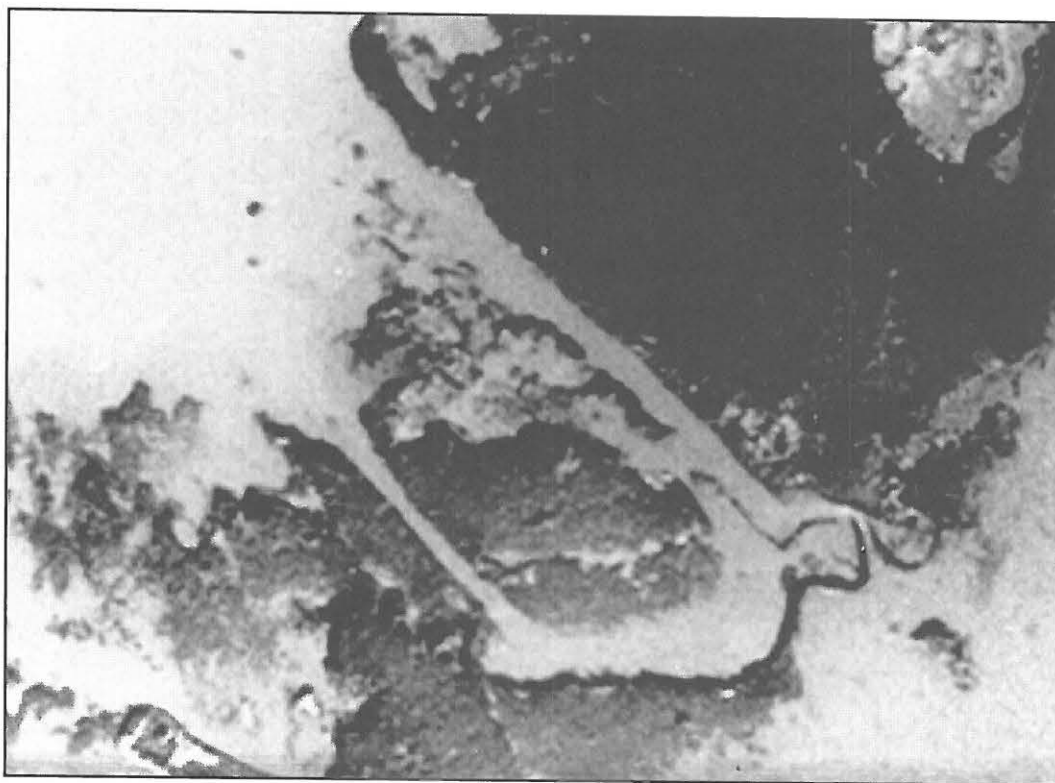
Fishtrap ES-1 (Figure 8) has no air-photographic registration but is included here for completeness. It was recorded by Riley (1998b) c. 250 m from the coast and just off the English Stones proper, consisting of a c. 25 m double row of wooden stakes driven into the Holocene deposits and now eroded down to ground level.

Nearby to the southwest air photographs (Figure 2F) reveal another and much larger fishtrap, in two parts (ES-2). The longer part is almost straight and ranges for c. 175 m between the long outfall pipeline of factory in the neighbouring embanked area (Avonmouth Level) and a small, gravelly-rocky outcrop. The much shorter part of c. 50 m to the west is concave to the ebbing tide and links this outcrop across a shallow depression to a second area of gravel or rock. Both parts of the trap register with a faintly beaded appearance on the air photograph,

suggesting the presence of probably baskets or perhaps widely-spaced poles.

The large, elongated depression known as English Lake turns abruptly southwestward at its southern end while a shallow spillway continues directly a little east of south toward the lower end of the depression containing Salmon Pool (Figure 8). Blocking the southern end of this spillway is a fishery (ES-3) composed of a c. 150 m line of 40 or more putts (Figure 2G).

The southwestern branch of English Lake (Figure 8) is closed off by what appears to be a broken-down dam (ES-4) - it serves as the Constabulary Boundary - near to which lies a fishtrap (Figure 2H). The structure interpreted as a dam is a broad, sinuous feature (Figure 2H). From numerous gaps along its length plumes of white water can be seen to spill in the direction of the ebbing tide from the lagoon behind. The fishtrap in the lagoon just upstream (ES-5), still largely submerged when the sortie was made, is c. 100 m long and composed of two unequal arms, stretching about half-way across English Lake from the rocky platform on the east (Figure 2H). It is sufficiently narrow to be a pole-and-wattle hedge. The uneven patch of disturbed water



*Figure 10: English Stones, fishtrap ES-10 (scale c. 1:2100).*

visible to the west suggests that another, partly emergent structure, perhaps an earlier stone dam, may occur here.

The only other fishery in English Lake identifiable from the air lies on a gently shelving reef on the western side. It is a short row of putts, of which there are certainly four and possibly as many as seven (ES-6). Unless ES-5 was passable on foot, access to these could only have been by boat.

Two possible fisheries occur at the lower end of Salmon Pool (ES-7, 8). Ranging up to c. 60 m in length, each is registered as a linear feature that rises above the ground surface and is discordant to the ribs of sandstone that outcrop just to the west. Their nature is otherwise unclear from the photograph.

Two fisheries are located on almost-level rock shelves that rise up on the western side of Salmon Pool at its northern end (Figure 8). Spanning the lower end of a narrow, straight, steep-sided depression that obliquely crosses the shelves, ES-9 is a gently curved raised structure

75-100 m long that lies concave to the ebb across the depression (Figure 9). The feature is continuous over the southern part, but toward the north breaks up and weakens into a number of short segments as it rises up across the northeastern portion of the shelf. About 75 m to the south, and attached to the rock at the end of the western side of the depression, is a narrow, sinuous, but rather broken, feature of uncertain nature but possibly the remains of another fishtrap.

On the same shelf a few hundred metres to the north-northeast lies ES-10, the most complex of the fishtraps so far described (Figure 8). It is associated with a roughly U-shaped body of water which forms a lagoon at the outlet to a substantial, stone-dammed tidal pool to the northwest (Figure 10). The northwest-southeast trending arms, which appear to be artificial channels, are long, narrow and straight, and directed down the dip of the shelf. The two arms are linked at the south-east by a complex feature, probably a stone wall, that includes a flask-shaped pound open to the ebb with a short gap in one boundary. From this chamber a leader extends a little way along the

axis of the northeastern arm. To the east of the chamber, across a narrow gap that allowed the ebbing tide to flow, there is a second, almost semicircular pound, also open to the ebb, into the mouth of which extends what may be a short leader. There is no indication of what sort of baskets, if any, were mounted on these stone structures. A number of substantial, mound-like features - perhaps standings - seem to be present along the outer edge of the southwestern arm.

## DISCUSSION

At least two problems bedevil any commentary on the evidence presented by air photographs for fisheries in the Severn Estuary that depended on fixed engines.

One is the great dynamism of this large system, with its tidal range that approaches 15 m, tidal streams that peak at several knots, and exposure to the prevailing winds. There is abundant geomorphological and stratigraphical evidence for the changeability of the shoreline and the intertidal zone, probably in response to such factors as trends in windiness and shifts in land use (eg Allen and Rae 1987; Allen and Fulford 1992, 1996). Episodes of coastal erosion have alternated with times when the rapid building of mudflats and salt marshes was resumed. There is known to have been much coastal retreat in the sixteenth and seventeenth centuries (peak of Little Ice Age), in the mid nineteenth, and in the early twentieth century. The evidence from the older Holocene sequence indeed suggests that episodic advance and retreat has long been the norm (eg Allen 2001b). Hence, no matter how geologically favourable, a location that for a period allowed fishtraps to be constructed, accessed and maintained in the low-mid tidal frame could, after a modest change of hydraulic regime, see for a subsequent period a resumption of silting or sanding sufficiently heavy as to render those traps unusable.

The second is the issue of the general date of the traps to which are linked their mode of construction (stone, wood, stone with wood), frequency of repair/rebuilding, and purpose (putcher rank *versus* putts). Rows of putts can be made out in some of the photographs, but it is generally not possible from the image alone to

isolate putcher ranks with complete certainty. Leaders of whatever construction are generally recognisable from their sub-parallelism with the tidal streams across which the traps were placed. They are not necessarily otherwise distinguishable from putcher ranks, or from stone or post-and-wattle weirs, as is shown by a comparison of what could be inspected on the ground of AR-1 at Aust Rock with the photographic image taken 35 years earlier (Figure 7).

The fishtraps recorded above are all associated with rock platforms that lie in the low-mid tidal frame. Despite the changeability of the estuarine regime, these shelves have provided a more stable and longer-lasting, as well as a generally more extensive, substrate for 'fixed engines' than the mudflats and sandflats of the system. Most of the traps span some kind of natural depression in the rockhead, except in the case of ES-10 where narrow channels seem to have been deliberately cut through the soft rock to form artificial outlets to a substantial pool defined by a stone dam (Figures 8, 10). In a few instances, for example, traps OF-4 and OF-5 (Figure 2C, D; Figure 3), the depression is wide and of little relief, lying between the coast as defined by the edge of the salt marshes and a slightly elevated rocky area. In most cases, however, the trap joins elevated rock outcrops that lie either side of a pool or channel (eg Figures 6, 9). A particularly bold depression seems to have been exploited in the case of the dam-like trap ES-4 (Figures 2H, 8). In contrast, a comparatively level, open site had been selected for some traps, such as OF-8 (Figures 2E, 3). Trap ES-2 (Figure 2F) is in two parts, the shorter linking two gravelly-rocky outcrops, whereas the longer portion is opportunistically anchored at one end to a factory outfall pipe that strikes out across the foreshore.

A number of attempts have been made to classify estuarine fishtraps on the basis of their plan and constructional details. Surveying records of these engines from Britain as a whole, Salisbury (1991, fig. 11.1) illustrated nine different designs varying in plan from the simple to the complex and in mode of construction from post-and-wattle (the majority) to stone. Bannerman and Jones (1999) recognised six different kinds of plan and relationship to the

coast among the fishtraps, many of stone, encountered on the coast of northwest Wales and Anglesey. Fishtraps are becoming well known from Irish foreshores. O'Sullivan (2001, 227) found in the Shannon Estuary, with its mainly alluvial shores, a comparatively narrow range of exclusively wooden forms, some C-shaped, others L-shaped, and a number tick-shaped. Most of the traps in Strangford Lough, with its islets and coasts of erratic-filled glacial deposits, are of stone and, although large, of a comparatively simple plan (McErlean *et al* 2002, 166).

Some of the traps described above can be identified with reasonable confidence as putcher ranks, namely, HF-1 (Figure 1C), OF-1 and OF-2 (Figure 3), and ES-1 (Figure 8). These are straight to very gently curved in plan. The putcher rank at Aust Rock is exceptional in having a chair-shaped plan (Figure 7), consisting of two straight ranks that are offset but joined by a leader.

Some of the photographed traps take various positions between two end-member types, at the one extreme bow- or C-shaped and, at the other, an open-V-shaped form with not necessarily equal arms that come together at a relatively sharp angle. Examples from this range are provided by HF-2 (Figures 1C, 2B), OF-3, OF-5 and OF-7 (Figures 2D, 3, 4, 6), and ES-3 and ES-9 (Figures 2G, 8, 9). Rows of putts can be identified in some of these traps as well as features that could be leaders.

Salisbury (1991), O'Sullivan (2001) and McErlean *et al* (2002) all encountered tick-shaped traps. The only example of this type recognised from the fisheries described above is ES-5 (Figure 2H) just visible in the dammed lagoon at English Lake on English Stones (Figure 8). The type 5 or rectilinear trap of Bannerman and Jones (1999, fig. 12) is also a tick-shaped form.

Two traps illustrate a form that may be restricted to the Severn Estuary. These are the bucket-shaped trap at Hayward Rock, in which the longer, almost parallel sides are leaders, and the similar form, but with leaders of unequal length, in the shape of the younger, ladle-shaped feature in the OF-6 complex at Horse Pool on Oldbury Flats (Figures 2, 5). Each reveals a row of putts between the downstream ends of the leaders.

Seemingly without parallels elsewhere is the group of features assigned to the first phase at Horse Pool (Figures 3, 5). Their corridor-like plan suggests a trap that could have been used on either the flood or the ebb tide, provided that nets or appropriately orientated baskets had been placed across the waist.

Salisbury (1991) illustrated some shore and estuarine fishtraps of unusually complex plan. The only example of a similar complexity noted above from the Severn Estuary is ES-10 on English Stones (Figures 8, 10). In addition to the apparently artificial rockhead channels that feed it, there are two features that could have served as pounds, reminiscent of O'Sullivan's (2001, 228) stake-net weirs or 'puzzle traps' in the Shannon Estuary. He suggests that from such pounds the fish were either removed with a gaff or net or simply picked up once the tide had drained out. Nets could have been stretched across the narrow passage between the two pounds at ES-10.

The air photographs which underpin this account were partly taken immediately after the Second World War, when the active fishery at Oldbury Flats had another 15 years or so to run, and partly in the late 1960s, when Oldbury Flats had been extinguished but activity probably continued at English Stones. Given the likelihood that stone picked up or quarried from the rock platforms was used in the construction of many of the traps, those parts of the traps that it had not been necessary to rebuild, if not the sites of the traps, could have been in use for long periods. Documentary evidence points to fishing in the fifteenth and eighteenth centuries on Hills Flats (Jenner-Fust 1931), in the sixteenth to the eighteenth centuries at Chapel House on Oldbury Flats (Jenner-Fust 1931), in the nineteenth century on Oldbury Flats as a whole (Bradshaw 1996), in the seventeenth to nineteenth centuries at Oldbury Lake-Salmon Pool (Loads Pool) (Gloucestershire Record Office D6803/1, PC 97, PC 742, D537/T7; Bradshaw 1996), and in eighteenth and nineteenth centuries at Aust Rock (Gloucestershire Record Office D3806/3/9). These records of fisheries are chiefly post-medieval, but it would be surprising if there was not also archival evidence for medieval antecedents at these various sites, under the control of local lords or ecclesiastical bodies, as recorded by Bond (1988) and by Goldbold and

Turner (1994) from elsewhere in the Severn Estuary, by James and James (2003) from Carmarthen Bay, and in Ireland from Strangford Lough (McErlean *et al.* 2002).

Although it is clear that fishing using traps mounted on rock platforms has been practised in the Severn Estuary over a long period, it should not be supposed that there was unbroken exploitation of each geologically favourable locality. Natural changes in the sediment regime have certainly been responsible in some places for pauses in activity and in others for shifts in location, as James and James (2003) note from the Carmarthen Bay fisheries. The fishery at Oldbury Lake-Salmon Pool (Loads Pool) (Figure 1A), for example, was flourishing in the mid nineteenth century (Bradshaw 1996), with as many as 19 weirs and standings, but as the result of heavy siltation in the twentieth has disappeared and is unusable. At Magor Pill, on the Welsh coast (Figure 1A), an underlying trend of coastal retreat over the last millennium has forced a progressive landward relocation of traps (Nayling 1999a, Allen 2002). Factors largely human, however, have brought the industry generally to its present state of virtual extinction.

The 'fixed engines' in the localities described above do not by any means exhaust the material evidence for fishing using fixed traps in the intertidal zone of the Severn Estuary and inner Bristol Channel. Records provided by Godbold and Turner (1994), McDonnell (1994), Hildich (1997), Townley (1998), Nayling (1999a, 1999b) and James and James (2003) point to the considerable and long-standing role played at many other sites by intertidal fisheries in the rural economy of this general part of the British coastal zone, where marine as well as terrestrial resources are available for exploitation. They also point, through their siting and construction, to a well-developed understanding of natural factors and processes by coastal communities, and to a sensitive appreciation of the potential of natural construction materials.

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#### APPENDIX: THE AIR PHOTOGRAPHY

The sites discussed above are represented by prints of very variable quality from many air-photographic sorties, especially in the case of Oldbury Flats. Copies of the older of these prints can be purchased only as wet-process versions of the prints themselves produced using a fine raster; they consequently show less detail than the original contact prints which can be examined at the National Monuments Record. The above illustrations of the fishtraps, conventionally orientated with north upward (unless otherwise indicated), in particular draw upon the following prints.

##### *Hills Flats:*

RAF/CPE/UK/1825/frames 4078-4080 (4 November 1946)

##### *Oldbury Flats:*

RAF/CPE/UK/1825/frames 3037, 3094-7 (4 November 1946)

RAF/CPE/UK/2110/frame 4133 (28 May 1947)

##### *Aust Rock:*

ORDNANCE SURVEY/69/375/frame 009 (30 July 1969)

##### *English Stones-Gravel Banks:*

RAF/3G/TUD/UK/19/frame 5047 (13 January 1946)

RAF/106G/UK/LA198/frame 3016 (26 March 1945)

ORDNANCE SURVEY/69/375/frames 002, 003 (30 July 1969)