CASTING THE NET WIDE: MAPPING AND DATING FISH TRAPS THROUGH THE SEVERN ESTUARY RAPID COASTAL ZONE ASSESSMENT SURVEY

By Adrian M. Chadwick and Toby Catchpole

Gloucestershire County Council Archaeology Service, Environment Directorate, Shire Hall, Gloucester GL1 2TH. E-mail: amchadwick@btinternet.com; toby.catchpole@gloucestershire.gov.uk

Gloucestershire and Somerset County Councils have been undertaking the English Heritage funded Rapid Coastal Zone Assessment Survey (RCZAS) of the archaeology of the Severn Estuary in England since 2006. Phase 1 consisted of a desk-based assessment of all known recorded historical and archaeological assets within the RCZAS area, along with the transcription and analysis of aerial photographic and LiDAR data. A pilot stage of GPS-based survey took place during April-June 2009 in order to test equipment, methodologies and logistics for a more extensive Phase 2 fieldwork programme undertaken in April -October 2010 and March-April 2011. This report focuses on the numerous fishing structures from different periods that have been recorded during aerial and field survey, and builds upon previous studies of fishing-related structures and activities within the Severn Estuary. It includes the results of the radiocarbon dating of selected samples taken from these structures. The results of the Severn Estuary RCZAS reinforce the economic and social importance fishing once had to many coastal and riverside communities along the River Severn.

INTRODUCTION

The Severn Estuary Rapid Coastal Zone Assessment Survey (RCZAS) is funded by English Heritage through the National Heritage Protection Commissions Programme (NHPCP). The extensive project area of approximately 575 km² extends northwards from Beachley near the First Severn Crossing to Maisemore Weir upstream of Gloucester, and from Maisemore Weir south-west to Porlock Weir (Fig. 1). It encompasses the intertidal zone and foreshore down to Lowest Astronomical Tide (Chart Datum), and extends 1 km inland of Mean High Water (MHW). The RCZAS covers parts of the modern local authorities of Gloucestershire, South Gloucestershire, Bristol, North Somerset and Somerset, as well as part of Exmoor National Park and the Quantock Hills Area of Outstanding National Beauty. The work is being undertaken by staff of the Gloucestershire County Council Archaeology Service (GCCAS) and the Somerset Historic Environment Service on behalf of English Heritage and the relevant local authorities and other stakeholders.

England's Coastal Heritage (Fulford *et al* 1997) identified the Severn Estuary as a priority area, and along with similar projects around the entire English coast (e.g. Paddenberg and Hession 2008), the Severn Estuary RCZAS was intended to enhance the archaeological record of the coastal zone and inform future Shoreline Management Plans (SMPs). The Severn Estuary RCZAS is one of the largest of these surveys in terms of its area. The maritime archaeology of the Severn Estuary below Lowest Astronomical Tide (Chart Datum) has been the subject of a separate report (Burton *et al* 2007) and a historic seascape characterisation has also recently been completed by Cornwall Council and Seazone (Taylor *et al* 2011). At an early stage in the project, and based on the results of previous studies, it was recognised that the remains of fishing-related structures would form the most numerous category of archaeological feature encountered during inter-tidal survey work.

PHASE 1 DESK-BASED ASSESSMENT AND AERIAL SURVEY

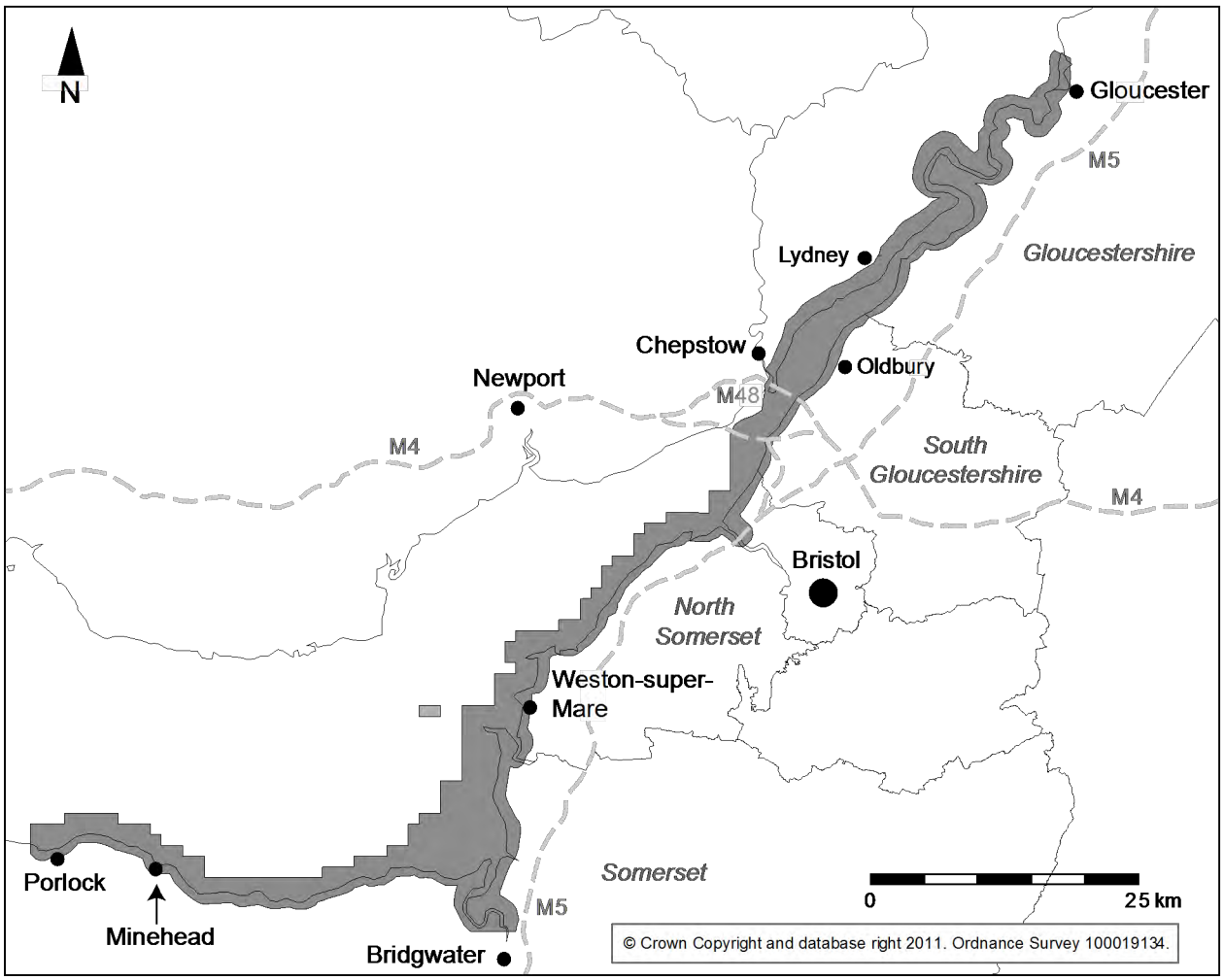

Figure 1 The Severn Estuary coastline and the extent of the RCZAS project area.

Phase 1 of the project (Mullin 2008; Mullin *et al* 2009) comprised a desk-based assessment of published books and research articles, local authority Historic Environment Records (HERs) and Records Offices, the Marine and Terrestrial Archaeology Databases in the National Monuments Record (NMR), the National Hydrographic Office in Taunton, and the Maritime and Coastguard Agency's Receiver of Wrecks. The report provided a record of all known archaeological sites within the study area, an assessment of current erosion patterns and threats, an overview of coastal change from the Palaeolithic to the present day, and a list of sites that required field survey.

The Phase 1 work included analyses of aerial photographs and LiDAR data to confirm the location of known archaeological features and to identify new examples. It was undertaken by GCCAS staff based in Swindon as part of English Heritage's National Mapping Programme (NMP) (Crowther and Dickson 2008; Truscoe 2007). This was intended to complement other NMP work and previous research and survey projects in the region.

Despite problems with rectification on some extensive but largely featureless intertidal areas, the Severn Estuary RCZAS NMP created 928 new monument records in the National Monument Record (NMR) AMIE database, whilst 373 existing records were revised. The assessment of LiDAR data provided by the Environment Agency for two selected areas proved it to be a useful complementary methodology (Truscoe 2007). The new monument records included large numbers of previously unrecorded V- and U-

shaped intertidal fishing features at Bridgwater Bay, Stert Flats, St Audrie's Bay, Blue Anchor Bay and Minehead Bay. In the inner estuary the most common features were the remains of putt and putcher ranks. In total the NMP survey identified 352 fishing structures within the Severn RCZAS study area.

PHASE 2a AND 2 FIELD SURVEY

RCZAS fieldwork focuses mostly on the inter-tidal zone rather than the coastal hinterland (Murphy 2007). Phase 2a of the Severn RCZAS consisted of initial pilot fieldwork during April-June 2009, informed by previous results and recommendations (Burton *et al* 2007; Merritt and Cooper 2005; Murphy 2007). This assessed survey methodologies and the practicalities and logistics of future fieldwork, in addition to verifying and characterising known sites and identifying new archaeological features not previously recorded through aerial survey. Fishing-related remains once again formed the majority of these (Catchpole and Chadwick 2009). RCZAS staff were able to take part in several training 'flights' of the Burnham-on-Sea rescue hovercraft, allowing them to record stake-built fishing features at Berrow Flats 800 metres out from the MHW level across otherwise inaccessible deep mud deposits.

The main Phase 2 survey took place during April-October 2010 and March-April 2011. As with the Stage 2a survey, handheld Global Positioning System (GPS) equipped data loggers were used to log the positions and key attributes

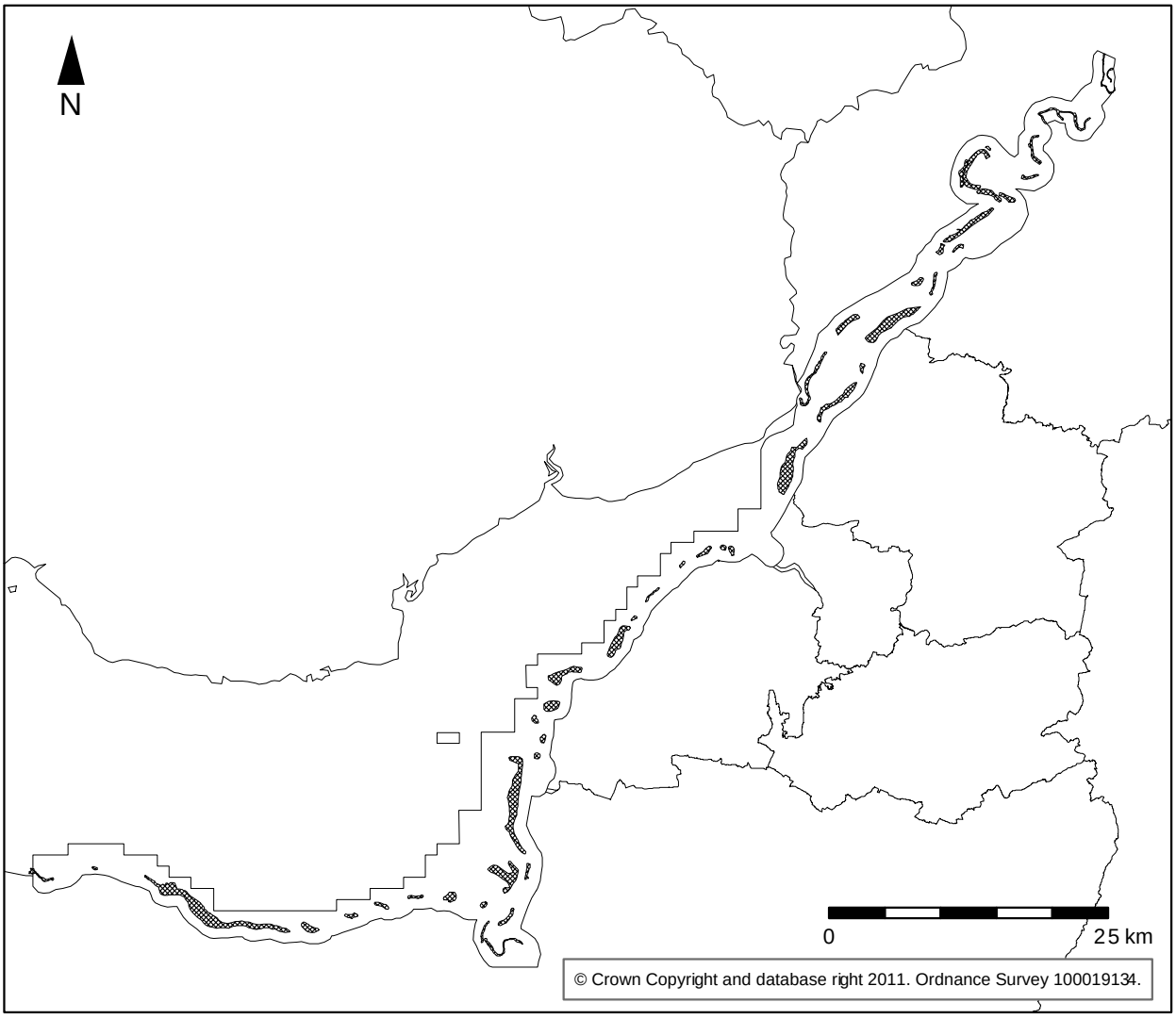

Figure 2 Locations visited and recorded during RCZAS fieldwork.

of identified features, usually with sub-metre accuracy, though digital voice recorders for additional comments replaced the written forms employed in the Phase 2a pilot. A laser rangefinder, Bluetooth-linked to the GPS data loggers, allowed features too difficult or dangerous to access directly to be surveyed. Waterproof cameras with built-in GPS receivers provided positions and orientations for photographs. No hovercraft were available for use in Phase 2, but at Berrow Flats and Stert Flats a hired Argocat 8 x 8 tracked All Terrain Vehicle (ATV) proved invaluable for transporting staff, equipment and samples over extensive distances.

Previous RCZAS projects in Kent and East Anglia had involved comprehensive survey work over their entire coastlines, but budgetary limitations meant that for the Severn Estuary a targeted approach was undertaken instead in order to locate and characterise as much of the visible archaeological resource as possible. The Phase 1 work, Phase 2a fieldwork, reconnaissance visits and the recommendations of the South West Archaeological Research Framework (SWARF; Webster 2008) highlighted areas of high and low archaeological potential. Revised Shoreline Management Plans (SMP2s) for the Severn Estuary and North Devon and Somerset areas (Atkins Ltd 2009; Halcrow Group Ltd 2009) and the Severn Estuary Flood Risk Management Strategy (Atkins Ltd 2010) were used to prioritise areas and groups of features under threat for further investigation. In addition, the sheer numbers of fishing-related features in areas such as Dunster Beach and Blue Anchor Bay necessitated a targeted approach to recording. No excavation was undertaken but a number of wood samples were obtained from fishing structures, some of which have been radiocarbon dated. The results of the first phase of this dating programme, involving 25 samples from nine selected features, are included below. In total an area of 17.62 km^2 was directly accessed, including approximately 45% of the total project shoreline of 277 km (Fig. 2). Details of all the features recorded will be provided to the relevant HERs and the NMR and cannot be included here. This paper provides a preliminary description and discussion of the various types of fishing structures recorded together with more detailed accounts of those structures for which radiocarbon dates were obtained.

Table 3 at the end of the paper gives a glossary of fishing terms used in the article.

RESULTS

Net and line fishing related features

The NMP aerial survey recorded many V- and U-shaped features in Somerset that were

Figure 3 A broad well-defined net hang line at Dunster Beach.

provisionally interpreted as fish traps of wooden and stone construction (Crowther and Dickson 2008, 102, fig. 5.25). Fieldwork survey, however, established that some of these are linear and curvilinear arrangements of stone that acted as the footrope weights for upright 'net hangs'. Metal posts or scaffolding poles are sometimes present or lying nearby, but in many cases the wooden or metal poles have been removed. There are lines and arcs formed by single large boulders spaced 2

Figure 4 A contemporary net hang in use at Dunster Beach, Somerset.

-15m apart; and also continuous, broader features 2-3 stones in width (Fig. 3), sometimes difficult to distinguish from eroded, dispersed stone fish weirs. In some instances net hangs were set up along or parallel to the arms of stone weirs, or appended at angles to them. One net hang still in use at Dunster Beach (Fig. 4) provides evidence for the original appearance of these features.

Net hangs were often little more than single lines of wooden stakes set at right angles to the shore, with more recent examples made of metal poles, and they are also present on the upper Severn in areas such as Beachley, Woolaston, Lydney, Hills Flats and Aust/Oldbury. Some putt and putcher ranks were re-used as later net lines, as at Aust/Oldbury Flats and Hills Flats (Fig. 5). At Hayward Rock near Hills Flats, earlier wattle leader arms were reused as net lines acting as

Figure 5 Putt or putcher rank at Oldbury Flats, Aust parish, South Gloucestershire; the taller posts and netting reflect its more recent re-use as a net hang.

leaders for putcher baskets at the apex of the 'V'. At Lydney, wooden posts parallel to the shoreline but set at angles may have supported nets to catch fish on ebb tides.

Other net hangs found along the Somerset coast consist of lines of stone rings or 'doughnuts', originally supports for vertical wooden or metal posts. Occasionally metal posts are still in place within these or lying nearby, but at Minehead Bay and St Audrie's Bay eroded remains of wooden posts survive within some stone rings (Fig. 6). Some stone supports appear more like small cairns, where stones have fallen

Figure 6 'Doughnut' stone ring supports for wooden net hang posts at Minehead Bay, Somerset.

inwards at steep angles following the withdrawal of vertical posts. Such features are present at Minehead Bay, Dunster Beach, Blue Anchor Bay, St Audrie's Bay and near Lilstock.

On Somerset's cobbled beaches net hangs are sometimes identifiable as narrow lines of clearance that prevented the fouling of nets, with metal poles or smaller metal pegs present, and occasionally spaced boulders at intervals within them and/or stone rings, the remains of net weights and net post supports. It is often difficult to differentiate net hang clearance lines from 'ground line gullies', where lines of baited hooks were set out along cleared strips perpendicular to the shoreline, with the catch collected on the

Figure 7 Recording a probable ground line gully near Minehead Harbour, Minehead Bay, Somerset.

falling tide. Ground line gullies have been previously recorded in Minehead Bay (McDonnell 2001, 23), but additional examples have been identified there and at Dunster Beach and Gore Point by the NMP aerial survey and Phase 2 fieldwork (Fig. 7).

Most net hang lines are probably later-nineteenth and twentieth century in date. Many possible fish traps recorded by the NMP at Stolford (Crowther and Dickson 2008, 97, 104, fig. 5.26) are modern net hangs. Nevertheless, information provided by the weir fisherman John Martin (Somerset HER 22248) concerning fishing structures in Minehead Bay suggests some net hang sites have been in use for generations. Based on Martin's testimony, McDonnell (2001, 25-26) noted that most net hangs in Minehead Bay were probably herring and kettle nets, with some posts possibly for seine and gill nets. Mullet, skate, whiting, sole and sprats could all have been caught in addition to herring (Jenkins 2009, 117; Rutter 1829). The mud-horse fishermen of Somerset used to employ fixed nets in the lowest tidal reaches to catch cod, plaice, whiting and sprats in winter; skate, sea bass, dover sole, mullet, conger eels and ling in the summer; and shrimps in the autumn. Along the upper Severn, net hangs targeted species such as salmon and shad. Until the 1930s sturgeon were caught all along the estuary as far up as Lydney (Brown 1980; Tierney-Jones 2008).

Given the extremely large number of these features and the relatively recent date of many, most were not normally formally recorded during Phase 2 fieldwork but were photographed with the GPS-equipped camera, thus identifying their positions to within *c*.5m. Net hang lines previously interpreted by the NMP as possible fish

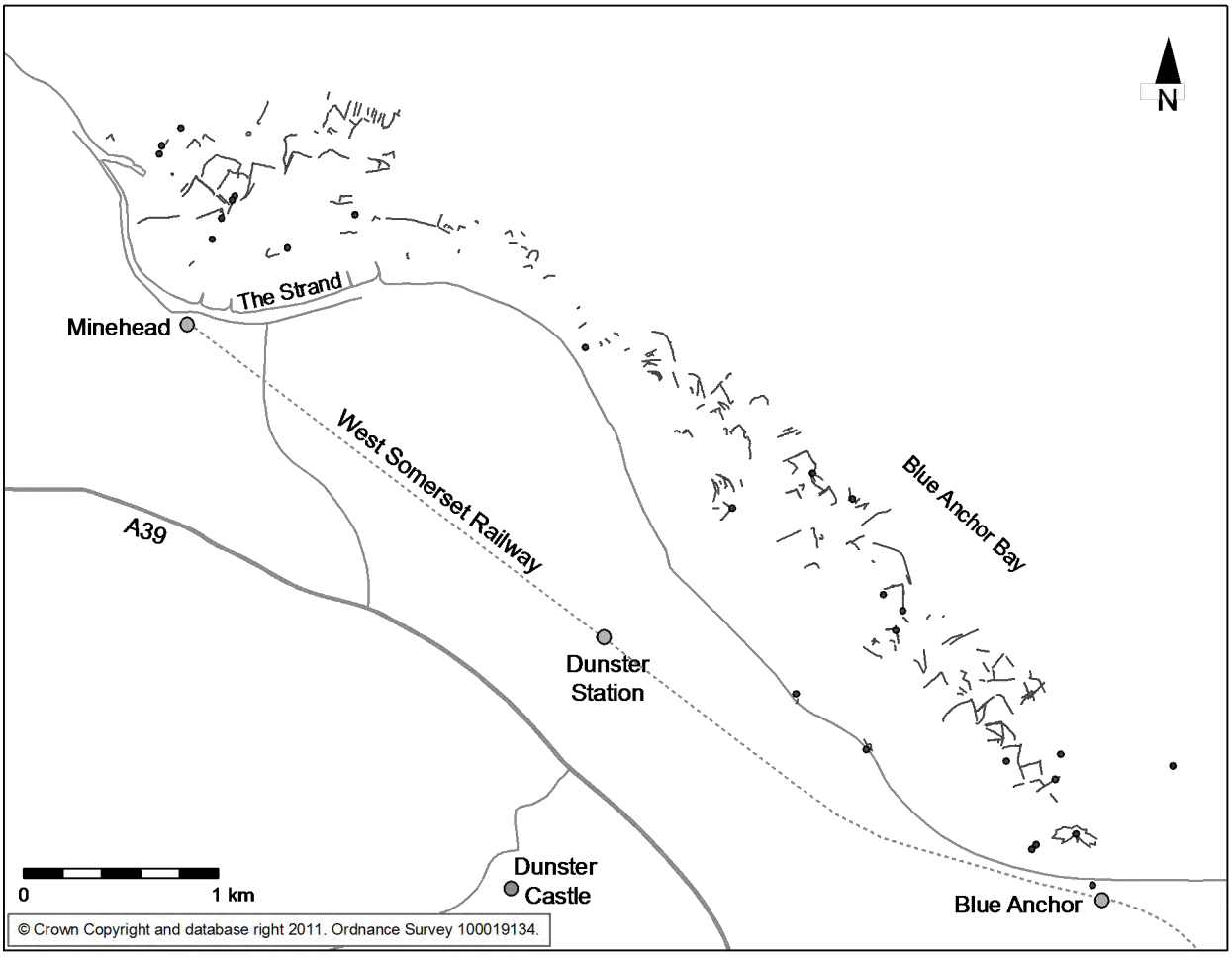

Figure 8 Surveyed features at Minehead, Dunster Beach and Blue Anchor Bay, Somerset. The majority consist of stone fish weir structures, with some net hang lines, ground line gullies and other miscellaneous features.

traps and/or those that could also have been eroded stone fish traps were however, recorded.

Stone-built fish weirs

Stone-built fish traps or weirs are found along the English, Welsh, Scottish and Irish coasts (Bannerman and Jones 1999; Bathgate 1949; Dawson 2004; Jenkins 1974a; James and James 2003; Lewes 1924; Nayling 1998, 2000b; O'Sullivan 2001; Salisbury 1991; Turner 2002; Went 1946, 1964); but within the RCZAS project area they are associated predominantly with the Somerset coastline. Some Somerset stone-built

Figure 9 A large stone fish weir at Blue Anchor Bay, Somerset.

fish weirs had been previously surveyed (Canti *et al* 1996; McDonnell 1980, 1995, 2001, 21-23; Riley 2001; Riley and Wilson-North 2001), but the RCZAS NMP survey identified major concentrations at Porlock, Minehead, Dunster Beach and Blue Anchor Bay (Crowther and Dickson 2008, 94; Fig. 5.25) (Fig. 8). There are two examples at Black Point by Brean Down, and Phase 2 fieldwork recorded two near Lilstock. Stone weirs of slightly different form previously noted at Stolford (McDonnell 1995, 98) were also accessed during fieldwork, along with two examples at English Stones near the Second Severn Crossing.

Most stone fish weirs are V- or U-shaped in plan with their 'open' arms facing landwards and were designed to catch fish on ebb tides. Their leader arms are usually straight or gently curved, though more sinuous examples exist and consist of banks 1.5-10m wide and up to 1.5m in height,

Figure 10 A small fish weir west of the Old Harbour at Minehead, Somerset.

formed from beach boulders and cobbles, the size of materials being dependant on those locally available. Most fish weirs at Minehead, Dunster Beach and Blue Anchor use boulders less than 0.5m long, but at Gore Point boulders up to 1.2m in length have been utilised. Weirs vary greatly in size, with some having leader arms up to 10m wide and/or hundreds of metres long, but others are only 20-30m across at their widest landward angle (Figs. 9-10).

At the apex of each fish weir there is usually a narrow outflow channel or 'gut' 0.5-1.5m wide, often marked by internal stone facing on the bank terminals and occasionally everted 'horns' extending outwards (Figs. 11-12). Some larger stone weirs have additional guts located along the leader arms, whilst others have no guts at the

Figure 11 Recording the 'gut' or outflow channel of a stone weir at Blue Anchor Bay, Somerset.

Figure 12 The 'gut' or outflow channel of a stone weir at Gore Point, Porlock Weir, Somerset, featuring everted 'horns' extending outwards from the apex.

actual apices at all. At the guts, catch baskets or perhaps bag-like nets (Pannett 1988, 371) were supported by wooden posts or stakes, with more recent examples having metal road pins or

Figure 13 Metal scaffolding poles and modern netting by the 'gut' or outflow channel of a stone weir at Minehead Bay, Somerset.

scaffolding poles (Fig. 13). Some stone weirs have hang net lines along the tops of their leader arms, parallel to their inner or outer faces, or attached at angles to them (Fig. 14).

Whilst the landward, 'inner' sides of fish weir arms are usually steeply faced or vertical to channel fish towards the guts, the outer faces are often less steep and less well built, although this minimised wave damage (McDonnell 2001, 21). The area encompassed by the arms was often deliberately cleared of stone, this being used to construct the arms, and sometimes also levelled. Several weirs at Minehead Bay and Blue Anchor Bay have carefully sorted and coursed stonework resembling drystone walling (Fig. 15), whilst others were probably never more than rubble banks. Some stone fish weirs span natural

Figure 14 Hang net line of stone weights (left of image) parallel to the leader arm of a stone fish weir (right of image) at Blue Anchor Bay, Somerset.

depressions and are appended to natural boulder ridges in the intertidal zone, and a few weirs were interlinked as contiguous W-shaped structures. Other groups of weirs were seemingly intended to operate together, channelling water from one to the other as it drained away from the intertidal zone, thereby increasing the chances of catching fish, a wide range of which were caught at

Figure 15 A well-built, coursed stone leader arm of a stone fish weir at Minehead Bay, Somerset.

Figure 16 Recording a stone weir where only the lines of the inner and outer facing stones of the leader arms survive, Dunster Beach, Somerset.

different times of the year. Weirs built with their guts below the mean low water neap tide level could only be fished on spring tides and were known as spring tide weirs, whereas those higher up the intertidal zone were called neap tide weirs and could be fished on both spring and neap tides (McDonnell 2001, 21). During the RCZAS fieldwork most of the stone weirs identified by the NMP aerial survey were accessed and recorded.

The state of preservation of stone fish weirs varies tremendously. A few examples in Minehead and Blue Anchor Bays are still in occasional use and thus excellent repair, but others have degraded so much that they are now only barely recognisable as rather dispersed spreads, or as lines of inner and outer facing stones (Fig. 16). Tidal erosion is the main contributory factor, but several stone weirs at the eastern end of Blue Anchor Bay and one of two stone weirs at Black Point off Brean Down are now buried underneath deep mud deposits. At Minehead Bay, stone weirs higher up the intertidal zone visible on 1940s and 1950s aerial photographs have been cleared as part of beach management, leaving only dispersed stone

Figure 17 This leader arm of a stone fish weir kinks noticeably in the foreground where it was built across the line of an earlier structure, which has been robbed and denuded but which is still partly visible in the background. Minehead Bay, Somerset.

Figure 18 Large stone fish weir at Minehead Bay, Somerset, with a 'hoop' of welded scaffolding poles above the gut or outflow channel. Note too the iron poles outside the apex.

spreads. Many weirs were deliberately robbed in the past in order to build further structures, with palimpsests of two or more overlapping or abutting stone weirs from different phases (Fig. 17). The testimony of John Martin suggests that in addition to routine repairs, many weirs in Minehead Bay had been rebuilt at the same location since the medieval period (McDonnell 2001, 22). Dating stone fish weirs is thus extremely problematic, although the majority of extant examples are probably of post-medieval or early modern origin. Nevertheless, some at Minehead probably have medieval antecedents, and medieval dates have been postulated for some stone examples in Ireland (McErlean and O'Sullivan 2002) and Wales (James and James 2003).

During pilot fieldwork, a stone weir at Dunster Beach with eroded wooden stakes surviving in its gut was recorded and several stakes were sampled. By the time of the main Phase 2 survey they were no longer visible and may have completely eroded away. Wooden stakes from underneath the eroded arm of a stone fish weir at Blue Anchor Bay were also sampled during Phase 2 fieldwork. The identifiable stakes were all oak and probably more than 200-300 years old, and had axe cuts made by iron blades (Brunning 2010). It is hoped that samples from these stakes can be submitted for dendrochronological analyses and/or radiocarbon dating in the future.

Not all stone weirs follow the general form and layout outlined above. An example at Dunster Beach has three outflow channels, one a conventional gut but also two others *c*. 2m apart with narrow D-shaped convex lines of boulders bulging seawards from the line of the weir. One of the largest stone weirs in Minehead Bay has several guts along its leader arms, whilst another large example has welded metal poles forming an arching hoop above the gut at its apex (Fig. 18). The field survey also re-visited V-shaped stone weirs at Stolford previously identified by McDonnell (1995, 98) and consisting of narrow rock-cut gullies 0.2-0.3m wide, filled with boulders and smaller packing stones. The stones may have been used to wedge wooden structures in place.

Only the most general morphological criteria can thus be applied to stone fish weirs (cf. Bannerman and Jones 1999; Langouët and Daire 2009). Establishing the date and function of weirs through a narrow typological approach seems highly problematic due to their continuous rebuilding, frequent usage of natural morphology, and the likelihood that there were numerous variations based on local and family traditions or individual whims.

Other stone-built fishing related structures

Several V-shaped stone structures recorded during the Phase 2 fieldwork at Minehead Bay, Dunster Beach and Blue Anchor Bay are quite substantial, well-preserved structures but do not appear to have guts or outflow channels. They may have had a role in the management of water across the intertidal zone and/or could have been 'dams' to trap fish for subsequent hand netting or spearing. An unusual, small subrectangular feature at Minehead also does not have a visible outflow channel. At Minehead Bay and at Gore Point, Porlock, straight cobble banks were appended to some of the leader arms of stone fish weirs, the enclosed areas being cleared of stone in order to create quite deep tidal pools. These might have been used for hand netting, or perhaps as oyster beds.

There were two large conger eel traps or 'heaps' in Minehead Bay (Dennison 1986; McDonnell 2001, 26) though only one, a circular

Figure 19 The surviving large conger eel trap in Minehead Bay, Somerset, marked by a low circular bank nearly 20m in diameter. There would once also have been a central cairn or heap of stones in the centre.

stone bank 19m in diameter, survives (Fig. 19). Eels were flushed out of the stones and caught in the rings, sometimes with the aid of trained dogs (Crowther and Dickson 2008, 98-99). Similar conger heaps have been identified in Scotland (Dawson 2004, 7). Previously unrecorded, subcircular heaps of stone identified at Minehead Bay and Gore Point were also possible conger heaps. At Gore Point, Porlock, in addition to V-shaped fish weirs and straight stone banks, Phase 2 field survey identified linear features consisting of large circular piles of stone 5-6m in diameter and up to 1m high, linked by low-lying banks of similar width up to 0.30m in height (Fig. 20). The 'cairns' on the banks were spaced 0.5-2m apart, in lines broadly perpendicular to the shore. These mounds or cairns may also have functioned as conger eel traps, or might have been similar to Scottish *croys* – cairns that created swirling eddies and backwaters which attracted fish that were then snared in gill nets secured to one or more of the

Figure 20 Linear features consisting of low banks with regularly spaced cairns or heaps of stone at Gore Point, Porlock Weir, Somerset.

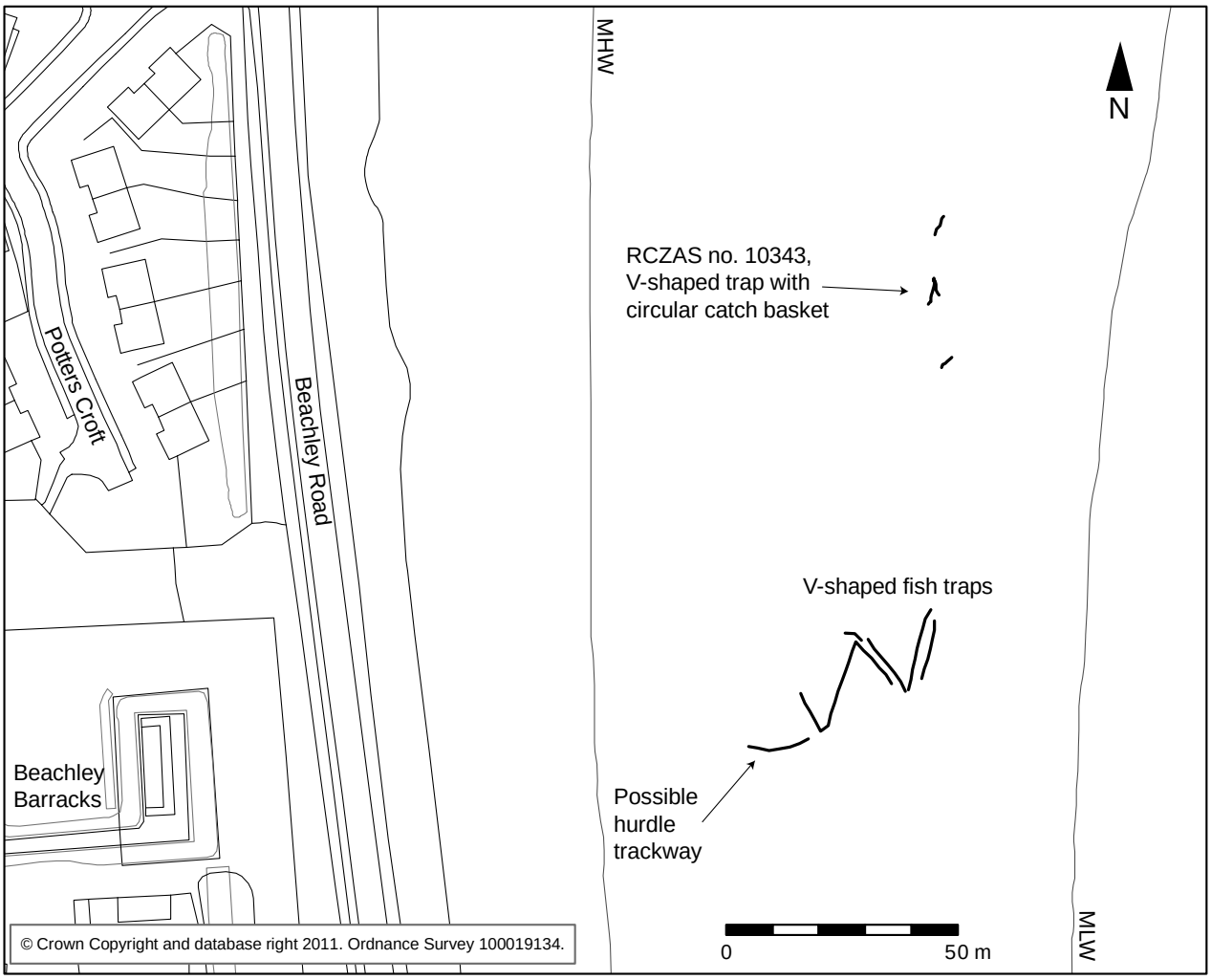

Figure 21 Plan of the V-shaped, stake-built fish traps recorded at Beachley, Gloucestershire.

croys and suspended on floats (Robertson 1998, 27).

An unusual feature at St Audrie's Bay consists of boulders placed sideways on to one another forming a 'wall' one course high with a *c*. 1.2m wide gap that was either a gut or the result of later erosion. The line of stones forms the western edge of a subrectangular shallow pool, and this may have been the remains of a weir, a 'dam' to create a pool where fish could be gathered using hand nets, or a pool to store live fish after they had been caught.

Wooden fish traps

At Beachley and Aust/Oldbury in Gloucestershire and South Gloucestershire, Phase 2 field survey recorded at least 11 V-shaped, stake-built fish traps (Figs. 21-23). These are similar to examples recorded by Townley (1999, 83, fig. 2a, 2b) south-west of Waldings Pill, Tidenham and Woolaston Pill. The Beachley examples were known to the Black Rock Lave Net Fishermen's Association, whilst one of the Aust traps was photographed in 2000 for a fishing history website (http: www.salmonboats.co.uk). These structures have leader arms formed of vertical or steeply angled stakes up to 0.06m across, mostly roundwood but with some split stakes. These are sometimes formed of single lines, but more often are 2-3 stakes in width (Figs. 24-26, 28, 30). Remains of finer horizontal hurdling evident on some leader arms are from upright wattle panels used to channel fish towards the apices. Some of these fish traps had remains of withy ties and more

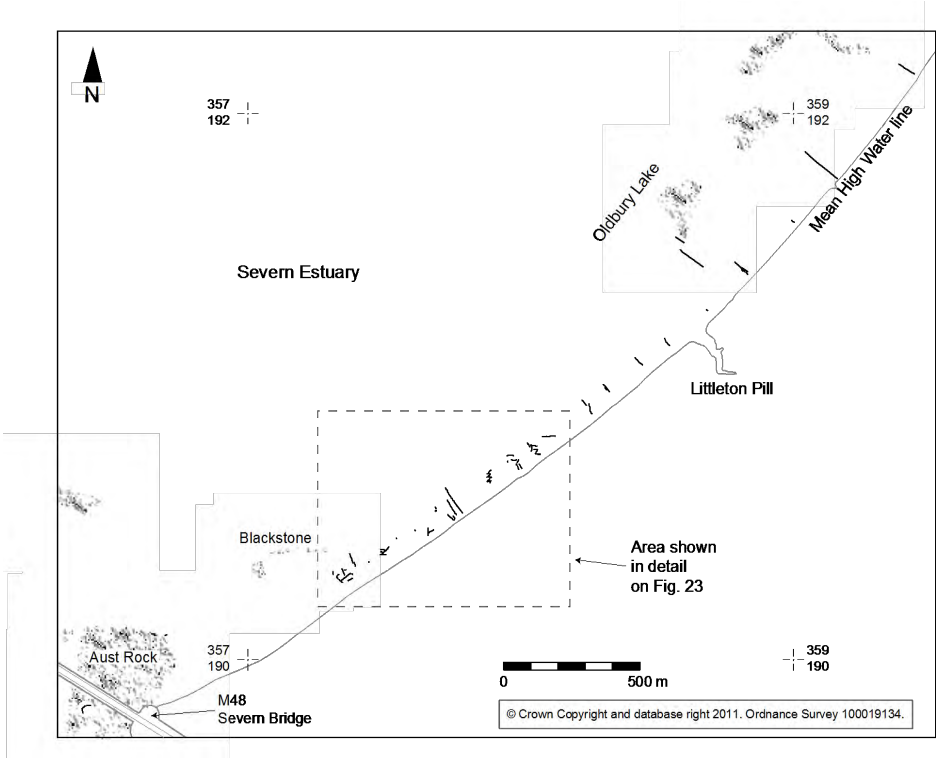

Figure 22 Fishweirs, putts and putcher ranks recorded between Aust and Cowhill Pill, South Gloucestershire.

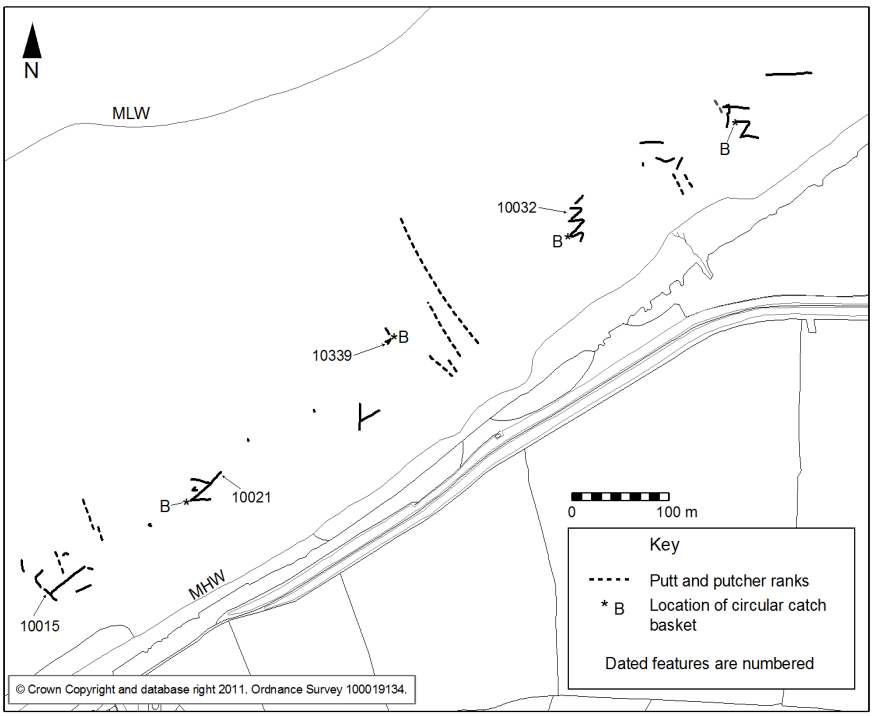

Figure 23 Detail of stake built structures at Aust/Oldbury Flats, South Gloucestershire.

finely woven fragments of baskets associated with them (Fig. 31). Some of these features had the wide angle of their leader arms facing downstream to catch fish on incoming tides, but in each group

Figure 24 V-shaped stake-built fish trap at Beachley, Gloucestershire, facing upstream.

Figure 25 V-shaped fish trap at Beachley, Gloucestershire, facing downstream. Note the stakes within the apex.

Figure 26 Another V-shaped structure at Beachley, Gloucestershire, facing downstream and right on the eroding edge of the active river channel. Note the horizontal hurdle remains, and possible associated riverbank revetment.

at least one also faced upstream to catch fish on the ebbing tide. Within the apices of some fish traps were clusters of posts that supported one or more fish baskets, but two of the features at Beachley and at least three of those at Aust/ Oldbury had circular structures outside their apices comprising settings of vertical stakes *c*. 1m in diameter, with hurdling originally woven tightly in between them (Figs. 27 and 29). Short, narrow necks or funnels led from the apices into the circular features which might have been catch baskets. One example photographed at Beachley in 2009 by Richard and Martin Morgan had sharp stakes pointing inwards into the circular structure to discourage fish from leaving (Fig. 27), though when the RCZAS survey team accessed this feature in 2010 this was no longer apparent due to erosion. Two examples with circular baskets at Aust/Oldbury Flats faced upstream, whereas the example at Beachley faced downstream. It may be that the 'internal' apex baskets and the circular

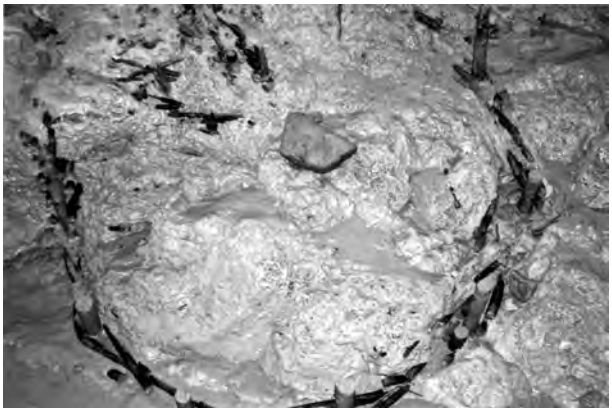

Figure 27 Additional detail of the circular catch basket at the apex of the fish trap shown in 18D and 18E, showing wattling and inward pointing stakes by the narrow 'neck', taken in 2009. Photo: Richard & Martin Morgan, used with permission.

baskets were designed to catch different fish species, the example with inward pointing spikes from Beachley suggesting eels, or this might reflect different periods of construction and use.

Some features recorded during the Phase 2 survey at Woolaston, Glos, may have formed part of two V-shaped stake-built fish traps recorded in 1998 (Townley 1999, 83, fig. 2), or additional but similar structures. At Beachley and Woolaston there may have also been stake revetments parallel

Figure 28 V-shaped fish trap facing upstream just to the south-west of Walding's Pill, Tidenham parish, Gloucestershire, photographed in 1998 by Toby Catchpole.

Figure 29 Surviving stakes of a circular catch basket at Aust/Oldbury Flats, South Gloucestershire, where much of the V-shaped fish trap once associated with this feature has eroded away.

to the Severn to consolidate the foreshore. There were indications at Beachley and Aust/Oldbury of overlapping lines of stakes and thus different phases of use. All these groups of features would greatly benefit from detailed cleaning and planning that was not possible during the RCZAS. South-east of the main group of features at Beachley, additional lines of stakes angled obliquely to the steeper shoreline may be the remains of leader arms of additional V-shaped fish traps.

At Oldbury Flats, fragmentary and highly-eroded traces of these structures were close to better-preserved putcher rank posts, and it is possible that some putchers were constructed in the same locales as earlier V-shaped fish traps (q.v. O'Sullivan 2003, 466), thereby destroying them.

These features resemble examples near Magor Pill and Sudbrook on the Welsh Severn shore that produced medieval radiocarbon determinations (Brown *et al* 2008; Godbold and Turner 1994; Nayling 2000a). Funding was not available for Townley to date the Woolaston structures (Townley 1999, 83); but some of the samples of stakes and woven structures from Woolaston, Beachley and Aust/Oldbury Flats that were taken during RCZAS fieldwork have now been the subject of radiocarbon dating arranged and funded by English Heritage.

At Beachley, the V-shaped stake built trap with a circular hurdle built catch basket mentioned above (Line no. 10343, Figs 21, 26 and 27) was sampled as it was situated precariously on the very edge of the eroding foreshore. Stakes were taken from the south-western end of the western leader arm as this was the only part of the feature that could be safely accessed. The results suggest construction of the feature between the late 8th and 10th centuries AD (Table 1).

At Woolaston three individual fish baskets and an associated stake and hurdle structure have been dated. At the lowest part of the foreshore, *c*.100m west of the mouth of Grange Pill, an area of apparently individual fish baskets was recorded amongst the peat and submerged forest remains (Line 10326, sample points 86, 88 and 90, Figs. 32-33). These are in the area recorded by Townley (1999, 83 fig. 2) and may be the same structures, but it was impossible to correlate what was identified in 2010 with Townley's plan. The stake and hurdle structure (Line 10328, sample point 87) was eroding at the lower edge of the current foreshore and may have been either revetting to maintain the edge of the channel below the baskets, or the leader arm of a V-shaped fish trap. The dates from these samples indicate a fishery in use during the period between the 8th and early 11th centuries AD (Table 1). The two differing dates for stakes from the hurdle structure may indicate its construction and repair.

Figure 30 Stakes within the downstream-facing apex of a V-shaped fish trap at Oldbury Flats in Aust parish, South Glouces-tershire.

At Aust/Oldbury Flats four sampled structures (Fig. 23) have been radiocarbon dated. An unusual T-shaped structure (10015) lay within an area of fragmentary features so that it was difficult to ascertain its full original form, or whether several phases were present. Some stakes were associated with hurdling, whilst others were not, suggesting that both fish traps and individual baskets had once been present. Radiocarbon dating of two stakes from the western end of the structure, at the head of the 'T', indicated a post-medieval date.

A large V-shaped stake-built structure (10021) faced upstream to the north-east with an apex pointing to the south-west. This had an apparently later line of stakes appended at approximately 60 degrees to its north-western side to create another V-shaped angle facing downstream to the south-west. The feature had no clusters of stakes within the upstream facing area of its apex, although a few individual stakes to the south-west may be remnants of a circular catch basket structure. The downstream facing angle formed by the additional line of stakes, however, contains stakes that could have supported individual baskets, suggesting several different phases of use. Two samples from the earlier V-shaped structure 10021 indicate that it was constructed in the late 7th or 8th century AD (Table 1).

To the north-east of a large putcher rank there was a row of three, possibly four, V-shaped stake built fish traps, centred at NGR SO 5788 9066 (Fig. 30). A well-preserved example of one of these (Line No. 10032) was sampled, with two samples being dated from each leader arm. Three dates suggest construction during the 11th – early 13th centuries AD, whilst the fourth and later radiocarbon date might be a statistical outlier or may indicate repair and reuse up to the late 13th century.

A further sample was taken from the apex of a V-shaped fish trap (Line No. 10339, Fig. 31) north of Potato Tump, at NGR SO 5767 9054. Most of the leader arms of this structure had eroded away or were not visible, but the apex was relatively well preserved. The apex pointed to the north-east, and the open leader arms to the south-west. Two stakes from the southern leader arm have been radiocarbon dated, indicating that it was constructed in the late 7th or 8th century AD (Table 1).

At Woolaston and Aust/Oldbury Flats, several small stake-built structures apparently not associated with leader arms were possibly for individual fish baskets called 'putcheons' and 'weels', used to catch eels, lampreys and lamperns (Taylor 1974, 17). At Aust/Oldbury Flats as well as the previously mentioned group at Woolaston, fragmentary woven remains of fine baskets were recorded with narrow rods only 5-10 mm wide set within slightly thicker frames 10-20mm in width. Some might have been individual fishing baskets similar to the Sudbrook examples (Brown *et al* 2008), with others the 'frails' used to transport

Figure 31 Detail of a withy tie used to secure wattling to the vertical stakes of a circular catch basket at Oldbury Flats in Aust parish, South Gloucestershire.

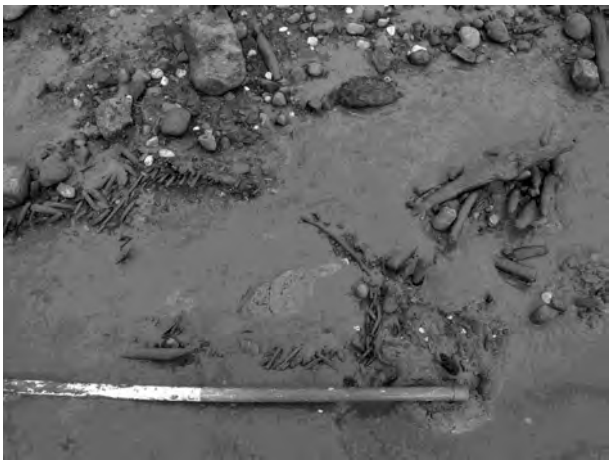

Figure 32 Woven fish basket at Grange Pill, Woolaston, Gloucestershire.

individual fish away from putcher ranks (Jenkins 1974b, 56). It is also likely that some of the woven features at Aust/Oldbury Flats were remnants of putt forewheels and putcher baskets that had become detached from putt or putcher ranks.

On Stert Flats, both earlier surveys and the RCZAS NMP aerial survey recorded numerous stake-built structures west and north-west of Stert Island (Brunning 2008; Crowther and Dickson 2008, fig. 5.27; McDonnell 1995, 2003). The Phase 2 fieldwork revisited many of these, and recorded several additional examples. These large V or tick-shaped structures had apices opening to the east or north-east, to catch fish on ebbing tides. The leader arms of these were formed from lines of mostly roundwood stakes, many now highly fragmentary due to erosion and/or drifting sediments. The apices often consist of clusters of split oak posts that once supported woven baskets, and dendrochronological and radiocarbon dating has indicated that some were constructed during the eighth to thirteenth centuries AD (Brunning 2008, 70, 72).

Figure 33 Different form of woven fish basket at Grange Pill, Woolaston, Gloucestershire, possibly a frail for transporting individual fish.

The RCZAS fieldwork found that many fish traps previously recorded by Richard McDonnell and Richard Brunning have either eroded completely or have been buried by highly mobile sand and silt deposits. Structure 204, for example (Brunning 2008, 72, fig. 4), has been largely buried, the stone cairn at its apex being only just visible as a few stones. Those in the south-western part of the Stert group, and those north-west of Stert Island were simply not visible and this area could not be accessed due to thick mud and quicksand. The new and previously unidentified structures consist only of fragmentary leader arms.

At Woodspring/Kingston Bay, conjoined V-shaped stake-built fish traps associated with hurdle panels and baskets had been recorded by the NMP aerial survey and earlier fieldwork (Crowther and Dickson 2008, 84-85; Hildich 1998, 100), but were not visible during Phase 2 fieldwork in 2010 as they now lie under deep mud deposits. A V- or tick-shaped structure identified from aerial imagery at Kilkenny Bay near Portishead is similarly inaccessible.

Another previously recorded structure at Stert (Brunning 2008, 78-79, no. 045, fig. 14) consists of a broadly V-shaped fish trap with leader arms of densely spaced vertical stakes, some firmly set within a low gravel bank. Several types of stakes in varying stages of preservation are identifiable, and at least one line of stakes extends to the north-east beyond the current apex, indicating different phases of construction and use. Later structures, including a putcher rank, were appended to it. Previous samples of stakes from this feature include spruce and larch, likely to post-date the sixteenth century (*ibid*, 80). Groups of vertical posts within the apex of this large structure are probably settings for baskets, and there is also a pronounced gap *c*. 20m wide along the northern arm with just a few single stakes across it. The

gap was filled with brushwood and hedge trimmings during the fishing season, which were removed over the closed winter season (B. Sellick *pers comm*). More detailed planning and sampling of this feature could be undertaken to try and establish stratigraphic sequences and absolute dating for these different phases. With the aid of the Argocat, additional samples of wood were taken from V-shaped fish traps at Stert during Stage 2 survey for species identification and potential dendrochronological and/or radiocarbon dating. These samples were taken after those reported here had been submitted for dating but it is hoped funding can be found for a further dating programme.

At Brean Sands/Berrow Beach, the NMP aerial investigation plotted many V- and U-shaped fishing structures, most of which are no longer visible and/or could not be accessed due to thick mud deposits. U-shaped structures that were accessible proved to be net hangs made from relatively recent wooden posts. Several stake-built features that were identified consist of relatively straight lines of low, eroded stakes arranged in multiple rows or 'hedges' up to 1.5m in width. One of these features is at least 200m long. In places these stakes are driven through prehistoric peat deposits, exacerbating the erosion of the latter (Fig. 34). It is not clear if all of the stake rows belong to the same phase. Single wooden stakes 1.5-3m away from the western, seaward sides of some of these features, and angled towards them at 45-60 degrees, were probably additional supports or braces.

Due to their severe erosion and/or burial by sediments the overall shape and form of these features is not discernible, but no apices, basket supports or guts/channels are visible. One example is orientated north-east to south-west and could be part of a V-shaped fish trap, but most are aligned north-south parallel to the existing shoreline and it is therefore uncertain how these features functioned as fish traps. At least one also features some horizontal hurdle elements.

Approximately 500m below the high water line, west of the parish church of St. Bridget, Brean, was a line of densely-packed stakes forming a hedge-like structure. It was orientated predominantly north-south, but with a very gentle convex curve out to the west. It was traced for at least 180m, but its original northern and southern limits were unclear due to mud, and especially to the north it appeared much more fragmentary and poorly preserved. If this was a fishing structure, it was at an unusually gently oblique angle to the shoreline, unless it had more acute tangential leader arms that were buried by sediment. Samples of stakes taken from approximately halfway along its length at NGR ST 2895 5604, proved to be of post-medieval date (Line no. 10257, Table 1).

Figure 34 Stake-built 'hedge' at Brean Beach, Berrow Flats, Somerset. The stakes were driven through peat deposits, causing linear erosion channels to form along them.

At the southern end of Berrow Flats, approximately 300m from the shoreline on the north-western edge of Burnham-on Sea were the remains of a north-west to south-east orientated wooden structure identified by Richard McDonnell 10-15 years previously, and centred at ST 2975 5020. This consisted of two slightly sinuous lines of stakes 2-2.5m apart, each line featuring a mix of larger stakes and smaller examples. In a few places there were also short lines of stakes visible running down the central

area between the two lines, and there were also outlying stakes, especially on the north-east side of the feature. Smaller twigs and brushwood up to 0.01m in diameter were laid horizontally between the vertical stakes, forming a trackway. Samples of stakes from the northern row of stakes (Line No. 10264, Table 1) produced post-medieval radiocarbon dates.

At Northwick Oaze in South Gloucestershire, a right-angled or L-shaped structure of roundwood stakes and larger irregular posts was interpreted by Allen and Haslett as a fish trap (Allen and Haslett 2007). A circular setting of stakes and rods around 0.9m across was also identified a few metres to the south-west. The L-shaped feature was surveyed again during Phase 2 fieldwork, but more silt was present around the structure than was evident in the 2007 photographs, and only a few stakes from the circular setting were visible. Associated objects currently visible include iron poles, a concrete block and stone slabs. Whilst small roundwood stakes would be an unusual choice for a riverbank revetment (*ibid*, 170), the orientation of the long axis of the 'L' is parallel to the existing shoreline which is unusual for a fish trap. The circular structure, however, is reminiscent of the round 'catch baskets' associated with V-shaped fish traps at Beachley and Oldbury Flats. The RCZAS fieldwork recorded paired stakes from a possible putt or putcher rank extending out from the bank into the area defined by the right-angle and perpendicular to the long axis of the 'L'. There are thus several different phases evident at this locale and detailed planning and perhaps excavation would be necessary to disentangle these.

Full results of the radiocarbon dating programme are presented in Table 1. The samples were dated by Accelerator Mass Spectrometry (AMS) at the Scottish Universities Environmental Research Centre in East Kilbride (SUERC-) and the Oxford Radiocarbon Laboratory (OxA-) respectively. The samples dated at SUERC were pre-treated using methods outlined in Hoper et al (1998), combusted following Vandeputte *et al* (1996), graphitized as described by Slota *et al* (1987), and measured by AMS (Xu *et al* 2004). The samples processed at ORAU were pre-treated using a standard acid/base/acid method followed by an additional bleaching step (Brock *et al* 2010), combusted, converted to graphite, and dated as described by Bronk Ramsey et al (2004). Internal quality assurance procedures and international inter-comparisons (Scott 2003) indicate no laboratory offsets and validate the measurement precision quoted.

The results reported are conventional radiocarbon ages (Stuiver and Polach 1977). The calibrated date ranges have been calculated by the maximum intercept method (Stuiver and Reimer 1986), using the program OxCal v4.1 (Bronk Ramsey 1995; 1998; 2001; 2009) and the IntCal09 data set (Reimer *et al* 2009). They are quoted in the form recommended by Mook (1986), rounded outwards to 5 years. Calibrated dates which may be effected by atmospheric ^{14}C produced in the atomic tests of the 1950s are denoted by *. The probability distributions of the calibrated dates, shown below, have been calculated using the probability method (Stuiver and Reimer 1993), and the same data.

Calibration of radiocarbon results from the Severn Rapid Coastal Zone Assessment Survey are by the probability method (Stuiver and Reimer 1993; Table 2).

Putt and Putcher ranks

Documentary evidence suggests that putts were earlier fishing structures than putchers (Bond 1988, 78; Jenkins 1974b, 60; Godbold and Turner 1994, 45; Taylor 1974, 13), although putts were still used on the inner Severn until the 1970s. Putt ranks trapped salmon, shad, eels, dabs and shrimp, and may have developed from earlier individual fishing baskets and shorter linear arrays (Nayling 2000a, 112). Putchers may have come into use during the late-eighteenth or early-nineteenth centuries, and were more usually associated with salmon fishing. Only two putcher ranks still operate, south of Awre and at Broadoak (Fig. 35).

The remains of these 'fixed engines' generally consist of vertical wooden posts arranged in two lines perpendicular to the shoreline, formed by pairs of posts set opposite one another 0.5-3m apart. Alternatively, there may be clusters of 4-12 posts opposite one another, a form of construction possibly associated with putts. Twentieth-century putcher ranks near Awre and Gatcombe still have surviving horizontal wooden supports in addition to the vertical posts. There are often outlying

Table 1: Radiocarbon dates and stable isotope measurements from the Severn Estuary RCZAS

Laboratory number	Sample	Radiocarbon age (BP)	δ13C (‰)	Calibrated date (68% confidence)	Calibrated date (95% confidence)
Beachley (10343)					
OxA-24674	Sample 106E, Quercus sp., 14 rings to bark edge (outer rings sampled), stake from fish-trap 10343.	1169±27	−26.9	cal AD 780–895	cal AD 775–970
SUERC-34345	Sample 106G, Quercus sp., 11 rings to bark edge (outer rings sampled), stake from fish-trap 10343.	1175±30	−27.2	cal AD 780–895	cal AD 770–970
Grange Pill, Woolaston (10326/86)					
OxA-24675	Sample 86A, roundwood (outer rings sampled), from woven basket fishing structure (10326/86).	1114±26	−25.4	cal AD 890–980	cal AD 880–995
SUERC-34346	Sample 86B, roundwood (outer rings sampled), from woven basket fishing structure (10326/86).	1055±30	−26.5	cal AD 975–1020	cal AD 895–1025
Grange Pill, Woolaston (10326/88)					
OxA-24677	Sample 88A, roundwood stake with bark edge (outer rings sampled), from woven basket fishing structure (10326/88).	1048±25	−25.5	cal AD 985–1020	cal AD 900–1025
SUERC-34348	Sample 88D, roundwood stake with bark edge (outer rings sampled), from woven basket fishing structure (10326/88).	1075±30	−26.1	cal AD 900–1015	cal AD 890–1025
Grange Pill, Woolaston (10326/90)					
OxA-24678	Sample 90B, roundwood with bark edge (outer rings sampled), from woven basket fishing structure (10326/90).	1062±25	−27.2	cal AD 975–1020	cal AD 895–1025
SUERC-34352	Sample 90M, roundwood with bark edge, from woven basket fishing structure (10326/90).	1150±30	−27.2	cal AD 875–950	cal AD 775–980
Grange Pill, Woolaston (10328/87)					
OxA-24676	Sample 87A, Quercus sp. with 14 rings to bark edge (outer rings sampled), from a hurdle (10328/87) which may either be part of a V-shaped fish-trap or a revetment associated with the fishing basket structures at this location.	1228±25	−25.5	cal AD 720–855	cal AD 685–885
SUERC-34347	Sample 87D, Quercus sp. with 12 rings to bark edge (outer rings sampled), from a hurdle (10328/87) which may either be part of a V-shaped fish-trap or a revetment associated with the fishing basket structures at this location.	1125±30	−25.7	cal AD 885–975	cal AD 830–990
Oldbury Flats (10015)					
OxA-24679	Sample 92A, Quercus sp. roundwood with bark edge (outer rings sampled) from stake-built fish-trap (10015).	182±23	−27.1	-	-
OxA-24680	replicate of OxA-24679	141±24	−26.9	-	-
weighted mean	T'=1.5; T'(5%)=3.8; ν=1	162±17		cal AD 1670–1945	cal AD 1665–1950
SUERC-34357	Sample 92C, roundwood with bark edge from stake-built fish-trap (10015).	160±30	−25.3	cal AD 1665–1950	cal AD 1660–1955*
Oldbury Flats (10021)					
OxA-24681	Sample 93A, Quercus sp. of eight-rings to bark edge (outer rings sampled), from stake-built fish-trap of unusual form (10021).	1300±24	−25.9	cal AD 665–770	cal AD 660–775
SUERC-34356	Sample 93B, roundwood with bark edge (outer rings sampled), from stake-built fish-trap of unusual form (10021).	1320±30	−25.9	cal AD 660–690	cal AD 650–775
Oldbury Flats (10032)					
OxA-24684	Sample 100A, roundwood with bark edge (outer rings sampled), from northern leader arm of V-shaped fish-trap 10032.	895±25	−28.7	cal AD 1050–1180	cal AD 1040–1215
SUERC-34353	Sample 100E, roundwood with bark edge (outer rings sampled), from northern leader arm of V-shaped fish-trap 10032.	870±30	−26.9	cal AD 1155–1215	cal AD 1045–1225
SUERC-34354	Sample 99B, roundwood stake with bark edge, from southern leader arm of V-shaped fish-trap 10032.	800±30	−22.4	cal AD 1215–1265	cal AD 1180–1280
OxA-24683	Sample 99A, Quercus sp. stake (outer 10 rings of sapwood), from southern leader arm of V-shaped fish-trap 10032.	918±25	−25.0	cal AD 1040–1160	cal AD 1025–1205
Oldbury Flats (10339)					
OxA-24682	Sample 94A, roundwood with bark edge (outer rings sampled), from V-shaped stake-built fish-trap with woven hurdle 'catch basket' (10339).	1292±24	−26.2	cal AD 670–770	cal AD 660–775
SUERC-34355	Sample 94B, roundwood with bark edge (outer rings sampled), from V-shaped stake-built fish-trap with woven hurdle 'catch basket' (10339).	1285±30	−25.9	cal AD 670–775	cal AD 660–780
Berrow Flats, Brean Beach (10257)					
OxA-24685	Sample 70/10257B, unidentified roundwood with bark edge (outer rings sampled), from brace from possible fish-weir 10257.	138±24	−26.6	cal AD 1680–1940	cal AD 1665–1950
SUERC-34358	Sample 70/10257U, unidentified roundwood with bark edge (outer rings sampled), from brace from possible fish-weir 10257.	185±30	−26.8	cal AD 1665–1950	cal AD 1650–1955*
Berrow Flats, Burnham-on-Sea (10264)					
OxA-24686	Sample 76C, roundwood with bark edge, from vertical stake forming part of trackway 10264.	193±24	−26.3	cal AD 1665–1950	cal AD 1650–1955*
SUERC-34362	Sample 76M, roundwood with bark edge, from vertical stake forming part of trackway 10264.	230±30	−26.7	cal AD 1645–1800	cal AD 1640–1955*

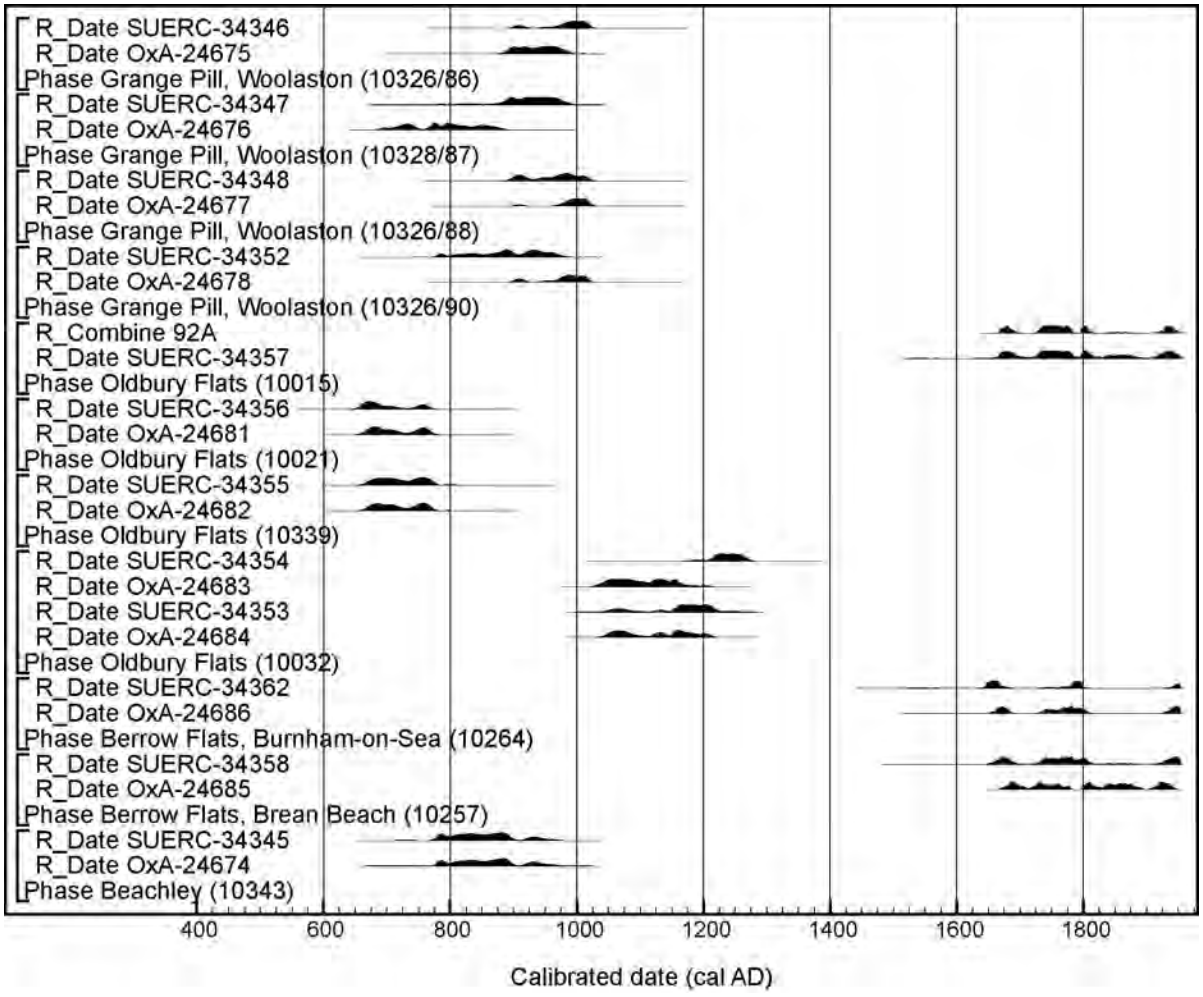

Table 2: Calibration of radiocarbon results from the Severn Rapid Coastal Zone Assessment Survey by the probability method (Stuiver and Reimer 1993).

posts and stakes acting as braces and supports, especially with putt ranks where such stakes were used to support and anchor the more complex three part 'kype', 'butt' and 'forewheel' arrays (Jenkins 1974b, 45-47; Taylor 1974, 12-13). The large, relatively well-preserved structure at Slime Road, Sedbury, was probably originally a putt rank (Fig. 36), before being converted to putchers. In some instances remains of the woven putt baskets themselves survive, as with an example north of Littleton Pill (Fig. 37). More recent putcher ranks along the inner Severn utilised squared timbers, fencing posts or telegraph poles in their construction, as well as metal rails and concrete.

On Stert Flats double lines of wooden posts are also present, at least four of which extend across the Gutterway near the mouth of the River Parrett (Brunning 2008, 77-78, fig. 13; McDonnell 1995, 99). The width between the double lines of posts (3.5-6m) suggests that they may have originally been for putts, and their position indicates that some probably post-date the late-eighteenth century breach in the Stert Peninsula (McDonnell 1995, 99). Many narrower possible putcher ranks were also recorded at Stert. It is also feasible that either the wider or narrower versions of these double lines, or both, could have supported nets, as with contemporary examples still in use at Stolford. A series of 'zig-zag' structures previously recorded at Stert, probably conjoined V-shaped settings for lines of baskets (Brunning 2008, 74-76) or perhaps nets, could also not be directly accessed due to thick mud, though part of their alignments were recorded using the laser rangefinder.

Figure 35 The only permanent putcher rank still in use on the upper Severn, south of Awre, Gloucestershire. Another smaller example at Broadoak is only assembled on a seasonal basis.

Figure 37 Putt rank at Salmon Catch near Littleton Pill, Oldbury Flats in Aust parish, South Gloucestershire. The surviving baskets are probably the butts.

Figure 36 Large putt or putcher rank at Slime Road, Sedbury, Gloucestershire. The multiple stakes behind the main rank may indicate that it was originally a putt rank.

Figure 38 Different phases of putcher ranks at Oldbury Flats in Aust parish, South Gloucestershire. At least four different structures are present.

Putt and putcher ranks were often built in bays with gently shelving intertidal surfaces. Outcrops of very hard rock were usually avoided, with softer rock shelves, firmer clay or gravel surfaces preferred. Gravel, stone and more recently concrete slabs and metal sheeting were sometimes used to provide firmer footing. Many putt and putcher ranks were rebuilt several times or were re-used as later net hangs, and one fishing station could have had multiple structures built on the site over many human generations (Fig. 38). The Environment Agency holds the Certificates of Privilege for fixed fishing engines along the Rivers Severn and Parrett, and kindly provided GCCAS with edited versions of these records that detail when the recorded structures were last used, and usually the numbers of baskets they used to support.

The RCZAS NMP aerial survey and the earlier Forest of Dean NMP project identified numerous putt or putcher ranks along the upper Severn (Crowther and Dickson 2008, 70-78), along with the double lines of posts at Stert, but

only one other possible putt or putcher rank, at Black Rock Clyce on the River Parrett (*ibid*, 77). Phase 2 survey of this latter structure found that a net hang of metal posts had been built on the remains of an earlier wooden structure, and this site was used until 2000 (Environment Agency LHB 000).

It is likely that only the largest and most recent putt and putcher ranks were recorded by the RCZAS NMP and previous aerial surveys, partly due to the scarcity of oblique aerial images for many of these areas, but also the problem of identifying low, eroded wooden stumps (Crowther and Dickson 2008, 61-62). In the Phase 2 survey at Gatcombe, Sharpness and Hayward Rock, Ham and Stone identified numerous postholes from putt or putcher ranks cut into underlying softer marl rock, filled with packing stones and/or the low eroded remains of wooden stakes and stumps (Fig. 39). Postholes from wooden hang net posts were identified at Minehead Bay and St Audrie's Bay. Larger wooden posts from putt and putcher ranks would have been driven or bored into the intertidal surface, the latter involving a rock auger and bar, the debris being removed using long-handled ladles (Jenkins 1974b, 58). In areas of softer marl, clay and gravel there may be more putt and putchers surviving as postholes, but sediments will have buried much of this evidence.

The Phase 2 field survey identified putt and putcher ranks along the upper Severn at Slime Road Pill and Sedbury Cliffs, near Gatcombe and Awre, and south of Sharpness Docks, at Hills Flats, Oldbury Flats, Aust and Northwick Oaze. South of the Second Severn Crossing, fieldwork recorded fragmentary remains of putt or putcher ranks at Severn Beach, possible examples at Woodspring/Kingston Bay, and the structures at Stert Flats, although some of these had been noted by earlier surveys (Brunning 2008; McDonnell 1995, 2003; Riley 1998a, 1999). Some putcher ranks at Oldbury and Hills Flats still extend hundreds of metres out into the river channel, making use of rock outcrops or raised bars of gravel and sand. It is no longer possible to walk out to these, and the lengthier examples may only have been accessible at the lowest tides, or using boats.

Figure 39 Rock cut postholes (two on the left, one on the right) for a putcher rank at Hayward Rock, Hills Flats, Ham and Stone Parish, Gloucestershire.

A putcher rank at Hayward Rock has extensive leader arms at least 300m long, some based on earlier putcher ranks and originally featuring hurdle panels but more recently replaced with nylon netting, and last used in the 1990s (Environment Agency LHB 019 24/10). On Hills Flats by White House, the remains of a north-west to south-east orientated putt or putcher rank are indicated by another line of low and eroded paired roundwood posts, re-used as a more modern net hang line with taller wooden posts. At its north-western end there is an arc of smaller posts gently curving to the north-east, initially consisting of double posts but then becoming a line of more widely spaced single stakes. This multi-period structure has been identified by several previous studies (Allen 2005, 34, fig. 2; Small 2006, 69, fig. 30). It is not clear if the arc of stakes was in use at the same time as the putcher rank but the single stakes could have formed part of a post and wattle leader arm for the rank (Allen 2005, 34).

The Crown, aristocratic landowners and monasteries were traditional owners of fishing rights along the River Severn (Bond 1988, 87-88). The fish traps near Sedbury were owned by Tidenham Manor until they passed to Llanthony Priory, along with the fisheries at Awre, whereas Tintern Abbey held the fishery at Woolaston until this passed to the Earl of Worcester in the sixteenth century (Baggs and Juřica 1996, 14-46; Morgan and Smith 1972a, 68-73; 1972b, 109-114). Despite a wealth of documentary evidence for ownership of medieval fisheries, the terminology used is inexact and the nature of the fishing undertaken at many of them is uncertain.

The fisheries at Beachley and Tidenham were sold several times during the sixteenth and seventeenth centuries, with the Duke of Beaufort acquiring those at Tidenham, Woolaston and Horse Pill by the early-nineteenth century. The fishing structures between Gatcombe Pill and Brims Pill were owned by Poulton Manor in the sixteenth century and the fishing rights in that stretch of river descended with the manor to the Hagloe Estate. Low, eroded wooden posts and rock-cut wooden postholes recorded south-east of Hagloe House were thus probably part of an earlier fishery belonging either to the Hagloe Estate or to Poulton Court. The fact that a prominent holloway leads from Little Hagloe south-eastwards down to the foreshore near these structures is further evidence that this was a significant fishery in the medieval and/or post-medieval periods.

During the later-nineteenth century the Duke of Beaufort's Severn and Wye fisheries were leased by the Miller Brothers of Chepstow, who exported salmon to London, Bristol and other centres. By 1860 the Severn Estuary supported one of the largest commercial salmon fisheries in the British Isles, the majority of fisheries being operated on behalf of three large estates (Beaufort, Berkeley and Lydney), with others still owned by the Crown and the Church of England, in addition to minor gentry and freehold farmers (Jenkins 1974b, 54; Taylor 1974, 14).

Following Salmon Fisheries Acts in 1861 and 1865 that attempted first to ban and then subsequently to regulate fixed engine fishing on the River Severn, Special Commissioners for English Fisheries mapped and listed the locations, ownership and size of licensed ranks (Jenkins 1974b, 49-55). The 1865 documents and Certificates of Privilege issued after 1866 mention large numbers of unlicensed structures that depleted fish stocks and were hazardous to navigation, and many putt and putcher ranks recorded during Phase 2 field survey were thus either earlier in date or were 'unofficial' structures.

Other possible wooden fishing related structures

Several horizontal wooden features projecting from the bank at Arlingham Passage may have been 'flakes' associated with long netting (Crowther and Dickson 2008, 81, fig. 5.9). At Aust/Oldbury Flats, just north of Littleton Warth, a line of horizontal hurdle panels around *c*.15m in length is perpendicular to the shoreline. At least three woven panels 0.5-0.6m in width are present, although the structure is partly buried beneath salt marsh silts. Withy ties have been used to secure the hurdle panels to several vertical stakes. There is a T-shaped arrangement of stakes at the end of the trackway, and several outlying stakes. It was probably built either to reach boats, or perhaps used in long netting.

Additional fishing related features

Just south of Black Rock Clyce on the eastern bank of the River Parrett at Pawlett Hams and *c*.50m from the riverbank is a flat-topped mound of stone approximately 1.2m high and 30m across, forming the foundation for a metal secure store. Two rowing boats are berthed next to it, and there is a large hand-operated metal winch. This is probably a fishing station used for seine or long-net fishing. Several square and rectangular 'tanks' in the mound lined with concrete blocks may have been used for storing fish or bait.

Small riverbank buildings recorded east and south of Awre, near Minsterworth and Elmore Back are fish houses, similar to the fish hut on the north side of Newnham, now restored and converted to a fishing museum by the Environment Agency. These were generally single storey structures, usually with fireplaces and chimneys and often with a storage loft above to protect fishing equipment from flooding. Most are brick-built, though an example east of Awre has a brick chimney with wood and corrugated iron sheeting walls. Fishermen would spend the night in them when collecting fish on early or late ebb tides. Only the example south of Awre, and possibly the one at Elmore still seem to be used as working fishing structures.

A small stone building set into cliffs at Middle Hope on St Thomas' Head in Somerset was described in an earlier survey as a 'fish-processing structure' (Hildich 1998, 99), but the evidence for this is unclear.

Possible 'draw ups' or beach moorings at Minehead

At several places within or just east of Minehead Bay, several relatively flat areas of possible deliberate clearance were noted. At Warren Point, a subrectangular platform had been cleared of large cobbles, and a large vertical wooden post was situated centrally within it, probably the mooring post for a beached vessel. Along the north-eastern or seaward side of this cleared platform, the low stone bank of a separate fishing structure has a distinct 'notch' that may have resulted from the hull of a vessel being repeatedly drawn over it and onto the flat, cleared area. Approximately 300m south-east of the Old Harbour at Minehead there is another subrectangular patch of clearance, with a broadly NE-SW line of cleared stone forming a low bank on its eastern edge, with a vertical metal pipe at one end. Immediately alongside and parallel to this rough bank is a short line of at least six large boulders. This too may have been a boat mooring. Several small jetties identified along the Severn Estuary during RCZAS fieldwork could have been used by fishing boats.

Stop-net boats at Gatcombe

At Gatcombe in Gloucestershire, the Gloucester to Chepstow railway line has cut off the nineteenth-century stone quay from the riverbank, and on it are three wooden stop-net boats once used for stop-net fishing in Wellhouse Bay. Two boats are almost totally decayed, and the third has been partly burnt by vandals. Adjacent to these boats are long wooden poles – the 'rames' or 'rimes' once used to hold the nets taut. Up to three boats would be tethered across the flow of the tide, originally on poles fixed into the riverbed but later by a steel cable fixed to the shore at one end and by anchor at the other (Taylor 1974, 13). From 1878 the rights to use stop nets in Wellhouse Bay were leased by Charles Morse, owner of the Court House at Gatcombe. His descendants later bought these rights as well as those to putcher ranks at Gatcombe belonging to Etloe Duchy Manor. The family ran the fishery at Gatcombe for the next 100 years, and in the 1920s still owned 10 stopping boats (Baggs and Juřica 1996, 14-46). The three stop net boats at Gatcombe were last used in the early 1980s.

INTERPRETATION AND DISCUSSION

Negative evidence

The RCZAS field survey indicated that some proposed fishing-related features transcribed from aerial photographs are unlikely to be of anthropogenic origin. For, example, at English Stones and Gravel Banks, a study identified a series of possible stone-built and wooden fishing structures (Allen 2005, 40-42). Feature ES-5 was indeed a large V-shaped stone and metal post structure, with another previously unidentified stone-built fish trap located just to the south-west of it. Features ES-4, ES-3 and ES-8, however, appeared to be natural rock shelves or shingle ridges, although structures that utilised these favourable but exposed sites could have been entirely destroyed by the tide, whilst parts of ES-2 and ES-10 were represented by natural eroded channels in the bedrock. Only a few metal stakes from a recent net hang were identified at the location of ES-7. Allen's feature ES-1, however (Allen 2005, 41; Riley 1999), is probably the putcher rank listed on the Certificate of Privilege at NGR ST 53513 83724. This once had 225 putchers on its lower extent and 300 on its upper, and was last fished around 1950 (EA LHB 002 50/31). No traces of this were identified during the Phase 2 survey, and Environment Agency records note only a few surviving low wooden posts that are now probably buried or eroded.

The distribution and dating of fishing structures

One main influence on the distribution of stone fish weirs was probably the availability of suitable raw materials. Nevertheless, there are gaps in their distribution at Warren Bay, Doniford Bay, St Audrie's Bay and Lilstock Bay where, despite suitable cobbles and boulders being present, few or no stone weirs were constructed. In these areas tides and currents may be less favourable for fishing. Phase 2 field survey confirmed that putt and putcher ranks were once present as far south-west as Stert Flats.

Bronze Age and Iron Age fishing structures have been found at Wooton-Quarr on the Isle of Wight, and along the Shannon Estuary and Lough Begg (Loader *et al* 1997; Mitchel 1965; O'Sullivan 2001), and possibly on the Welsh Severn shore near Peterstone (Neumann *et al* 2000, 307, 310). Nonetheless, there is

surprisingly little evidence for the exploitation of marine and river fish in later prehistory (Bell *et al* 2000; Dobney and Ervynck 2007; Jay and Richards 2007), outside Scotland, the Western Isles and the Orkneys. If rivers and the sea were used for the disposal of human remains, as finds around the Severn Estuary suggest (Bell *et al* 2000, 64-73; Brett 1997, 118), then beliefs regarding death and the afterlife might have placed dietary prohibitions on fish consumption (Hill and Willis 2010, 153, 165-166). The apparent lack of Romano-British fishing structures is also striking. The socio-economic reasons behind these patterns clearly require future research.

The V-shaped, stake-built fish traps recorded by the Severn Estuary RCZAS share many features with tenth to fourteenth-century structures from the Welsh Severn Estuary (Brown *et al.* 2008, 2010; Godbold and Turner 1994; Nayling 1998, 2000a); fifth to thirteenth-century examples from Strangford Lough and the Shannon Estuary in Ireland (McErlean and O'Sullivan 2002; O'Sullivan 2001, 2003); seventh to tenth-century fish traps from the Blackwater and Stour Estuaries, Essex; seventh to eleventh-century examples at Holbrook Bay, Suffolk (Everett 2007; Hall and Clarke 2000; Murphy 2010; Strachan 1998); sixth to tenth-century fish traps from the north Norfolk coast of the Wash at Holme (Robertson and Ames 2010); and the seventh to eleventh-century structures at Stert Flats (Brunning 2008). All these examples lack circular catch baskets, however, and many were much larger in size than the middle Severn examples.

The preliminary radiocarbon dating programme presented above indicates that estimating the age of features on form or size alone is extremely unreliable, particularly as the original extent of features is usually unknown. The fact that further V-shaped weirs of mid-Saxon to high medieval date have now been identified in the Severn Estuary at Beachley, Oldbury/Aust and Woolaston is perhaps unsurprising given the known examples in Wales and at Stert but it adds significantly to the number and distribution of dated examples for these periods. What remains surprising, given the documentary evidence for the importance and number of fisheries in the high medieval period, is that most of the dated examples seem to belong to the earlier parts of this date range rather than the later. Further detailed recording, dating and research of the identified structures are essential if the form of documented medieval fisheries is to be clarified. It appears from the very limited evidence so far available that the regularly repaired, 'hedge' type fish weirs at Brean/Berrow Beach and at Stert Flats represent a different tradition, probably of post-medieval origin. There remains an urgent need to investigate the origins of stone built weirs in the estuary.

Material culture and materiality

Fragments of finely-woven baskets at Woolaston and Oldbury Flats may be remains of putt forewheels, putcheons and weels or frails, with thicker wattling from butts and kypes, the leaders or sails from fish traps and hurdle trackways. Withy ties are evident at Beachley, Woolaston, Hills Flats and Oldbury Flats, and modern wire putcher baskets lie abandoned near ranks south of Awre (Fig. 40) and at Hayward Rock. Late medieval and post-medieval pottery found at Beachley, Berrow Flats and Blue Anchor Bay was derived from pancheon-like vessels, perhaps used for a particular purpose by fishermen. At Aust/

Figure 40 Disused putcher rank and wire putcher baskets near Brims Pill south-west of Awre, Gloucestershire.

Oldbury Flats, the bowl of a late-nineteenth-century clay pipe was found near a putt rank just north of Littleton Warth, and at Hills Flats, two solid iron wheels and the axle of a cart sit on the foreshore next to remains of a putcher rank. Apart from the fishing structures themselves, this

paucity of material culture is a salutary reminder of how centuries of endeavour can leave relatively few traces. As sea level changes and erosion increases in tempo in the next few decades, then many of the features recorded by the Severn Estuary RCZAS will themselves disappear.

Taskscapes, communities and identities

There has been much recent discussion in archaeology, anthropology and history of 'senses of place' and the 'taskscapes' of people – their embodied, everyday experiences and routines embedded within the landscapes in which they dwelt (Ingold 1993, 2000). The fishing communities along the Severn possessed a stock of accumulated knowledge of salt marsh, foreshore, mud flats and beaches, along with understandings of movements of tides, currents and fish (q.v. O'Sullivan 2003, 465). Enormous time and effort was spent on constructing and maintaining stone fish weirs, as descriptions of the Welsh *goredi* suggest (Lewes 1924), whilst wooden fish traps and woven fish traps would have also required coppicing, trimming poles and stakes, and the construction of woven hurdles and baskets (Jenkins 1974a; Taylor 1974; Wymer 1948). The need to check many fishing structures at both tides would have necessitated long hours away from home. Favourite fishing stations may have been jealously guarded, and coupled with the illegal nature of some fishing and its unusual hours, it may have often been perceived as secretive or even semi-mystical.

Although some fishing folk might also have worked on local estates and manors, these embodied fishing-related practices would have set them apart from neighbours who laboured entirely in agriculture or industry (O'Sullivan 2003, 462). Together with the effort and pride in building and maintaining fishing structures, this would have provided fishing families and communities with powerful senses of self-identity, and those along the Severn may have had much in common with each other. Many fishermen in Cardiff Bay used to use mud-horse sleds similar to the mud-horses or slime mares of the Somerset coast (Jenkins 2009, 119), and during the 1930s many Somerset fishermen moved across to Wales, establishing for example a fishmonger's shop in Splott in Cardiff (B. Sellick *pers comm*).

Estuarine fishing communities would thus have had particular senses of place, memory and identity (O'Sullivan 2003). Some variations in form evident amongst the stone fish weirs of Somerset may be due to different local or family traditions. The unusual linear stone structures at Gore Point, Porlock have not been identified anywhere else within the project area, and the few stone fish weirs at Lilstock and Severn Beach were different in form from those at Minehead, Dunster Beach and Blue Anchor Bay. The stake-built V-shaped fish traps with circular catch baskets recorded along the middle Severn also seem to be a localised type. Some putt and putcher ranks were built amongst the remains of older structures, perhaps endowing fishermen with longer-term appreciations of time and history than many of their fellows (O'Sullivan 2003, 466). They would have become adept at recognising the small eroded stumps and fragments of hurdle and basketry from earlier structures, in a manner akin to archaeologists. Indeed, many old fishing structures along the Severn have been identified by modern fishermen such as the Black Rock Lave Net Fishermen's Association.

Further research into fishing and fishing structures along the Severn Estuary could explore such themes as the contrast between the ecclesiastical and lay elites who controlled many of the fish traps with those people who actually did the fishing (q.v. O'Sullivan 2003, 462); disputes between fishermen; official attempts to control fishing in the nineteenth and twentieth centuries and those who resisted and subverted this; the change from fish as a subsistence resource to a commodity within wider capitalist networks; and the development of salmon as a fish destined mainly for the tables of the middle and upper classes outside the region (see Turner this volume). There is much that is also relevant to modern communities along the Severn's shores. The impacts of increased flooding and erosion, the extinction of sturgeon and the dramatic decline in salmon, shad and eels – all have great resonance with current concerns for the changing environment of the River Severn.

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Table 3: Fishing terms used in the article

Fish weir/trap	Usually V-shaped barrier, constructed of stone, wooden stakes or hurdle panels, or a combination of these materials, designed to channel fish into a net or basket at the **gut** (see also Jecock 2011)[1].
Fixed engine	Official legal term for licensed **putt** and **putcher** ranks and **stop net** fisheries.
Flake	Landing stage used for **long netting.**
Frail	Rush basket used for transporting fish from the fishery (also widely used for other commodities).
Ground line gully	Narrow strip of beach perpendicular to the shoreline cleared of obstructions. Used for setting out lines of baited hooks.
Gut	Gap in fish weir arms, predominantly at the apex, where fish are trapped in a basket or net. Sometimes also referred to as the 'eye' (Jecock 2011)
Long netting	Form of land and boat based fishing where one end of the net is held on land, whilst the remainder is played out in a circle by boat, the far end then being drawn back in to land using manpower or a winch (for detailed description see Taylor 1974).
Mud horse	Wooden sled used to safely traverse mud deposits with fishing equipment and catches.
Net hang	Line of metal or timber posts supporting fixed vertical netting which is weighted along the base. Replaced traditional fish weirs in many areas from the late 19th century.
Putcheon	Individual eel basket, smaller than a **weel**, measuring *c*. 3ft 3ins (1m) in length with a mouth opening of c. 10 ins (0.25m). Baited and weighted with stones then attached to the bank and placed in the river (after Taylor 1974).
Putcher	Single piece woven basket 5-6ft (1.5-1.8m) in length, placed in long ranks of 3-4 tiers in height. Used to catch salmon only (after Taylor 1974). Introduced in the late 18th or early 19th century[2].
Putt	Complex three piece basket trap comprising a 'kype', 'butt' and 'forewheel' up to 6ft (1.8m) in diameter and 12-14ft (3.6-4.2m) in length. Used to form weirs in single tier ranks (after Taylor 1974). Probably of medieval origin.
Stop netting	Form of boat based fishing common in the upper estuary until recently (for detailed description see Taylor 1974).
Weel	Individual eel basket, larger than a **putcheon**, measuring *c*. 4ft 3ins (1.30m) in length with a mouth opening of c. 14 ins (0.35m). Baited and weighted with stones then attached to the bank and placed in the river (after Taylor 1974).

[1]The terms weir and trap have been used interchangeably in the past. Wooden v-shaped structures are referred to as traps in this article to distinguish them from stone weirs and the other types of wooden structure (mainly putt and putcher ranks), also commonly referred to as weirs.

[2]The term putcher is not post-medieval. It is mentioned in medieval documents, but in the 19th century it came to be applied specifically to baskets used in salmon fishing ranks. In the medieval period the terms putt, putcheon and putcher might have either been interchangeable, or might have reflected other differences between the structures that we are no longer aware of; they certainly weren't used in such a manner that we can be sure exactly what is being referred to.

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