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Severn Estuary Rapid Coastal Zone Assessment Survey

PHASE 2a Pilot fieldwork report

for English Heritage
(HEEP Project No. 3885)

Toby Catchpole and Adrian M. Chadwick

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Authors:	Toby Catchpole and Adrian M. Chadwick Archaeology Service Environment Directorate Gloucestershire County Council Shire Hall GLOUCESTER GL1 2TH
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Summary

This Project Report outlines the fieldwork undertaken for the Phase 2a pilot of the Rapid Coastal Zone Assessment Survey (RCZAS) of the archaeology of the Severn Estuary. It is to be submitted to English Heritage, together with an Updated Project Design for the full Phase 2 fieldwork project. The extensive project area includes both the 'right' bank and the 'left' bank of the River Severn in England, extending from Beachley near the First or 'Old' Severn Crossing up to Maisemore Weir north and upstream of Gloucester on the right side of the Severn, and from Maisemore Weir south-west to Gore Point, west of Porlock Weir in Somerset along the left coast. The area investigated includes the intertidal zone and foreshore at Lowest Astronomical Tide (Chart Datum), and extends 1km inland of the Mean High Water level. The total area covered by the survey is approximately 575km².

Phase 1 of the project comprised a desk-based assessment of information from the Marine and Terrestrial Archaeology Databases in the NMR; the National Hydrographic Office, Taunton; the Maritime and Coastguard Agency's Receiver of Wreck; County SMR/HERs, County Record Offices; aerial photographic collections and academic research papers. The Phase 1 assessment also included the analysis of aerial photographs and lidar data to confirm the location of known historical and archaeological features and to identify new ones. Field survey was considered necessary to:

- *Verify identifications made during the desk-based assessment;*
- *Locate and characterise sites and features undetected by the desk-based assessment;*
- *Determine the geomorphological/sedimentary context for features;*
- *Assess whether features are actively eroding;*
- *Selectively sample features;*
- *Test fieldwork methodologies and assess the practicalities and logistics of future fieldwork.*

Phase 2a consisted of an initial pilot fieldwork project, undertaken during April-June 2009. In addition to locating known sites and evaluating their current state of preservation, the fieldwork was able to identify and record several new archaeological features and findspots, including possible Neolithic peat deposits and associated faunal remains, and a wooden fish trap with possible contemporaneous early post-medieval pottery.

1 Introduction and project background

1.1.1 This Project Report outlines the Phase 2a pilot fieldwork phase of the Rapid Coastal Zone Assessment Survey (RCZAS) of the archaeology of the Severn Estuary, and has been prepared by Gloucestershire County Council Archaeology Service, on behalf of the relevant local authorities. It has been structured according to the framework set out in *Management of Research Projects in the Historic Environment* (MoRPHE: English Heritage 2006), *Commissioned Archaeology Programme Guidance for Applicants* (English Heritage 2002) and *A Brief for Rapid Coastal Zone Assessment Surveys v.10* (Murphy 2007).

1.1.2 Aims and objectives were drawn up with reference to *A Brief for Rapid Coastal Zone Assessment Surveys* (Murphy 2007) and in discussion with Buzz Busby, Vanessa Straker and Peter Murphy of English Heritage.

1.1.3 Phase 1 of the Severn Estuary RCZAS project resulted in an archaeological aerial survey as part of the National Mapping Programme (Dickson and Crowther 2008), an archaeological assessment of Environment Agency lidar data (Truscoe 2007), and a desk-based assessment of all known archaeology within the intertidal zone and its immediate hinterland (Mullin 2008). This Project Report outlines the methodology adopted and the results obtained from Phase 2a pilot fieldwork undertaken during April-June 2009. The results will inform future fieldwork during the main Phase 2 fieldwork phase, in addition to the management of the coastal archaeological resource by evaluating the nature of this resource and the ways in which it can be recorded and assessed.

1.1.4 The Phase 2a work also included an aerial photographic progression study of the early modern hulks and wrecks at Purton in Gloucestershire (Dickson 2009), and an update of the original phase 1 desk-based assessment (Mullin, Brunning and Chadwick 2009). These reports will also be submitted to English Heritage prior to the main Phase 2 fieldwork.

1.1.5 This Project Report comprises a brief summary of the research aims and objectives of the Severn Estuary RCZAS (see section 2 below); a brief summary of Phase 1 work (section 3); an outline of project interfaces (section 4); details of proposed communications and publications (section 5); a review of Health and Safety issues (section 6); an examination of the constraints on fieldwork (section 7); the Phase 2a project methodology (section 8); an assessment of the fieldwork methodologies and technologies (section 9); the archaeological results of the Phase 2a fieldwork (section 10), an assessment of archaeological potential within the RCZAS project area (section 11); and some initial proposals for the main Phase 2 fieldwork (section 12). A full bibliography is provided in section 13.

2 Research aims and objectives

2.1 SHAPE compliance

2.1.1 SHAPE (**S**trategic Framework for **H**istoric Environment **A**ctivities and **P**rogrammes in **E**nglish Heritage – April 2008) requires projects seeking English Heritage funding to identify a Primary Driver from those listed in 'Making the Past Part of Our Future' (English Heritage Strategy 2005-10), and an Activity Type, Research Programme and Sub-Programme from those listed in SHAPE.

2.1.2 The **Primary Driver** for the proposed project is Aim 4: "*Help Local Communities to Care for Their Historic Environment*", more specifically Aim 4a: "*Help local authority members and officers develop the skills, knowledge, advice and capacity to make the most of their historic environment*"

2.1.3 The **Activity Type** is 1. Research

2.1.4 The **Research Programme** is A2: "*Spotting the gaps: Analysing poorly understood landscapes, areas and monuments*"

2.1.5 There is a specific **Sub-Programme** detailed in SHAPE for Rapid Coastal Zone Assessment Surveys as reproduced in the table below:

Sub-Programme Name	**Rapid Coastal Zone Assessments: The historic environment in Shoreline Management Plans**			
Sub-programme Number	**41112.110**			
Corporate Objective	4A: Help local authority members and officers develop the skills, knowledge, advice and capacity to make the most of their historic environment			
Activity Type and Programme	RESEARCH A2: Spotting the gaps: Analysing poorly understood landscapes, areas and monuments			
Sub-Programme Description	Specific projects developing coastal and intertidal datasets for inclusion within local authority Shoreline Management Plans.			
Reason for EH Support	Critical requirement to build up evidence-base for littoral landscapes, structures, artefact or ecofact concentrations, and palaeoenvironmental resources to feed in to marine planning.			
Research categories	***NABS***	***SETI Primary purpose***	***Frascati Definition***	***Research Areas***
	1.2	B	Strategic-Applied	Humanities
Similar Sub-Programmes	Distinct from the seabed mapping and characterisation programmes as this specifically relates to audits to building into Shoreline Management Plans			

2.1.6 The fieldwork outlined in this Project Report meets the above through the accurate location and recording of known and new sites and the transmission of updated information to local authority records and Shoreline Management Plan (SMP) teams. This phase also specifically assesses methodologies that might increase knowledge of the archaeological resource in the intertidal zone and coastal hinterland of the Severn Estuary.

2.2 Project specific Aims and Objectives

2.2.1 The overarching aim of the Severn Estuary RCZAS project was outlined in the Phase 1 Project Design (Mullin 2005: 7):

- To provide an enhanced understanding of the resource in order to develop management and research priorities in respect of specific sites and areas of potential.

2.2.2 A more specific Aim of the Phase 2a pilot fieldwork stage was:

- To formulate and field-test a methodology for a survey-based Phase 2 of the RCZAS.

2.2.3 Following the results of the three Phase 1 assessment reports (Dickson and Crowther 2008; Mullin 2008; Truscoe 2007), and based on the English Heritage Brief for Phase 2 Field Assessment of RCZAS projects (Murphy 2007), the following Objectives were identified:

- To verify, characterise and assess archaeological sites or features previously identified as a result of the desk-based assessment reports, LiDAR survey results and NMP aerial photographic mapping;

- Locate, characterise and assess additional archaeological sites and features previously undetected by the desk-based assessments;

- Determine the geomorphological or sedimentary context for features where possible;

- Assess the degree of preservation of archaeological features, and whether or not they are actively eroding;

- To test fieldwork methodologies and data recording strategies, and assess the practicalities and logistics of future fieldwork.

3 Summary of Phase 1

3.1 Introduction

3.1.1 A desk-based Phase 1 of the RCZAS was undertaken during 2006 and 2007 (Mullin 2005, 2008). Three reports were produced during that phase:

- A Phase 1 report that provided a record of all known archaeology within the intertidal zone and its immediate hinterland, an assessment of current erosion patterns and threats this poses to the archaeological resource, an overview of coastal change from the Palaeolithic to the present day, and a list of sites which require further fieldwork investigation as part of Phase 2 (Mullin 2008). That document has now been updated following the completion of the Phase 2a pilot fieldwork phase.

- A National Mapping Programme (NMP) report (Dickson and Crowther 2008) covered the entire RCZAS area of 575km² (Figs 1 and 2). A total of 928 new monument records were created in the National Monument Record (NMR) AMIE database and 373 existing records were revised. During the early phases of the preparation of the Updated Project Design, only an interim report on this work was available (Dickson and Crowther 2007), covering areas of the 'left' and 'right' banks near Gloucester, and from Brean Down southwards. These areas were thus the focus of the Phase 2a pilot fieldwork. The area of the 'left' bank between the Second Severn Crossing and Brean Down (with the exception of Avonmouth and the wrecks at Purton; see below) should therefore be targeted for future survey in the main Phase 2 fieldwork.

- An assessment of Environment Agency lidar data was undertaken for two selected sections within the RCZAS survey area (Truscoe 2007), and the technique was recognised as being a useful complementary methodology to aerial photographic mapping and field survey.

3.2 Sites identified as requiring further study

3.2.1 The Phase 1 reports (Dickson and Crowther 2008; Mullin 2008; Truscoe 2007) listed types of features and some specific sites and areas where fieldwork could be potentially productive, and these were listed in section 3.2 of the Updated Project Design (Catchpole and Chadwick 2009a).

3.2.2 In addition, English Heritage recognised that two areas within the overall Severn Estuary RCZAS project area required further work:

- A short, stand-alone archaeological report should be produced on the wrecked and beached vessels at Purton using aerial photographs, NMP mapping and other Gloucestershire sources to examine how this group of vessels developed over time and provide baseline information for any future detailed assessment of these wrecks nationally by English Heritage. Such a wider national assessment is beyond the scope of this RCZAS project.

- In earlier drafts of the UPD it was proposed that a rapid assessment of aerial photographs could facilitate understanding of the development of Avonmouth during the 20th century. English Heritage decided that this was beyond the scope of a RCZAS, and would be better accomplished through Environmental Impact Assessments in advance of proposed developments in the Avonmouth area.

4 Phase 2a pilot fieldwork

4.1 Summary and reasons for pilot stage

4.1.1 RCZAS fieldwork has been previously undertaken in the coastal areas of East Anglia, North Kent and Dorset, and reports on this were utilised in the drawing up of the Project Design and in the planning of the fieldwork. There were several unknown aspects of working in the Severn Estuary, however, in part the result of the extensive survey area encompassing such a wide variety of archaeological features and landscape types and because of the huge tidal range and deep mobile mud banks to be safely negotiated. It was felt that there was a need for potentially different responses and methodologies to maximise results within a rapid assessment programme.

4.1.2 After discussions with English Heritage staff (mainly Buzz Busby, Peter Murphy and Vanessa Straker), it was therefore decided that a pilot fieldwork stage should be undertaken. The pilot stage aimed to assess the practical aspects of undertaking RCZAS fieldwork in the Severn Estuary in preparation for a much more extensive main fieldwork phase, and it would also act as a test run for the proposed handheld data recorder and GPS unit, its associated software and more conventional context sheets. Areas of the coastline were chosen that could act as representative samples of the archaeological and landscape character zones of the estuary.

4.2 Surveyed areas

4.2.1 The overall survey area for the Severn Estuary RCZAS runs from Maisemore Weir north of Gloucester along both banks of the Severn in England as far as Beachley Point, Tidenham on the north-west bank (hereafter referred to as the 'right' bank) and Gore Point, on the west side of Porlock Bay, on the south-east bank (hereafter referred to as the 'left' bank) (Figure 1). The agreed width of the survey area is from Lowest Astronomical Tide (Chart Datum) up to 1km inland of Mean High Water (Fig. 2). The total extent of the Severn Estuary RCZAS survey area is 575km^2.

4.2.2 For the purposes of the Phase 2a pilot fieldwork, the proposed survey areas were restricted to those sections of the Severn RCZAS previously covered in the interim NMP report (Fig. 2, Dickson and Crowther 2007). In addition, the majority of the Phase 2a fieldwork targeted the intertidal zone, as called for in the brief (Murphy 2007), as it is these areas that are most under threat from coastal change and that required the most careful consideration in terms of Health and Safety issues and the development of quick and efficient recording methodologies. In addition, a range of other coastal environments (e.g. rocky foreshore, salt marsh and salt grazing) and a broad geographic spread of target zones were also covered during the Phase 2a pilot survey project.

4.2.3 The following survey areas and landscape types were originally selected to be investigated during the Severn Estuary RCZAS Phase 2a pilot fieldwork:

Somerset

- Porlock Bay, to examine the submerged forest, aurochs findspot and fishing structures in the intertidal zone;

- Minehead Bay, to examine fishing structures recorded in the intertidal zone on the NMP;

- Bossington Hill, to locate and assess the condition of known prehistoric earthworks and the remains of Second World War structures in an area of upland heath;

- Watchet, to examine possible fishing structures identified from the shore in the rocky intertidal zone;

- St Audrie's Bay, to examine fishing structures and an area that has produced Pleistocene faunal remains in the intertidal zone;

- Doniford Bay, to search for any fishing structures or other archaeological features in the intertidal zone;

- Blue Anchor Bay/Dunster Beach, to examine and record in detail a selected area of fishing structures and other physical remains of fishing practices (stone hang net weights, linear stone clearance etc) previously identified during an initial site visit to the intertidal zone;

- Stert Flats and Berrow Flats, to examine selected fishing weir structures, wrecks and possible palaeo-environmental deposits in the intertidal zone, particularly any not recorded in previous surveys (e.g. Brunning 2008);

- The River Parrett, to try and identify any features along the west and east river banks and in salt grazing areas adjacent to the mouth of the river.

Gloucestershire

- Elmore, examining selected areas of river bank and salt grazing at Elmore, and particularly the 'Great Wall' earthwork;

- Guscar Rocks, examining areas of rocky foreshore in the intertidal zone;

- Lydney Harbour and Lydney Level, to examine and assess the condition of known wrecks located there, and to try and identify new features;

- Woolaston Pill, to examine possible structures and palaeo-environmental deposits in the intertidal zone;

- Oldbury, where palaeo-environmental deposits, prehistoric flintwork, faunal remains, footprints and animal tracks and Romano-British pottery has been recorded in the intertidal zone;

- Hawkins Pill near Newnham, to try and identify remains of a possible riverbank fish house; and a pasture field adjacent to woodland east of Bays Court and Bollow near Westbury-on-Severn, to verify a possible round barrow or windmill mound identified by lidar survey.

5 Communications and project products

5.1 Communications

5.1.1 Consultation, training and discussion sessions took place with Richard Brunning, Richard McDonnell, Nigel Nayling, Hazel Riley and Vanessa Straker.

5.1.2 Several progress meetings and numerous informal discussions were held with the English Heritage Project Assurance Officer (Buzz Busby) and other key English Heritage staff (mostly Vanessa Straker and Peter Murphy) during the pilot fieldwork.

5.1.3 Consultation meetings were arranged for the steering group created for Phase 1 of the RCZAS, comprising local authority curators and English Heritage curatorial and specialist staff. Further consultation was also carried out via e-mail requests for advice, and through the circulation of draft documents. A PowerPoint-based summary of the results of the Phase 2a pilot fieldwork was presented to a meeting of local authority curators and English Heritage staff at Shire Hall in Gloucester on August 24th 2009 when future work and the implications of second round of Shoreline Management Plans (SMPs) were also discussed.

5.1.4 Other organisations with an interest in the Severn Estuary were consulted and informed about the project, and relevant permissions obtained. These included Environment Agency staff and consultants producing SMPs, Natural England, the National Trust, the Ministry of Defence, the Coastguard and the Harbour Masters of Gloucester, Lydney, Watchet and Bridgwater. Other researchers with an interest in the Severn Estuary were notified, including John Allen, Michael Fulford and Professor Martin Bell of the University of Reading, and Paula Gardiner of the University of Bristol. Sian Rees of Cadw and Deanna Groom of the Royal Commission on the Ancient and Historical Monuments of Wales (RCAHMW) were also informed of progress. Contact was also maintained with interest groups such as the Friends of Purton and the Severn Estuary (nets and fixed engines) Fishermen's Association.

5.1.5 The principle formal method of sharing information with other researchers continued to be via the Severn Estuary and Levels Research Committee (SELRC), through papers delivered to its annual meeting – a summary PowerPoint presentation on the results of the Phase 2a pilot fieldwork was delivered at a SELRC meeting in Chepstow on the 7th November 2009. An interim paper on the Phase 1 and Phase 2a RCZAS work will be submitted to the journal *Archaeology in the Severn Estuary* early in 2010. This paper will form the main outreach product of the pilot fieldwork, and will comprise an introduction to the project methodology, together with a summary of the results of the NMP work undertaken during Phase 1.

5.1.6 The final version of this report will be circulated to English Heritage, the HER (Historic Environment Record) sections of Gloucestershire, South Gloucestershire, Somerset and North Somerset Councils, Bristol Council, Exmoor National Park and other relevant stakeholders. Documents will also be submitted to the Archaeological Data Service or another appropriate repository for digital archiving as directed by English Heritage.

5.2 Project products

5.2.1 At the end of the pilot fieldwork an Updated Project Design was produced for the main Phase 2 field survey (Catchpole and Chadwick 2009b), incorporating changes in methodology and addressing the issues and problems highlighted by the initial fieldwork as set out in this report.

5.2.2 The Phase 2a work also included an aerial photographic progression study of the early modern hulks and wrecks at Purton in Gloucestershire (Dickson 2009), which is currently being revised to include further information made available by the Friends of Purton.

5.2.3 The Phase 1 desk-based (Mullin 2008) report was also substantially revised and updated based on the availability of the full RCZAS NMP (Dickson and Crowther 2008), SWARF (Webster 2008) and draft second round SMPs, with additional data and references added (Mullin, Brunning and Chadwick 2009).

6 Health and Safety

6.1 Risk management strategies

6.1.1 A series of working practices were adopted to minimise the risks from the potential Health and Safety hazards identified in the Updated Project Design for the pilot fieldwork (Catchpole and Chadwick 2009a). Richard Brunning, Richard McDonnell; Nigel Nayling and Vanessa Straker were all consulted in this regard, as was Neil Chatten, the Gloucestershire County Council Health and Safety advisor responsible for the Environment Directorate.

6.1.2 The relevant Coastguard station (Swansea) was always notified prior to staff entering the intertidal zone, and following their safe return to shore. The Harbour Masters' offices at Lydney, Watchet and Bridgwater were also contacted prior to the commencement of survey work in the intertidal zone of their areas, and they were also consulted about local tidal stream conditions.

6.1.3 A series of forms were produced to help minimise and manage risk (Appendix A). A generic risk assessment of fieldwork tasks was produced. Survey sites were always visited in advance and potential hazards noted on a site specific assessment form. This was a 'tick-list' type form, drawn up to ensure that all necessary pre-survey safety checks were made, including tide and weather conditions, safe working window times, Coastguard and GCCAS office contact telephone numbers, and any relevant landowner permissions. Access points and rights of way were also identified along with parking, toilet and other welfare facilities, and the nearest Accident and Emergency hospital departments. The type of terrain to be covered was included in the assessment of each survey location in advance of fieldwork. The information collected was summarised on a survey log form, which required further details to be completed on-site on a daily basis.

6.1.4 Tide tables were consulted during the detailed scheduling of fieldwork in order to timetable the optimum periods for access to foreshores and intertidal zones, and survey work was usually designed to follow the tides out. Both Arrowsmith printed tide tables and the BBC online tide tables (www.bbc.co.uk/weather/coast/tides) were used for this purpose. Local wind and weather conditions were also monitored to ensure the safety of staff.

6.1.5 The time taken to walk to sites was often difficult to predict in advance due to the variability of ground conditions, and the amount of surveying and recording kit being carried. When walking transects parallel to the coast, it was important for fieldworkers to remember that the way back to shore would not necessarily take the same time as the route walked out, and extra time was allowed for this as a sensible safety precaution. This was the case at Oldbury Flats, for example. Project staff members were also made aware of the potential threat of headlands cutting off retreat or limiting communications. Local knowledge was sought wherever possible – for example, there is only one safe route out onto Stert Flats, whilst walking conditions at Berrow Flats varied greatly.

6.1.6 Staff remained in visual and audible contact with at least one other member of staff at all times, and for intertidal survey a team of three was utilised, although a team of two sufficed for riverbank, upland heath and salt grazing areas.

6.2 Health and Safety equipment

6.2.1 The following equipment was deemed essential for the Phase 2a pilot field survey:

- A daily safety plan including tide times and emergency plan with arrangements and contact details;
- A charged satellite telephone and a charged mobile telephone;
- An accurate waterproof watch;
- Paper maps and waterproof map cases in case of IT failure;
- First Aid kit;
- Washing solution/eye wash;
- Antiseptic wipes;
- Clean water and towels, and;
- Access to suitable welfare facilities.

6.2.2 In addition, every team member had access to the following clothing and equipment:

- Wet weather gear, in a lightweight breathable fabric;
- Breathable thermal base layers suitable for winter or summer work;
- Safety Wellington boots;
- Self-inflating lifejackets to British Standard EN 394:1994 with a buoyancy of not less than 100 Newtons, and with built-in harnesses suitable for helicopter or boat recovery;
- High-visibility clothing if necessary;
- Sunscreen and hats where necessary;
- Compasses;
- Signal flares;
- Throwing strops (for pulling out stuck team members);
- Whistles.

6.3 Marine VHF radio versus satellite telephone

6.3.1 Initially, a handheld Marine VHF radio was costed into the Updated Project Design, and applications were made to Ofcom for the relevant free licenses. GCCAS also booked a training day with a local Royal Yacht Association-affiliated trainer, who then informed us that according to new guidelines we were no longer allowed to use these radios. HM Coastguard was contacted to clarify this, but their officers were not aware of this change. On further direct enquiry with Ofcom, one of their staff members stated that we would need a Coastal Radio License, and agreed that a Marine VHF radio would be essential for Health and Safety reasons if a mobile telephone signal was blocked by cliffs, headlands or buildings. When a contact at Ofcom headquarters was e-mailed to confirm this, however, they later telephoned back and stated unequivocally that unless GCCAS staff would be on a boat, they were not allowed to use these radios at all. Ofcom instead suggested that GCCAS use the SPOT tracking system. This can send an e-mail or text message to chosen recipients with a link to Google Earth or the emergency services with position co-ordinates.

6.3.2 GCCAS then contacted Anthony Firth, head of Wessex Archaeology's marine section, about the use of handheld Marine VHS radios but he was unaware of any change to the Ofcom regulations. As Wessex coastal and maritime survey teams undertake a large amount of boat-based work, however, this is still standard kit for them.

6.3.3. HM Coastguard was contacted once more for their advice on SPOT, and one of their officers warned GCCAS staff that SPOT was *not* a reliable or convenient system. Users' information has to go via operators based in the United States, and the possibilities for confusion during this process would appear to be great. Coastguard staff therefore recommended the use of a handheld satellite telephone, and for the purposes of the Phase 2a pilot project, one was rented from a suitable vendor. It was relatively small and lightweight. This seemed to be a satisfactory solution, although mobile telephones seemed to work in most areas other than Porlock Weir and thankfully the satellite phone was not used other than to check it worked on receipt. A satellite telephone would thus be a key item of equipment for the main Phase 2 survey.

6.4 Assessments of Health and Safety equipment and methodology

6.4.1 There were no Health and Safety incidents during the duration of the Phase 2a pilot fieldwork, although deep sucking mud was encountered in places at Guscar Rocks, Lydney Harbour, Berrow Flats and Oldbury Flats, and staff consequently retreated from these localised soft areas. Although they were carried on each visit to the intertidal zone, it was fortunately not necessary to use either the throwing strops or the flares.

6.4.2 There is no doubt that wearing Wellingtons, salopettes, waterproof coats and self-inflating lifejackets whilst carrying equipment in waterproof rucksacks often felt bulky and uncomfortable. Nevertheless, in hot weather GCCAS staff members were able to strip down to wickable T-shirts and shorts. In wet and windy weather however, the waterproof clothing kept survey team members warm and dry, and the lifejackets provided added reassurance. Sealskin socks were found to be very effective if water overtopped Wellington boots. The sensible compromise reached was that GGCAS staff wore clothing appropriate to the conditions, but lifejackets and other equipment were always carried in case of emergencies and changing weather conditions. The waterproof rucksacks proved to be particularly useful items of kit. Separate high visibility clothing was not thought to be necessary during the Phase 2a surveys, as the waterproof clothing that had been purchased was in bright colours and also had built-in reflective panels and 'high-viz' hoods.

6.4.3 The daily check-in with the Coastguard worked well, and their staff members always seemed pleased that they had been notified.

6.4.4 At Berrow Flats, use of the Burnham-on-Sea hovercraft allowed team members to visit with confidence archaeological features such as fish traps and peat deposits that were quite far out from the shore, and to progress across mud that was in places very deep and soft. It also saved a tremendous amount of time and effort by greatly reducing the need to walk for long distances. The use of a hovercraft or other vehicle would be particularly advantageous in future Phase 2 fieldwork, especially if there was a need to take wood and peat samples for dendrochronological and radiocarbon dating and palaeo-environmental analyses. Due to the size restrictions of the Burnham-on-Sea hovercraft cabin, however, for this form of survey and sampling work two rather than three team members might be more appropriate. The cost and efficiency of options for vehicles to assist the team in the areas of the estuary with the greatest tidal range are explored in the UPD for the main fieldwork phase (Catchpole and Chadwick 2009b); it is likely that cost considerations will preclude any more than very occasional use of hovercraft.

7 Constraints

7.1 The availability of NMP data

7.1.1 The pilot fieldwork was only undertaken in areas covered by the interim Severn RCZAS NMP report (Fig. 3, Dickson and Crowther 2007), which was all that was available when the UPD for the pilot fieldwork was first drafted. This encompassed those parts of the survey area south of Brean Down, and those areas covered by the Forest of Dean NMP Project, which included most of the survey area from Beachley and Thornbury northwards, apart from three small blocks on the left bank around Oldbury-on-Severn, Berkeley and Slimbridge.

7.1.2 The riverbank, coastline and intertidal areas from Arlingham southwards including Avonmouth, Portishead, Clevedon and Weston-super-Mare, with the exception of an area of Oldbury Flats visited on a training day with Vanessa Straker, were thus not examined at all during the Phase 2a pilot fieldwork. These will therefore require much more work during the main Phase 2 fieldwork. Some previous survey work has been undertaken at Gravel Banks, Severn Beach and Oldbury-on-Severn (Riley 1998a, 1998b, 1999), and around English Stones/Second Severn Crossing (Allen 2005), where medieval, post-medieval and early modern fish weirs and putcher ranks have been recorded, but further fieldwork here would compliment proposed work on fish traps in Blue Anchor/Minehead Bays. At Oldbury Flats, prehistoric peat deposits, Mesolithic and Neolithic artefacts, human and animal tracks have also been found (Brown 2007a, 2007b; Straker in Riley 1999), as well as Romano-British artefacts and structural finds. The archaeological potential of many of these areas is therefore quite high.

7.2 Environmental designations

7.2.1 Numerous statutory designations apply within the Severn Estuary, giving it one of the highest levels of protection in the United Kingdom, and these cover most of the Severn RCZAS survey area. These include Sites of Special Scientific Interest, Special Areas of Conservation, Special Protection Areas, Ramsar sites, Areas of Outstanding Natural Beauty (AONB), and a National Park. These different designated areas were illustrated in the Updated Project Design for the Stage 2a pilot fieldwork (Catchpole and Chadwick 2009a). It was recognised as essential that working methods were employed that minimised any disturbance to plant and animal communities in the intertidal zone, salt marsh and grazing land behind. These categories formed all of the RCZAS survey area outside built up urban land. Charlotte Pagendam, the Natural England Severn Estuary Officer and her colleague Bob Corns were contacted for information and advice regarding fieldwork. Based on the methodology proposed, they agreed to issue blanket permissions for fieldwork provided that none took place during December and January in the area between Stert Island and Fenning Island, and that details of proposed visits to particular areas were forwarded to them in advance.

7.3 Landowner permissions

7.3.1 The Crown Estate owns approximately 55% of the intertidal foreshore nationally. The Managing Agent for the marine estate over the entire Severn RCZAS survey area is Knight Frank, Bristol. Christopher Smith at Knight Frank was contacted and provided permission to access Crown Estate land. The National Trust's Somerset and Devon Archaeology Officer Shirley Blaylock was also contacted regarding fieldwork in Porlock Bay, although in the event NT land was not visited there.

7.3.2 Defence Estates confirmed their landowning in the survey area (Beachley, south of Portishead and St Thomas' Head), but these areas were not visited as part of the Severn Estuary RCZAS Phase 2a pilot fieldwork.

7.3.3 Initial enquiries were also made to the Commercial Services department of the Land Registry in order to try and obtain information concerning the names and address of private landowners within the Severn Estuary RCZAS study area. ESRI ArcMap GIS Shape files of the absolute minimum survey area (comprising the intertidal zone up to the immediate foreshore) were sent to their Merseyside offices, but they quoted a £400 information extraction fee, plus a charge of £2 per record for each separate land title under their Polygons service, rising to £3 per record for their Polygons Plus service – only the latter actually provides the names and addresses of the landowners concerned. Such charges would have amounted to several thousand pounds, and were far too great for the budget of the Phase 2a pilot fieldwork. The main Phase 2 Project Design may have to take these costs into account, however, at least for some areas.

7.3.4 In the event, all of the areas visited during the pilot Phase 2a of the Severn Estuary RCZAS were publicly accessible from footpaths, harbours and/or car parks.

7.4 Other constraints on field survey work

7.4.1 Past or present military bombing or firing ranges are present at Aust, Brean Down, Stert Flats, Lilstock (disused) and between St Thomas' Head and Kingston Seymour in Woodspring Bay (in use). Defence Estates (Michael Russell at Tidworth) provided mapping of their current land holdings in the survey area and were consulted regarding access and hazards represented by former military use. These areas were not visited as part of the pilot Phase 2a of the Severn Estuary RCZAS, but will be an issue for the main Phase 2 fieldwork.

7.4.2 Additional constraints were presented by the physical environment and restrictions encountered at some of the survey areas, detailed in section 9.1 below; and also by the limitations of the handheld digital recording unit and associated software, discussed in section 9.2.

7.4.3 Unexpectedly large amounts of GGCAS staff time was taken up in dealing with initial enquiries from other organisations regarding strategic projects along the English shoreline, as the dissemination of information regarding the Severn Estuary RCZAS project through the Severn Estuary Forum and other outlets has made GGCAS something of a 'first stop' for general information. In particular SMP consultations involved the repeated supply of data, checking of numerous lengthy documents from which heritage assets had been missed and the attendance of meetings in remote locations. There have also been many general enquiries regarding the Purton hulks.

7.4.4 The revisions of the Phase 1 report took longer than expected, largely because of the many changes to the nomenclature and boundaries of Policy Unit areas introduced as a result of the updated Shoreline Management Plan consultancy documents (SMP2s) (Atkins Ltd 2009; Halcrow Group Ltd 2009). These SMP Policy Units may even be revised again for a second time following stakeholder feedback, once the consultancy period ends in January 2010.

8 Methodology

8.1 Methodological guidance

8.1.1 The Phase 2a pilot fieldwork followed the methodological guidelines outlined in version 10 of the English Heritage Brief for RCZAS projects (Murphy 2007), and these were reiterated in the Updated Project Design (Catchpole and Chadwick 2009a). It was also informed by the Phase 1 desk-based assessment (Mullin 2008) and the results of the Severn Estuary National Mapping Programme (Dickson and Crowther 2007, 2008).

8.1.2 As recommended in the English Heritage brief (Murphy 2007), during the Phase 2a pilot stage both open coast and upper estuarine areas were targeted, and although the work concentrated on the intertidal zone, other landscape types were also selected for fieldwork. In addition to recording and mapping some previously unknown features, several known features (such as fish weirs in Porlock Bay and at Culver Cliff, and Second World War military features on Bossington Hill) were therefore targeted in order to assess and photograph their current state of preservation, and to enhance their existing HER entries.

8.1.3 One small section of a wider area with large numbers of archaeological features (Dunster Beach/Blue Anchor Bay) was selected for more intensive survey and recording. This was not only to field test the written context sheets developed specifically to record such features as stone weirs, net hangs and ground line gulleys, but also to provide a guide as to how long such detailed archaeological recording takes, so that reliable estimates can be drawn up for future Phase 2 fieldwork in such areas of dense features.

8.2 Updated NMR and HER data

The NMR record for the RCZAS survey area was significantly enhanced by Phase 1 of the Severn Estuary RCZAS, and the HER and SMR data was similarly updated. These updated records were therefore requested from the NMR and HER/SMRs and loaded onto the project GIS prior to the commencement of Phase 2a pilot fieldwork. Due to technical software difficulties, however, it was not possible for the survey team to access most of the data in the field (see section 9.2 below), although this information was printed out beforehand, along with colour versions of the GIS mapping with NMP, NMR and HER/SMR features and findspots.

8.3 Preparatory and desk-based tasks

8.3.1 As outlined in sections 6.1 above, a risk assessment of each site or area to be surveyed was undertaken, initially through study of imagery on Windows Live Search and the project GIS, and then through preliminary site visits. This introductory work identified access points and rights of way, possible hazards, parking and toilet facilities, and the nearest Accident and Emergency hospital departments. The type of terrain to be covered was included in the assessment of each survey location carried out in advance of fieldwork, along with the reasons why each area was selected (for example, to examine fish weirs, or to investigate areas of submerged forest) (Appendix 1).

8.3.2 The draft list of areas or sites to be visited during the Phase 2a pilot fieldwork was circulated in advance to English Heritage staff and other relevant stakeholders for comments, and several amendments were made following their advice.

8.4 Staff training

8.4.1 The fieldwork staff received the following training and familiarisation sessions prior to or during the course of Phase 2a pilot fieldwork:

- Hazel Riley of English Heritage demonstrated the use of the Trimble GeoXT and GeoBeacon GPS and handheld data-logging equipment, and introduced the survey team to the archaeology of Lilstock Bay;
- Nigel Nayling of the University of Wales, Lampeter briefed staff about general issues relating to fieldwork in the intertidal zone, in addition to providing training in identifying tree species and assessing the dendrochronological potential of wooden structures, and recording timbers and wrecks;
- Richard Brunning of Somerset County Council, Buzz Busby of English Heritage, Richard McDonnell and Vanessa Straker of English Heritage provided insights and guidance regarding the identification and recording of areas of submerged forests, peat deposits and/or fish weir and fishing structures; and also introduced the survey team to the archaeology of Porlock Weir and Porlock Bay, Berrow Flats, Stert Flats, Oldbury Flats and Dunster Beach/Blue Anchor Bay.

8.4.2 In order to lead the field survey team, Adrian Chadwick received three-day First Aid at Work training in order to renew a lapsed certificate, and also underwent Designated Risk Assessment and ESRI ArcMap GIS training. All staff were briefed in detail on the hazards of inter-tidal working.

8.5 Recording methodology – introduction

8.5.1 Following recommendations from the Head of English Heritage Technical Survey Trevor Pearson, it was decided that the basic technique and equipment used during the Severn Estuary Phase 2a pilot RCZAS would consist of the Trimble Geo XT handheld data logger and GPS loaded with base map, NMP, NMR and HER/SMR data. The Trimble GeoBeacon was used as a real-time differential correction source to provide the necessary accuracy with the Egnos satellite available as backup. The Trimble Geo XT, GeoBeacon and WorkFlow software were hired from a commercial equipment supply firm.

8.5.2 The Norfolk Archaeological Unit context sheet (NAU 2005) was used as the basic template for a paper version of a manual survey sheet specifically devised for the Severn Estuary RCZAS (Appendix B) and digitised for use on the Geo XT as data fields linked to GPS survey Shapefiles. This was also based on comments outlined in a review of previous RCZAS methodologies (Merritt and Cooper 2005), and paper versions were carried in the event of equipment failure, and/or to record certain features such as stone piles and net hangs in more detail. Another paper recording sheet was devised specifically to record timber structures and wrecks in greater detail (Appendix B), following advice from Richard Brunning, Buzz Busby and Nigel Nayling. Draft copies of these recording sheets were circulated for comments and criticisms prior to the final versions being printed for use in the field. There was space on both the paper recording sheets and the digital versions for free text descriptions of identified features.

8.5.3 The landscape and feature descriptions on the two sheets incorporated many terms derived from the National Monuments Record Thesaurus of Monument Types and INSCRIPTION word lists, and were intended to be compatible with NMR, HER and SMR databases. Both types of sheet were used during the Phase 2a fieldwork. It was originally intended that cell, sub-cell and PMU units were to be added to site identifiers (Mullin 2008: section 14), but in the event the revised Shoreline Management Plan 2 Policy Units were not available in time for fieldwork.

8.5.4 Standard GCCAS film planning sheets were also carried in case sketches or rapidly measured plans were required for more complex features that could not be adequately surveyed using the simple point, string and polygon formats available with the GPS. These film sheets were not utilised, however, during the course of the Phase 2a fieldwork.

8.5.5 Digital photographs of features and areas were taken with a shock and water resistant Ricoh 600SE camera., Photographs were automatically georeferenced via an inbuilt GPS module and were capable of being linked using a Bluetooth connection and FotoFlow software to the data and survey records for each feature. As many non-record specific photographs were taken, however, it was not possible to link the photographs to the database until the record-specific photographs were separated from the overall digital photographic archive. It was possible using FotoFlow to display accurate positional information for the photographs on GIS, along with their orientations, with one or two notable exceptions. One photograph taken close to the base of a cliff east of Lilstock Harbour, for example, was transposed into the middle of the Bristol Channel (see Figure 3).

8.5.6 The RCZAS brief required that the geomorphological and sedimentary context of features should be recorded. A Van Walt gouge auger was purchased for this purpose, but during the Phase 2a pilot the only times this was actually used were at Stert Flats and Oldbury Flats. It was also suggested that quickly-dug spade slots would also be an effective method of ascertaining the nature of underlying sediments (Richard Brunning pers. comm.).

8.6 Recording methodology – digital records

8.6.1 During the drafting of the UPD and pilot fieldwork planning stage, it was hoped that use could be made of the trackplot facility of the GPS to produce 'snail trails' indicating the areas that were actually traversed during field visits by recording the location of the surveyor at set time intervals. This would be useful in assessing the areas covered and the efficiency of attempting to walk transects in difficult conditions. In the event, however, it proved too time consuming switching between modes for efficient use of this facility in between making survey records and it was not used during the Phase 2a pilot fieldwork.

8.6.2 Extensive use was made of digital photography during the Phase 2a pilot fieldwork, with some very modern features (such as net hangs formed by metal scaffolding poles) recorded solely using digital images. The GPS camera was found to be an excellent method of very rapidly recording and locating features that either didn't merit the time taken to record fully or when incoming tides or equipment failure made full recording difficult.

8.6.3 Wherever possible, time constraints permitting, a site record was generated for each feature or deposit identified or visited during the Severn RCZAS Phase 2a pilot fieldwork. Each record included a unique identifier, a feature description, and photographic references. Site conditions and an estimate of stability or vulnerability to erosion were also recorded. When the GPS and handheld data-logger were working correctly, a co-ordinate was taken with a differential correction (DGPS) to improve the accuracy of data to ± 1m. The brief only required accuracy to ± 3m (Murphy 2007).

8.6.4 It became clear during the pilot fieldwork that complementary written records were essential for the recording of complex assemblages of features.

8.7 Sampling and artefact retention

8.7.1 Richard Brunning and Vanessa Straker advised that samples suitable for wood species ID and potential radiocarbon dating should be taken wherever possible during the

pilot fieldwork, as these would be relatively small and portable. Especially when visiting remote and rarely accessed sites not taking samples would be missed opportunities. Only very limited sampling took place during the Phase 2a pilot fieldwork stage, of structures at Berrow Flats and Stert Flats. In line with the RCZAS brief (Murphy 2007: 6.12), the collection of artefacts was also kept to an absolute minimum.

8.7.2 In the event, some wood samples for species ID and possible future radiocarbon dating were taken from structures at Berrow Flats and Stert Flats, whilst animal bone stained black by peat and found in association with previously unrecorded peat deposits at Berrow Flats was also retained for species ID and possible radiocarbon dating. Late medieval/early post-medieval pottery possibly associated with an unusual form of V-shaped fish weir at Berrow Flats was also recovered, on the advice of Richard Brunning.

8.7.3 The wood samples that were taken by Richard Brunning are held by GCCAS at their finds store at Kingsholm in Gloucester. The pottery and the animal bone found at Berrow Flats are also being held at Kingsholm.

9 Fieldwork assessment

9.1 Access issues

9.1.1. There were several instances during the RCZAS Phase 2a pilot fieldwork where deep sucking mud prevented safe access to archaeological features – this occurred at Guscar Rocks, Lydney Harbour, Berrow Flats and Oldbury Flats, and along the banks of the River Parrett. Sometimes it was possible to predict these conditions in advance – the mud thickening towards the sides of the channel of Grange Pill near Guscar Rocks, for example. Experts such as Richard Brunning and Nigel Nayling confirmed that to actually enter such riverbanks and channels on foot would be foolhardy in the extreme, as the mud is usually at its deepest within them, and there would be considerable difficulties experienced in leaving these areas. A potentially useful function of handheld data logger equipment is the possibility of linking it to a laser rangefinder in instances where no direct measurements are possible because features are inaccessible. Through taking 'offset' measurements using a laser linked to the GPS at a position where a clear signal is achievable, it is thus still possible to take accurate georeferenced survey readings. This facility would be extremely useful for surveying features located on riverbanks where deep sucking mud prevents direct access, or for recording shipwrecks from a safe distance to avoid the tidally scoured area around them. In the future, use of a laser rangefinder coupled to a handheld GPS data logger may therefore allow features within 100m of solid ground to be more accurately located (see the Updated Project Design for the main Stage 2 fieldwork, Catchpole and Chadwick 2009b).

9.1.2 At Lydney Harbour, in one area south of the harbour just below where most of the wrecks were located, deposits of fine sucking mud actually became unexpectedly thicker the further up the shoreline one progressed. Further out in the intertidal zone, the deposits were firmer mud or sand. The softer, finer deposits seem to have been 'banked' up against the shore by currents, and survey staff progressing along the lower part of the intertidal zone found that they could not move directly up the shoreline and gain access to the wrecks. Instead, survey team members had to leave the intertidal zone altogether, and then approach the wrecks from the dryland and shore above.

9.1.3 There were some areas which had been planned to be visited during the Phase 2a pilot fieldwork that were not accessible through public tracks, paths and other rights of way. These included Horse Pill, Woolaston Pill and the possible windmill mound or round barrow at Bollow near Westbury-on-Severn. For the Phase 2a pilot fieldwork this was not considered a problem, but for the main Phase 2 Severn Estuary RCZAS fieldwork therefore, landowners' permission will have to be sought in order to gain access to these areas. It is likely that other foreshore areas in or near locales such as Beachley, Sedbury, Purton Manor, Gatcombe, Awre, Longney, Arlingham, Sharpness, Oldbury Flats, Old Passage, Gravel Banks, Portishead, Woodspring Bay, St Thomas' Head and Middle Hope will also require access permission from private landowners and/or firms.

9.1.4 In Somerset, very small bays at Selworthy Sand and Greenaleigh Point between Minehead and Porlock Weir can only be reached via very steep footpaths leading down through narrow combes. This increases the potential danger to staff of being cut off by rising tides, or the risk of injuries due to trips and falls, particularly when staff are tired after the completion of survey work. Some of these more specific areas may thus require additional careful planning and risk assessments before any access can take place during the main Phase 2 survey.

9.1.5 On the morning of Friday 24th April, the survey team was supposed to meet with Richard Brunning at St Audrie's Bay so that he could demonstrate the position of a findspot of mammoth remains, and also the location of further fish weir structures. Unfortunately, due to confusion by Adrian Chadwick over the correct map locale and where to park, the

survey team actually visited part of Helwell Bay/Doniford Bay instead. Several previously unrecorded timber post-built features of relatively modern date were identified, but it was clear that most of this area was devoid of archaeological interest. Although this was an unfortunate missed opportunity to examine St Audrie's Bay, at least this means that the Helwell Bay/Doniford Bay area will probably not have to be visited again during the main Phase 2 RCZAS project.

9.2 Recording and IT issues

9.2.1 The digital recording equipment and software used during the pilot fieldwork was found to be more complicated to use and slower in operation than expected and prone to refusing to operate at all. It should be noted however, that those contacted before the project phase commenced had used similar equipment successfully and it therefore seems possible that a less than fully functional unit had been supplied. This issue should have been easily resolvable but the company from whom the equipment was hired was repeatedly contacted regarding various matters but despite support services being included in the hire charge, failed to reply to e-mails or telephone messages. It is likely that most if not all of the issues highlighted below could similarly have been resolved if the support paid for had actually been made available.

9.2.2 Despite assurances from the salesman that the handheld GPS and accompanying software was almost as easy to install and use as 'plug in and go', this proved not to be the case at all. Many days of GGCAS staff time were wasted trying to get the software to install and function properly. There were also considerable problems experienced in getting the underlying map and HER/NMR data to install and display correctly. All this ate into the time allocated for familiarisation and team member training and contributed to later difficulties with problem resolution.

9.2.3 With help from the GCC IT department, some OS mapping was eventually loaded and operated correctly in the field. It proved difficult to load most HER/SMR/NMP records onto the handheld unit, however, and it was very slow to turn these on and off. Paper printouts were found to be a far more reliable alternative. Consequently, only on a few occasions could GGCAS survey staff navigate directly onto known archaeological features using the GPS. This was rarely a problem during the pilot phase, but in the main Phase 2 fieldwork this will be absolutely imperative in order to avoid any duplication of records in areas such as Minehead Bay, Blue Anchor Bay, Berrow Flats and Stert Flats. Here there are many features that are overlapping with one another or very close to each other.

9.2.4 The handheld GPS unit was found to be unreliable in the field. Sometimes the GPS only worked intermittently, and kept losing its satellite fix even in open areas in clear conditions. The unit then had to be frequently restarted, which was not a rapid process. More seriously, the Z or height co-ordinates displayed on the GPS handheld were clearly inaccurate by the order of *c*. 60m, and none of the calls to the supplier regarding this issue were returned. Furthermore, despite being clearly displayed on screen these Z co-ordinates were not logged in the Fastmap records, and thus there is no height data available for any records made during the Phase 2a fieldwork. This information appears to have been lost. When attempts were made to correlate displayed Z co-ordinates with known benchmarks in Gloucester city centre, it was apparent that even if the files could have been located, they did not have a consistent inaccuracy that could be retrospectively recalibrated.

9.2.5 Although it was relatively simple to create pull-down menus for the recording, they were found to be slow to access and work through in the field, reducing the amount of survey work that could be undertaken. On return to the office records had to be downloaded to and opened from the unsecured hard drive on office PCs, as the time delay caused by downloading to or opening files from network servers caused the software to crash. Records were also abbreviated and information lost when converted into other formats for display and dissemination and had to be re-written manually. Further time was taken up in adding revised SMP Process unit boundaries to the records and in checking HER/SMR and NMR numbers on GIS, as these could not always be checked with certainty in the field (see 9.2.3).

9.2.6 In conclusion, other digital recording equipment suppliers will be sought for the main Phase 2 survey. Paper recording was found to be an acceptable alternative but the speed

of recording will need to be improved for future work, and less reliance placed solely on digital equipment. The essential aspect of digital recording in RCZAS fieldwork is the accurate surveying of the location and extent of archaeological features through GPS and equipment searches should concentrate on this function. It is suggested that a mixture of digital, hand written and voice recording that could be combined off site would allow for a more rapid survey to be made within short tidal windows, and would utilise the number of staff present more efficiently. The paper records made during the pilot allowed essential further information and context to be recorded and a methodology that allows these to be efficiently combined with digital records for dissemination back to HERs and the NMR will be required in future. In addition, resources could have been more efficiently expended if communication between other RCZAS archaeological survey teams had been available. Thanks however, must go to Trevor Pearson and Hazel Riley of English Heritage for their time, help and advice.

9.3 Training issues

9.3.1 Although the training given to members of the GCC survey team in terms of maritime and coastal archaeology was found to be very useful, with hindsight more would have been requested especially regarding the use of handheld GPS equipment and the associated specialist software, and other more general factors such as understanding tides. It was felt that lack of detailed knowledge of tides caused the team to return to the shore too soon after low tide times, reducing the amount of surveying possible. On the recommendation of English Heritage advisors (Buzz Busby and Trevor Pearson), Hazel Riley of English Heritage's Exeter office was contacted to provide training in the use of the GPS kit. She very generously gave up one day of her time to meet up with GCCAS staff at Lilstock for preliminary training on the 18th March 2009 (**Plate 1**). Although this was potentially a useful session, when the GPS unit that had been ordered arrived, it was a 2008 series that was rather different to the older English Heritage equipment that Hazel had demonstrated. GCCAS survey staff would have welcomed at least 3 days worth of training on the handheld data logger and GPS equipment, particularly with regard to trouble shooting when problems arose, as they subsequently did in the field.

9.3.2 A training session with Nigel Nayling at the Newport Ship Centre and on the Gwent Levels in Wales on Thursday 9th April proved to be extremely useful. He not only provided guidance in how to distinguish between different wood species in waterlogged conditions (**Plate 2**), but also showed GCCAS staff the best way to move on foot across slippery and/or sucking mud, and gave tips on how to spot quicksand and avoid scouring holes full of soft sediment around wrecks. He also provided details of wood conversion techniques, and about the types and probable dates of hulls and timber structures likely to be encountered.

9.4 The use of a hovercraft

9.4.1 During the Phase 2a pilot fieldwork at Bridgwater Bay/Berrow Flats, GCCAS survey team members were granted the use of one of the Burnham-on-Sea Area Rescue Boat (BARB) hovercraft *Spirit of Lelaina*, a BBV-6 (Bill Baker Vehicles) machine that can seat 5-6 people including the pilot and a coxswain. This had been proposed in the Phase 2a Updated Project Design (Catchpole and Chadwick 2009a: 20-21), and the survey work was intended to run parallel to routine training flights undertaken by the BARB crew. The use of this machine for two days by the GCCAS survey team highlighted a series of advantages and disadvantages that can be used to inform any future decision to utilise such craft as part of the main Phase 2 survey programme.

9.4.2 The disadvantages of the hovercraft were:

- Despite having a theoretical capacity of 5-6 people, the BBV-6 hovercraft's enclosed cabin was cramped, especially with three GCCAS survey team members in addition to the BARB pilot and coxswain, the latter being necessary to balance the hovercraft and prevent it from flipping over. The cramped cabin also restricted the space available for archaeological equipment, and potentially for samples of wood, artefacts, peat and/or sediment.

- The movement of the BBV-6 hovercraft generated much spray and fine mud. Only the front windscreen had a wiper, however, and this often made it very difficult to see out of the vehicle's windows. This in turn made identifying archaeological features whilst on the move quite difficult.

- The hovercraft often could not proceed directly to the features to be investigated, but had to tack back and forth due to the prevailing on-shore winds. All those inside the hovercraft had to lean to one side when it was turning, as on motorbikes, in addition to the BARB coxswain. Once again, this often made identifying features whilst on the move difficult.

- Without having the locations of features previously recorded by the SMR/NMP loaded onto the handheld GPS unit, it was often difficult for GCCAS staff to know precisely where they were within the area of Berrow Flats, due to the open, flat and featureless nature of the intertidal area. It was thus also not possible to proceed directly to specific features or areas of interest.

- In some instances, the hovercraft could not get close to some of the stake-built fishing features, as the wooden structures formed a physical hazard to it. In addition, some areas of Berrow Flats, especially those with tidal creeks and channels, were too uneven for the hovercraft to go over. On-shore waves also form a potentially serious hazard to the hovercraft, especially with an incoming tide.

- The hovercraft was not able to cross the Gutterway at the mouth of the River Parrett for similar health and safety reasons. In the future, if a hovercraft was required for use on Stert Flats, it would have to be taken by road to a suitable unloading point. The environmental designations and sensitivity of Stert Flats, however (Catchpole and Chadwick 2009a: 26), might prevent such vehicle use there.

- The Bridgewater Harbour Master was unhappy at the use of the hovercraft and considered that any further or longer term use of such a vehicle would have to be subject to restrictions and costs applicable to commercial use of hovercraft.

- The significant cost implications of the use of a hovercraft would have to be seriously considered as part of any future Phase 2 Project Design. Prices for the hire of commercial hovercraft and crew were obtained during the planning phase of the Phase 2a pilot, and were around £1000 per day.

9.4.3 Despite these disadvantages, there were also *considerable advantages* from the use of the BARB hovercraft during the Phase 2a pilot survey. These would make the future use of the BARB hovercraft and/or a similar vehicle highly desirable in certain parts of the Severn RCZAS area during the main Phase 2 survey programme. These advantages were:

- The hovercraft allowed GCCAS staff to proceed to areas far out into Bridgwater Bay and Berrow Flats in a short space of time, and to leave such locales speedily ahead of the incoming tide. Accessing such areas on foot would consume considerable amounts of valuable time during often limited tidal windows. In very broad terms, the

earliest and most potentially interesting archaeological structures and deposits are often located furthest away from the modern shoreline (R. Brunning pers. comm.).

- When GCCAS staff disembarked from the hovercraft, they sometimes found themselves in deep and soft mud that was too dangerous to have walked across. Such locales would have been avoided altogether on foot, and would have prevented access to archaeological features on the far side of such areas.

- The reassurance provided by the presence of the BARB hovercraft and its trained rescue crew cannot be underestimated. This invaluable health and safety backup gave the GCCAS survey team members much greater confidence in carrying out their work in such a potentially dangerous and demanding physical environment.

- Although as noted above there were significant limitations on the amount of equipment that could be carried on the hovercraft, it was nevertheless a considerable physical boon for GCCAS survey staff not to have to carry their equipment in rucksacks on their backs for extended periods out across intertidal areas. In addition, despite the restricted cabin space, many more wood, peat and sediment samples, and/or artefacts, could potentially be retrieved and carried than would be possible with staff working on foot. A hovercraft would be particularly useful when taking samples of wooden stakes for dendrochronological and radiocarbon dating, and would significantly reduce the time necessary to undertake such work.

- The BBV-6 hovercraft cabin was cramped for three GCCAS survey staff plus the pilot and coxswain. Given the significant health and safety advantages of having the hovercraft and its crew standing close by, however, in some future flights it might be possible for a team of just two people to undertake the necessary archaeological survey, recording and sampling work.

Although undoubtedly expensive machines, the time taken to access distant structures and deposits in areas such as Berrow Flats and Stert Flats would be considerably reduced through the use of vehicles. Alternatively, a tracked All Terrain Vehicle (ATV) might provide most of the advantages of hovercraft at significantly reduced cost. Together with the considerable health and safety benefits, this reduction in time and staff costs may prove advantageous and might offset at least some of the costs of hovercraft hire. It is therefore recommended that use of hovercraft and of hired ATVs is fully explored in the drawing up of further work.

9.5 Staffing issues

9.5.1 One serious setback to the Phase 2a pilot survey programme occurred when the Project Officer Adrian Chadwick suffered a serious non-work related back injury (a prolapsed spinal disc). This made it increasingly difficult for him to work, and eventually had to be corrected by major surgery that prevented permanent paralysis but removed him from work until September 2009. From the 27th April 2009 therefore, he was unable to continue leading the field survey team, and as no GCCAS staff member of a similar grade was available fieldwork was halted until 8th June, when after rescheduling other work commitments the Senior Project Officer Toby Catchpole was able to lead the field team.

9.5.2 During the main Phase 2 project fieldwork, however, it would be advisable to have more than one person that would be able to lead the survey work. As two or more survey teams may be required to operate concurrently with one another (see section 12.1 below), it would be advisable to have a team leader but also a backup reserve team leader for each

survey team. In addition to providing cover for illness and injury, this would also provide greater flexibility for working practices, and may be able to alleviate some problems of long-term fatigue too.

9.5.3 During periods of optimal low tides, and as long as light conditions were adequate, it may be advantageous to make two survey visits to intertidal areas per day. Due to potential problems of fatigue, however, it is not recommended that this should be undertaken by the same team each day, but staff could instead rotate the fieldwork.

9.5.4 Problems of fatigue leading to potential lapses of concentration and accidents would also be a serious problem for staff surveying large areas such as Blue Anchor Bay, Stert Flats and Berrow Flats, with the repeated visits that will be necessary to record the complex archaeology present there, and the difficult physical environments in these locales. This may be exacerbated by staff needing to stay away from their homes. The use of hovercraft and/or ATVs would be a means of ameliorating such fatigue. It may still be necessary to rotate staff between a mixture of more and less physically demanding survey areas though.

10 Archaeological results

10.1 *Elmore, Gloucestershire*

10.1.1 The southern bank of the River Severn and the so-called 'Great Wall' earthwork at Elmore in Gloucestershire were visited by two GCCAS staff (Toby Catchpole and Adrian Chadwick) on Friday 3rd April 2009. This was not intertidal work, and the survey was conducted from public footpaths alongside pasture and arable fields. The handheld data logger operated correctly (with the exception of the height or Z coordinates, see section 9.2 above). Approximately 20m west of the farm at Elmore Back, a series of timber and hurdling structures were identified along the riverbank, partly concealed by bank slippage and mud deposits. Their extent was recorded along the top of the bank. The timber posts appeared to be for riverbank revetment, but they also included subrectangular 'bays' up to 1.5m wide and lined with hurdling (**Plate 3**). Some of the hurdling disappeared into the riverbank itself. The most likely interpretation of these structures is that they are the remains of post-medieval 'cribbing' to protect the riverbank. The Parish of Elmore was ordered to repair the cribbing at Stonebench in 1680 (VCH Gloucestershire, online text-in-progress (Elmore, local government 2010)). Modern eel fishing stations belonging to named individuals were also marked out in this area.

10.1.2 Further to the west along the riverbank, there were a series of what were almost certainly riverbank revetment structures, with vertical wooden stakes supporting stone rubble, although most of the latter had collapsed into the river. At one locale, several apparently conjoined timbers and planks may have once been part of a boat. The structures and the boat may have been early modern or modern in date.

10.1.3 South of the River Severn and approximately 150m inland was the northern end of the so-called 'Great Wall' of Elmore (Glos SMR 16695) (**Plate 4**). This survived as a broad, low bank, with the fields on the western side of the feature clearly higher than those to the east. It may have continued northwards as a flattened earthwork, although this could also have been one ridge from a surviving area of ridge and furrow. This possible extension to the previously recorded 'Great Wall' was surveyed. There were no landscape stratigraphic or independent means of dating this earthwork. Near Farley's End there was a distinct break in slope where the reclaimed and low-lying alluvial land met the edge of the firmer geology and subsoil, and the Great Wall seemed to terminate at this point.

10.2 *Guscar Rocks, Glos.*

10.2.1 The intertidal zone at Guscar Rocks and Grange Pill was accessed by GCCAS staff (Adrian Chadwick and Nick Witchell) on Monday 7th April via a private track from Woolaston Manor, with the permission of the landowner. The initial idea had been to examine known wooden structures immediately south of Grange Pill, but little was actually visible under thick deposits of blanketing grey mud too deep to move safely across on foot. There was a line of round and split timber posts visible at the edge of Grange Pill channel itself, however, and photographs were taken and records made of these from a distance (**Plate 5**), but it was too hazardous to examine them any closer, and they were probably early modern revetment features. Unfortunately, the handheld data GPS unit and logger crashed and no survey records could be made.

10.2.2 GCCAS staff then proceeded down onto Guscar Rocks, which consisted of several natural 'shelves' of outcropping brick-red marl with red and grey Old Red Sandstone boulders perched on top of them. No obviously anthropogenic features were visible, and only one worked timber was recorded by photograph, a large, well preserved box-sectioned (oak?) beam with a rectangular mortise hole at one end (**Plate 6**). This was probably early modern in date. This may have been a large structural timber from a building such as a

barn, but Nigel Nayling (pers. comm.) has suggested that it could possibly have been a ship's keelson and mast step. No other finds or features were recorded.

10.3 *Hawkins Pill and Bays Court, Westbury on Severn, Glos.*

10.3.1 On Tuesday 14th April, GCCAS staff (Adrian Chadwick and Nick Witchell) undertook some non-intertidal survey work. They examined an area of salt grazing near Awre, at a point called Hayward in and on the edge of some pasture fields in an area probably reclaimed from the river in the post-medieval period. There was an early modern corrugated iron and wooden fish house by a small pond behind the river bank defences, which was photographed (**Plate 7**). Some flattened ridge and furrow was visible in the pasture fields, along with silted up rhynes that cut across them, but these could not be photographed due to the relatively bright conditions and consequent lack of contrast. When checked with the GIS in the office at a later point, it was clear that the earlier ridge and furrow but not some of the cross-cutting later draining features have been plotted on the NMP. Although not a priority, such earthworks could be examined in more detail on the ground in a few areas to add additional information to the SMR – the additional features suggest greater stratigraphic complexity and thus a longer time depth to the landscape, perhaps with initial reclamation and arable use followed by additional later drainage and conversion to meadow/pasture.

10.3.2 The survey team then proceeded to Newnham, and from a public car park at the northern end of the village walked northwards along the footpath parallel to the A48, to try and find traces of one of two fish houses recorded in post-medieval documents for the parish (Elrington and Herbert 1972: 43-44; Mullin 2008: 18), one downstream of Hawkins Pill and another at Collow Pill. The latter was still in use in 1968 and is a Grade II listed building, a renovated brick structure now used as a small fishing museum (**Plate 8**). No above ground footings or other traces of the second structure survived in the area, however, although GCCAS staff could not proceed as far north as the outflow of Hawkins Pill itself, as this was not readily accessible. The only other possible fish house was located on the opposite (eastern) bank of the Severn. This early modern brick structure is not marked on contemporary Ordnance Survey maps, and although this could be an old field barn, its close position to the river suggests that it could have once been a fish house.

10.3.3 GCCAS staff then drove to Bollow, the nearest public road to a possible round barrow or windmill mound indicated by lidar during the NMP survey, and located south-east of Bays Court near Westbury-on-Severn (Catchpole and Chadwick 2009a: 7; Truscoe 2007). A public footpath provided access eastwards down to the Severn riverbank, where there was a line of pollarded willows on the river side of a north-south track leading to an early modern brick cottage and ruined outbuildings. This is currently used as a barn and storage complex. This cottage was perhaps originally a separate small holding, or a tied cottage for a fish keeper or gamekeeper as part of a larger estate (**Plate 9**). Map regression and documentary research may be able to establish this. One member of staff (Nick Witchell) scrambled up a steep path behind the cottage on a wooded slope to see if he could see the possible mound from the edge of the existing woodland, but it was not visible from his position. Confirmation or verification of this earthwork feature will therefore have to wait until the main Phase 2 survey stage of the project, when the landowner will have to be contacted to arrange direct access from upslope through pasture fields.

10.4 *Lydney Harbour/Lydney Sands, Glos.*

10.4.1 On Wednesday 15th April, two GCCAS staff (Adrian Chadwick and Nick Witchell) visited the Lydney Harbour area. They proceeded down the concrete harbour slipway out onto the intertidal zone immediately north of the harbour. A large squared timber there was probably all that was left of a recorded trow wreck, probably the keelson. Unfortunately, the

handheld GPS unit would only log point data, and so only the two ends of this timber were recorded. The GPS and data logger then stopped working altogether.

10.4.2 Despite the failure of the GPS equipment, GCCAS staff then moved around the harbour mouth and into the intertidal area south of the harbour, where timber remains of trows and other wooden structures were visible. A belt of sucking mud that actually increased in depth the higher up the foreshore one moved meant that the survey team had to backtrack all the way to the harbour entrance. As it was past lowest tide time and the tidal window at Lydney is narrow, further survey work was abandoned. When the tide did come in some 20 minutes later, it did so very rapidly, so great care obviously has to be exercised in this intertidal area.

10.4.3 The following day at Lydney harbour, on the 16th April, Adrian Chadwick and Nick Witchell proceeded south along the line of the old railway embankment, before dropping down and going out into the intertidal zone. They recorded the position and state of preservation of the remains of several trows or barges recorded on the SMR (Glos SMR 26111) (**Plates 10-11**). Some vessels had most of the keelson, stem and sternposts, transoms and lower hull sides surviving, but others had just a keelson and/or a few other timbers remaining. Some fragmentary wooden remains were also noted. In addition to recording the positions of some of the larger wrecks, digital photographs were used to document this state of preservation, concentrating on those not readily accessible from the shore at high tide.

10.4.4 SMR records also indicated a linear stone and wood structure in this locale (Glos SMR 26112). The line of this feature was recorded with the GPS, in addition to more detailed photographs of it (**Plate 12**). It is not clear what this structure originally was. In places it appeared to be a stone and timber revetment, with much of the stone perhaps washed away. In other places, however, the paired posts may indicate that it was a fishing structure such as a putcher rank built on top of an earlier stone revetment. Some of the posts were pine or spruce, suggesting an early modern date. More detailed recording might be able to draw this out. Some small groups of angled posts lower down in the intertidal zone were photographed but not recorded in detail. At least some of these may be for fishing nets – their angle may have been deliberate, to catch fish on the outgoing tide.

10.4.5 GCCAS survey staff also looked for possible routes from Stroat down onto Horse Pill where a hurdle trackway, a V-shaped fish trap and a putcher rank of 400 putchers is recorded on the SMR, along with Wentlooge peat deposits. No publicly accessible routes could be located, however, and this area will have to wait until the main Phase 2 fieldwork. Farm tracks will have to be used, and permission sought from the relevant landowners.

10.5 *Bossington Hill, Somerset*

10.5.1 On Monday the 20th April, two GCCAS survey staff (Adrian Chadwick and Nick Witchell) travelled down to Somerset, stopping in Watchet to obtain tide information from the Harbour Master's office there. They then proceeded to Bossington Hill above Minehead, and parked in a public car park at the western end of the hill, in an area of upland heath. The coastline at this locale consists of rocky cliffs and steeply sloping headlands cut by deep combes. The survey team followed a public footpath northwards alongside a medieval or post-medieval corn ditch. The GPS worked well and was used as a directional aid to navigate onto a Second World War structure recorded on the Somerset HER as a gun emplacement (HER 35517) (**Plate 13**). All that remained was a low earthen mound, a revetment into the slope and some reinforced concrete rubble. There was also a rusted iron wheel with a solid rubber tyre – this might have been from a field gun, but may equally be the front wheel of a tractor. The emplacement had been demolished and in-filled, but photographs were taken of it as an erosion monitoring exercise. Below the Second World

War position at the bottom of a very steeply sloping coombe was a small beach, and possible earthworks here may represent quarrying or other industrial activity. The GCCAS survey team did not go all the way down to examine these, and they may need to be visited during the main Phase 2 survey programme.

10.5.2 The GCCAS survey team then followed the coastal path eastwards for *c*. 300 metres, and located another Second World War structure recorded on the Somerset HER as an observation post (HER 35877), and which was largely obscured by a gorse thicket. This consisted of a three-sided earthen bank and dugout position, although it looked more suitable for a field gun. Close to it was a concrete base with metal fittings, perhaps for a mast or radio antenna. Again, these were photographed.

10.6 *Watchet Harbour, Som.*

10.6.1 On Tuesday 21st April, three GCCAS staff (Adrian Chadwick, Briege Williams and Nick Witchell) accessed the intertidal zone off Watchet Harbour, via a set of concrete steps on the eastern side of the harbour. The folded geology of the bedrock created a series of linear stone ridges interspersed with rock pools. Possible fishing structures observed from the harbour wall during the reconnaissance phase proved to be recent net lines formed from scaffolding poles and other metal pipes. These were recorded with photographs only, and many were beyond that day's low tide limit in any case. No wooden fishing structures were identified, but given the rocky nature of the intertidal zone, it is unlikely that many such features would have been constructed. No stone fish weirs were noted, and the archaeological potential of the area must therefore be low.

10.6.2 Immediately in front of the stone and concrete harbour wall of the western pier at Watchet was a series of large wooden piles up to 0.60m wide in a dense non-oak wood, driven into the foreshore up to 0.20-0.30m apart (**Plate 14**). Some posts were round in cross-section, whereas others were squared. These had marks from metal tools where the upper parts of the posts had been cut off, just above the current intertidal ground surface. A 'shadow' effect produced by the adjacent modern harbour wall did not allow an accurate GPS fix to be obtained, but the posts seemed to be early modern in date, and formed two lines at the approach to the harbour, one with a near right-angled 'kink' to it. The two lines of posts appeared to broadly respect the existing harbour entrance.

10.6.3 Information from the local museum indicated that a catastrophic storm in 1900 had demolished the wooden harbour breakwater wall, and had destroyed or damaged many ships inside. Whilst a more permanent stone and concrete harbour wall was constructed, a local estate donated 200 elm trees to form a temporary breakwater. Although the timber piles may have been from the original harbour wall, it is perhaps more likely that they represented the remains of the dense elm tree trunks of the temporary breakwater.

10.7 *Minehead/Culver Cliffs, Som.*

10.7.1 On Wednesday the 22nd April, GCCAS staff (Adrian Chadwick, Briege Williams and Nick Witchell) visited the intertidal zone at Culver Cliffs, immediately west of Minehead. After parking in the public car park at West Quay, the survey team proceeded on foot westwards along a footpath, before dropping down onto the cobble and boulder beach. The area west of the headland cliffs was the setting for a series of V-shaped fishing structures recorded by the RCZAS NMP survey, and on the Somerset HER. After a short wait, the falling tide revealed two overlapping stone fish weirs (HER 57144 and 57145) (**Plate 15**). These were recorded with the GPS as simple lines, as well as with digital photographs. One was better preserved than the other, and was perhaps more recent in date. The stones of both structures were gradually being dispersed, and they will be much more fragmentary or

even largely gone in another 5-10 years. A third V-shaped weir recorded by the NMP in the same general area was not visible (HER 57143), probably as the tide was not low enough.

10.7.2 The survey team walked back eastwards along the shoreline as the tide slowly came in, and noted part of another possible fish weir in Minehead Bay – just one 'arm' was visible above the rising water (HER 57146), but the incoming tide prevented further access. Some additional stone structures were also visible much further out in Minehead Bay, but the majority of the weirs recorded by the NMP aerial survey were probably well below the low tide level of that day. This means that any attempt in Phase 2 fieldwork to systematically visit and record all of the features recorded on the NMP should take advantage of the lowest tides, and given the apparent density of features recorded from the air alone (with additional features probably visible up close), adequate time should be allocated for this.

10.8 *Porlock Weir and Porlock Bay, Som.*

10.8.1 GCCAS survey staff (Adrian Chadwick, Briege Williams and Nick Witchell) met with Richard McDonnell on Thursday 23rd April, in order so that he could reveal some specific features in Porlock Bay. After parking in the public car park at Porlock Weir and meeting up with Richard McDonnell, the survey team walked eastwards back along the road into Porlock weir, before dropping down onto the top of the shingle ridge. Where the tide was still going out, Richard located the find spot of an aurochs skeleton that had been previously excavated (**Plate 16**). The trench edges were just visible, along with a marker post. These were surveyed in with the GPS unit. Some of the submerged forest in Porlock Bay was still visible, with waterlogged tree root bases, but most had been progressively covered by sand during recent years, as recorded in recent site visits (McDonnell 2005). In addition, palaeochannels that had once been visible as dark features in previous years were now so 'leached' in colour that they were barely apparent.

10.8.2 The survey team then moved eastwards to the recent breach in the shingle ridge, where developing salt marsh was visible inland beyond this point. Richard McDonnell showed us where he and Robert Wilson-North of Exmoor National Park had excavated several medieval timbers and associated early land surfaces, although it was still not clear what these features originally represented. The 'ready-made' sections through the shingle ridge showed earlier phases of these features, perhaps once waterfront structures.

10.8.3 Returning westwards to Porlock Weir, the remains of three recorded stone-built fishing weirs were visible (Somerset HER 35926. Two were fairly fragmentary, but one (HER 7907/7908) was still in a relatively good state of preservation (**Plate 17**). These were surveyed with the GPS and with digital photographs. One was very diffuse and it was not clear where it merged into the natural shingle and boulders – the only noticeable feature was the actual inlet at the apex of the weir. The approximate centre line and the visible extent of the spread bank were surveyed. The incoming tide prevented further recording.

10.8.4 During the main Phase 2 survey programme there would appear to be little scope for more detailed recording and sampling of the submerged forest and its associated lithic findspots, as much now seems to have been buried by recent shifts of sediments (McDonnell 2005). Richard McDonnell is currently working on a single report compiling all his previous monitoring visits to Porlock Weir on behalf of the Exmoor National Park, documenting this progressive silting (McDonnell in prep.). Apart from the area within Porlock Bay where the medieval features have been uncovered, there is much less potential in Porlock Bay than originally thought. A series of fish weirs or traps further to the west at Gore Point are still within the RCZAS survey area, however, and these would benefit from more detailed future investigation.

10.9 *Helwell Bay/Doniford Bay, Som.*

10.9.1 On Friday 24th April, the GCCAS survey team were meant to be meeting with Richard Brunning of Somerset County Council at St Audrie's Bay to investigate a find spot where mammoth remains had been found eroding out of peat deposits in the intertidal zone, in addition to fishing structures far out in the intertidal zone. Unfortunately, due to a map reading error, the survey team parked up by Helwell Bay/Doniford Bay, immediately east of Watchet Harbour, instead of a car park at St Audrie's Bay further around the next headland along to the east. We therefore failed to meet Richard Brunning, and examination of this important area will now have to wait until the main Phase 2 survey.

10.9.2 Nevertheless, the GCCAS survey team did investigate the rocky intertidal zone at Helwell Bay/Doniford Bay, where dramatic east-west ridges of upstanding rocks formed from eroded geological anticlines separate narrow rock pools and strips of sand or mud. The intertidal zone only contained a few modern net line structures formed by modern iron pipes and scaffolding poles. One large isolated timber post was found driven into the surface – possibly a mooring post. In another location, there was a small, right-angled arrangement of at least four timber posts, but these did not form any readily identifiable structure. The locations of the posts were mapped using the GPS, and they were recorded by digital photograph and with the written timber record sheets. All of these wooden posts were probably fairly recent (early modern) in date, and no stone structures were apparent.

10.9.3 Despite the mistake, it is apparent that the archaeological potential of Doniford Bay is low, and further Phase 2 survey work can concentrate on St Audrie's Bay.

10.10 *Berrow Flats, Burnham-on-Sea, Som.*

10.10.1 The two days of pilot survey work at Berrow Flats took place with the assistance of the Burnham-on-Sea Area Rescue Boat (BARB) rescue hovercraft team. This experimental approach to survey work had been proposed in the Updated Project Design (Catchpole and Chadwick 2009: 20-21), due to the logistical and health and safety implications of attempting to locate and record fishing structures situated far out in the intertidal zone of Berrow Flats. The original idea was to combine the archaeological survey work with routine training flights of the hovercraft and its crew.

10.10.2 The GCCAS survey team (Adrian Chadwick, Briege Williams and Nick Witchell) first met with the BARB hovercraft team on Monday 27th April. The BBV-6 hovercraft *Spirit of Lelaina* had an enclosed cockpit with a crew consisting of a pilot and a coxswain, plus the three GCC staff. Initially, the northern part of Berrow Flats near Brean Down was examined, but the wooden V-shaped fishing weirs and other timber structures that were identified (including HER 27773 and 27764) were probably relatively recent in date as they were rather close to the modern shoreline (**Plate 18**).

10.10.3 The BARB hovercraft then proceeded southwards and seawards. More V-shaped structures were identified further to the west, including many formed of small roundwood timbers. More enigmatic groups and lines of small posts and stakes were also noted, some forming possible overlapping structures of different periods. There were far too many of these to record in detail, but digital photographs were taken of some of the larger structures (Fig. 4). The GCC team also observed some dark patches that upon investigation proved to be eroding peat layers (**Plate 19**). Some of the edges of these areas of peat were plotted with the GPS, and during this process part of a pelvis from a large mammal (a bovid?) was identified on the surface, with pronounced black staining that indicated that it had almost certainly eroded out of the peat. This find spot too was plotted, and the bone retained for species ID and possible future ^{14}C dating. Two round wooden stakes were also identified – one seemed to be within a square stakehole cutting into the peat, but another was eroding

out of a peat face. This latter example was sampled for potential future species ID and ^{14}C analyses, although the tip of the stake broke off during extraction. The wood was not darkly stained, and this too was probably a relatively recent (early modern) stake driven into underlying peat deposits.

10.10.4 The GCCAS survey team and the hovercraft then moved southwards, and the BARB team swapped over their pilot and coxswain. The GCC team then proceeded to take photographs and log the position of a wooden wreck (the Nornen) relatively close in to shore that was recorded on the HER (HER 11148) (**Plate 20**). Another wreck recorded by the HER/NMP further out in the intertidal zone was not visible, however (HER 27960). As the tide was now coming in and was covering most of the significant archaeological features, the hovercraft crew then returned the GCCAS team to the original parking up point.

10.10.5 Peat deposits have been previously recorded at several places on Berrow Flats, and produced a series of calibrated late Mesolithic and earlier Neolithic radiocarbon dates in the range of approximately 4707 to 4268 BC just south of Brean Down (Bell 1990: 104) and 5440-3370 BC by Burnham-on-Sea (Druce 1998: 18). The peat layers identified by the GCCAS team were at least 6.5km north and *c*. 3.4km south of the sites previously investigated (Fig. 4), and may be of considerable palaeoenvironmental and archaeological significance. This locale will have to be investigated and recorded in greater detail during the main Phase 2 survey programme.

10.10.6 On the following day, Tuesday 28th April, two GCCAS survey staff (Briege Williams and Nick Witchell) met up with Richard Brunning of Somerset County Council, and the BARB hovercraft team. They began by investigating some wooden fish traps close to the modern shoreline, and thus likely to be fairly modern in date. Samples for species ID were taken from one well-defined 'arching' fish trap (HER 27973, 27974), and this structure was also recorded with the GPS handheld unit.

10.10.7 The GPS was then used to navigate onto the peat deposits seen the day before. The outlines of further areas of peat were planned, and the depth of the peat deposits was established by spading through them. A piece of submerged oak was also sampled for species ID and possible ^{14}C dating.

10.10.8 As the tide reached its lowest point for that day, the hovercraft and the archaeological team went far out to the west, in order to try and find some of the more ephemeral stake-built structures that had been noted the previous day. With frequent stops to observe and identify features, a very low line of small stakes was identified and partially planned (**Plates 21-22**) (Fig. 4). This proved to be larger and more complex than first thought, and ultimately time restraints and the ingress of tide meant that it could not be fully recorded. A large, unabraded sherd of probably early post-medieval pottery was found in association with some of the wooden stakes forming this structure. Several wooden stakes were sampled for possible future species ID and ^{14}C dating.

10.11 *River Parrett, Som.*

10.11.1 Owing to the lead member of the GCCAS Stage 2a survey team (Adrian Chadwick) experiencing severe back problems (a prolapsed spinal disc), further RCZAS fieldwork did not take place until the 8th June, with a survey team composed of Toby Catchpole, Briege Williams and Nick Witchell. This exploratory work examined the south-western bank of the River Parrett north of Combwich, attempting to identify and record features from the top of the bank only, deep sucking mud deposited along the riverbanks making it far too dangerous to venture down to the water's edge without specialist equipment.

10.11.2 The GCCAS survey team proceeded northwards along the riverbank, and approximately 150m south of South Brook Clyse they identified a stone rubble and wood structure or 'platform' at the base of the bank, presumably of relatively modern date and relating to fishing. It was unclear if the modern rubbish visible there was associated with its use or had simply snagged on it when floating by. To the north of South Brook Clyse there were a large number of wooden stakes, making all but the most peremptory recording impossible. There were several features constructed of vertical or angled posts, or a mixture of both, many apparently at the front of large stone rubble dumps. This may indicate a recent date, or that dumping stones was used after the wooden structures had gone out of use. The location of these features on the 'outside' of the river meander north of Combwich suggests that they may have been revetments designed to prevent the River Parrett cutting into the adjacent farmland, or even cutting off the peninsula containing Steart village. There were also a large number of random isolated stakes and posts, and small groups of such features, which made recording problematic as it was difficult to assess the start and end of features, especially where there seemed to be many overlapping structures.

10.11.3 A preliminary check on the GIS indicated that none of the features identified on the riverbank were recorded by the NMP or were on the HER. An artificial oyster bed recorded on the NMP was not visible on the ground. If additional documentary historical research does not indicate a very recent date for all these features, in the future it would be worth recording this stretch of riverbank in more detail and investigating the opposite eastern bank of the River Parrett to see if similar features are present there. There were two known wrecks (recorded by the NMP), one near North Clyse and one on the opposite bank. Only one of these was visible (**Plate 23**).

10.11.4 The GCCAS survey team continued to just beyond North Clyse, *c*. 2km north of Combwich Harbour. As the density of features had decreased, they returned southwards to record more of the features already identified as the tide was at its lowest point for the day. The fact that not many new structures had emerged in the lower parts of the bank perhaps supports the suggestion that most were related to riverbank revetment rather than fishing.

10.11.5 Due to the predominantly grey and brown landscape of mud, water and sky, it was extremely difficult to identify any features on the opposite bank of the River Parrett, even with binoculars from only 10m away. When some stakes and timbers were recognised, the limited locational capabilities of the GPS camera made actually recording them, even by photograph, a relatively pointless exercise, other than to indicate their approximate position.

10.11.6 A second day of exploratory survey work, in this instance along the north-eastern bank of the River Parrett, took place on Thursday 25th June. The GCCAS survey team consisted of Toby Catchpole and Nick Witchell, and they examined the area north-west along the riverbank from Pawlett village. They had been able to download Somerset Historic Environment Record data in advance. At Brickyard Farm and east in front of Brickyard Cottages they searched for any traces of a recorded brickyard (Som HER 10693) and a nearby pillbox (HER 15985), but found no surviving sign of either.

10.11.7 The survey team then proceeded west along the bank, again only recording features from the top of the bank. South of Gaunts Farm was a concrete pillbox (HER 11956), a hexagonal structure with five gun ports and a door at the rear. This was in very good condition, although it was full of standing water (**Plate 24**).

10.11.8 Between the riverbank and the hangar of a recorded Second World War military research establishment (HER 27122), rectilinear bare patches were noted on the ground and were recorded by digital photographs. These may reflect unknown buried features, and further research and examination of historic aerial photographs might be able to ascertain this. Short lengths of seawall reinforcing stretches of riverbank near the military installation

may have been related to its occupation, or might simply reflect riverbank revetments. A former flood defence bank (HER 27755) was also recorded.

10.11.9 The survey team walked to a point opposite Dallington's Clyce without encountering any noteworthy features, close to a sluice and a fenced-off modern shed, the latter possibly a measuring station. This point is marked on the Somerset HER as a wind pump (HER 10684), but there was no sign of this. The survey team then turned back to make the return journey. Several timbers were observed on the opposite south-western bank of the Parrett, but as before the murky conditions meant that they did not show up on the digital photographs that were taken.

10.11.10 The outgoing tide revealed a 'berm' of half-dried silt that appeared firm but was actually deep and extremely hazardous. In the riverbank near the outflow west of Gaunt's Farm, a number of isolated wooden stakes were recorded, probably of relatively recent date. Two lines of fairly widely spaced wooden stakes parallel to the river were observed close to the water level on the 'outside' of the river bend, perhaps some form of revetment. A short line of nine large roundwood stakes parallel to and near the top of the bank was also identified, together with a large dump/platform of stone rubble below this point. It was unclear if this was originally a retaining structure where the rubble had slipped down the bank, or if the rubble was always meant to be lower than the stakes. They were presumably connected though, and again are probably relatively recent revetment structures.

10.11.11 East of these features was the site of former artificial oyster beds recorded on the Somerset HER (27749), but as with those on the opposite bank, no traces of these were visible.

10.12 *Oldbury on Severn, South Glos.*

10.12.1 On Wednesday 17th June, the GCCAS survey team (Toby Catchpole, Briege Williams and Nick Witchell) met with Vanessa Straker of English Heritage at Oldbury Levels, south of the modern power station at Oldbury on Severn. This visit was more of a training exercise for the GCCAS team in the recognition and recording of peat deposits, use of the Van Walt auger, and best practice in the recognition and recording of the samples obtained from it (including standard context deposit descriptive terms, colour, transitions between layers and macro-fossils). The team also planned to investigate and record the current extent of several known Romano-British find scatters at the top of the foreshore.

10.12.2 In the event, an already limited tidal window was exacerbated by a strong south-westerly on-shore wind. It was also very difficult to discern peat deposits and archaeological features due to an extensive covering of seaweed. In addition to the training in peat recognition and auger sampling, however, two separate lines of wooden stakes in two slightly different locales were rapidly recorded by digital camera (**Plate 25**). These were on different alignments, one running at right angles to the shore. The tide turned very quickly, and GCCAS staff returned to the shoreline with water lapping around their Wellington boots. Future work at Oldbury Levels will need to beware this often rapid tidal turn around.

10.12.3 Below the small cliff at the edge of the salt marsh and *in situ* within it was substantial stone building rubble and numerous Romano-British pot sherds. The extent of the spreads was recorded with the GPS handheld unit, and they were photographed with the digital camera too. This locale was immediately adjacent to records on the South Gloucestershire Historic Environment Record, including a Romano-British building (Sth Glos HER 18646), a Romano-British slate palette find and other artefacts (Allen and Davidson 2007; Allen and Fulford 1987, 1992; Allen and Rippon 1997; HER 18647).

10.12.4 On the return to Gloucester, the GCCAS team stopped off at Severn House Farm, Hamfield Farm and Stone Farm, south of Berkeley power station, to look for evidence of another recorded Romano-British site at the north end of Hills Flats, and noted on the Gloucestershire Sites and Monuments Record (Glos SMR 6494). Unfortunately, the tide was too high to see the foreshore or a possible Roman revetted channel thought to exist at that locale by Richard Brunning. There is a modern, steeply-sloping and slippery concrete breakwater extending over a long stretch in this area with no easy access by foot onto the intertidal zone. In the future RCZAS main Phase 2 survey programme, archaeological work in this area will need careful risk assessments and perhaps a reconsideration of methodologies.

10.13 *Stert Flats, Som.*

10.13.1 On Monday 22nd June, the GCCAS survey team (Toby Catchpole, Briege Williams and Nick Witchell) met with Richard Brunning and Richard McDonnell at the Dowell's Farm car park at Steart, in order to gain familiarisation with some of the archaeology of Stert Flats and the hazards presented by that intertidal landscape. Richard McDonnell had advised that limited recording time would be available, and the day would be best spent walking out as far as possible to the furthest accessible archaeological features.

10.13.2 The survey team were then led from the Dowell's Farm car park out to Stert Point, south of the line of the Gutterway, walking north-east for *c*. 500m before turning north-west to avoid quicksand. The positions (but not the details) of several features were recorded with the handheld GPS against their previously surveyed positions logged with the Somerset Historic Environment Record (Figs 5-6), particularly those mapped solely from the aerial photographs in which a lack of known reference points had caused problems during plotting (Dickson and Crowther 2008). The first feature recorded was a large L-shaped fish weir (Brunning 2008: fig. 1 no. 045; HER 12650; McDonnell 2003a, 2003b), formed by many small wooden stakes, and probably post-medieval in date (**Plate 26**). The eastern end was only just emerging from under the water and although it was recorded as one continuous line, the previous plan indicated another further arm (Brunning 2008: no. 206; HER 27935; McDonnell 2003a) that was not identified. The easternmost part of the recorded line was narrower, and the wooden stakes appeared larger and/or better preserved.

10.13.3 The previous surveying of this and subsequent features appeared to be reasonably accurate when compared to the GPS readings obtained from the handheld GPS, with a difference of between 4-13m. The National Mapping Programme record locations derived from aerial photographs alone were generally less accurate.

10.13.4 A series of straight double lines of wooden stakes was then identified (Brunning 2008: nos. 300-305), one of which was recorded with the GPS to check its location (Brunning 2008: fig. 1 no. 303; HER 27949; McDonnell 2003a, 2003b). These features were probably net lines or ranks for fishing baskets of fairly recent date (Brunning 2008: 77; R. McDonnell pers. comm.). A further double stake line of multiple phases was digitally photographed (Brunning 2008: no. 046; HER 12652; McDonnell 2003a) (**Plate 27**).

10.13.5 Richard McDonnell noted that more stake lines had been visible during earlier visits, suggesting that there had been some tidal scouring and lowering of the surface in this area. Both Richard McDonnell and Richard Brunning also recalled that the low channel to the south of the Gutterway which many of the stake lines crossed now appeared significantly deeper than they remembered from previous visits. In order to test these possibilities, however, there needs to be a full and detailed future GPS survey of all archaeological features currently visible. This would require adequate time and resourcing.

10.13.6 As the team continued westwards, they should have passed through an area where many small V-shaped fish traps or weirs had been recorded on the NMP, but these were not identified, although some might have been underwater when the team passed by. Again, it is not clear if these had been scoured away, or buried by sediments. The area was characterised by a shelf of hard clay that had been rounded into a series of parallel ridges or rills with pebbles collected in the furrows, presumably by tidal currents. In several places indistinct lines of stones were photographed at right angles to the underlying clay ridges or rills. It is possible that these may be anthropogenic features such as net lines, although they have not been previously recorded. Alternatively, these might be natural features resulting from changes in current patterns and depositional regimes in this part of Stert Flats, as tidal flats may develop quite complex interbedded deposits (Hill 2004: 55). These features should be examined by geoarchaeologists or coastal geomorphologists.

10.13.7 A large Second World War parachute mine recorded on the Somerset HER (HER 12649) was destroyed by military bomb disposal experts in a controlled explosion in 2008, leaving a visible crater in the intertidal sediments and a spread of aluminium fragments and shrapnel scattered over an area several hundred metres in extent. This area was avoided, but at the westernmost edge of the area that Richard Brunning and Richard McDonnell said was safe, spot location points were taken with the GPS handheld unit on the apexes of several previously recorded V-shaped fish weirs (Brunning 2008: fig. 1 nos. 204-205; HER 27939 and 27940; McDonnell 2003a).

10.13.8 Beyond this point the extent of relatively firm intertidal surface tapered to a narrow isthmus. Although many timber structures were visible to the south of this area, both Richard Brunning and Richard McDonnell advised against proceeding towards them because of the risk of quicksand. The GCC team then headed north-eastwards and crossed the Gutterway which had drained sufficiently to be safe to wade across. Richard Brunning and Richard McDonnell were both concerned at the marked lack of features visible in the area to the north of the Gutterway, as they had expected this to contain many visible structures (Figs 5-6). A shallow but extensive layer of mud had been deposited over the area, however, and this may have been obscuring features, although a more pessimistic possibility is that the wooden structures have already been eroded away altogether. Future Phase 2 fieldwork will have to investigate this. The mud became deeper to the north-west, and an attempt to look at a long conjoined row of wooden weirs (Brunning 2008: fig. 1 no. 054; McDonnell 2003a) was abandoned.

10.13.9 The southern part of previously recorded V-shaped fishing weir 203 (Brunning 2008: fig. 1; HER 27938; McDonnell 2003a) was only just identifiable, but further north a significant number of stakes were visible, although these did not form any immediately coherent structures. Richard Brunning asked for a GPS spot record for the location of a previous sample he had taken in this area, and he also took a sample wooden stake from the apex of weir 203 (HER 27938) for potential future species ID, dendrochronological and/or ^{14}C analyses (**Plate 28**). This sample too was spot located. Following this, it was decided to return to shore, as this would take an hour and a half.

10.13.10 There are clearly many significant issues to be resolved in the future regarding the structures at Stert Flats, including the exact number and location of the features, their date and relationship to one another, and also their presence or absence and current state of preservation. This will require multiple survey visits over an extended period of time following different tidal and weather regimes, and may also involve the taking of samples for species ID, dendrochronology and ^{14}C dating (see section 13.3 below). This will clearly require careful resourcing and detailed planning of survey methodologies and health and safety considerations.

10.14 *Blue Anchor Bay/Dunster Beach, Som.*

10.14.1 The GCCAS survey team (Toby Catchpole, Briege Williams and Nick Witchell) returned to Blue Anchor Bay and Dunster Beach on Tuesday 23rd June. This followed on from a preliminary visit there on the 13th March with Richard Brunning and Buzz Busby of English Heritage, where the number and density of previously unrecorded features in the intertidal zone had become apparent. In order to provide some form of representative sample of the features present to inform further Phase 2 fieldwork, it was agreed that the GCCAS survey team should only attempt to record a few transects in detail. In the event, GCCAS staff still had to be selective in their recording, and did not take GPS readings or make written records of net lines formed by modern pipes and scaffolding. These were recorded by GPS-referenced digital photographs only, together with a GPS spot record of the end from which they had been photographed.

10.14.2 Additional difficulties were caused by the sheer scale of many of the linear features investigated. Given that three team members were necessary for health and safety reasons, it did not make sense for the person with the handheld GPS to walk along fish weirs locating them, but then also to have to write descriptions of them using the data logger. This would be too much work for one person, but would conversely leave other team members standing idle for long periods. It was therefore more efficient for one person with the handheld GPS to locate features, another to photograph them with the digital camera, and the third to write descriptions of them on the context sheets and/or in a notebook. This methodology generally worked very well, and could be adopted in the main Phase 2 survey phase (see section 12.2. below). Wet and windy conditions, however, would render written recording on feature sheets extremely difficult.

10.14.3 Unfortunately, the handheld GPS became increasingly unreliable, and kept losing its satellite fixes, despite the clear day and open landscape. Some problems were also experienced in walking along a straight transect on the outgoing tide, when variations in the local topography of the intertidal zone meant that some areas were dry whilst others were still submerged. Although the beach at Dunster is orientated NW-SE, due to these problems the GCC team decided to walk a north-south line on the Ordnance Survey National Grid, walking out northwards along easting 300600, and back in southwards along easting 300700 (Fig. 7). They recorded everything visible on or between these two lines, and conditions were sunny with clear visibility.

10.14.4 A plethora of features were recorded. These included a variety of modern or early modern structures including groynes formed of lines of timber posts, isolated timber posts that may have been mooring posts or signs, and linear net lines and both U and V-shaped fishing traps formed of metal pipes and scaffold poles as noted above. Several stone and stone and timber fish weirs were identified, including some recorded on the Somerset Historic Environment Record (e.g. HER 27219, 27234 and 27258), but also others not previously identified. Some were very poorly preserved, with wooden stakes only projecting a few centimetres above the boulder surface of the intertidal zone. The stone components were also often hard to identify against the background boulders and cobbles of the beach, especially where the stones had been dispersed. There were many low, degraded and consequently confusing stone banks. Some modern metal fishing lines and weirs had made use of earlier structures as foundations or anchoring points.

10.14.5 More ephemeral intertidal archaeological features were also noted, such as small rings or piles of stones that would presumably once have supported timber or metal posts from net lines or fish traps, lines of stone net weights, and also linear zones of clearance for net lines (**Plate 29**). Most of these features were probably recent in date.

10.14.6 On Wednesday the 24th June, the same GCCAS team continued the recording at Dunster Beach begun the previous day. A strong on-shore wind helped to keep the tide in for longer than expected, and throughout the day the team were further hampered by the fact that the handheld GPS unit frequently malfunctioned and had to be rebooted many times. The GCCAS team had intended to walk out into the intertidal zone northwards along the 301000 easting and southwards back inland down the 301100 easting, but there were few features visible on the gravel ridge to the east side of the tidal pond and Nap Lock. They therefore recorded up to 301200 in 'zigzags' following the tide out, staying out longer than they would have if they had been actively recording on the way back, and walking straight back in once they had reached the lowest tidal level for that day. Nevertheless, later comparison with the OS mapping available on the GIS suggested that the GCCAS survey team had walked the full extent of the beach, and nearly reached the location of the most distant fish weir mapped by the NMP. This was the last day of Phase 2a pilot survey work.

10.14.7 Only a few features were recorded on the second day therefore, including two largely destroyed Second World War pillboxes noted on the Somerset Historic Environment Record (e.g. HER 15328), modern beach defences and modern net lines (HER 27217), the latter including lines of stone weights within linear cleared areas. An L-shaped stone feature and more sinuous stone banks were also recorded, although the function of these was not clear. A V-shaped stone fishing weir with wooden stake supports and roundwood stakes near its apex was recorded (HER 27267) (**Plate 30**), as was a curvilinear line of large stones, probably forming part of a net line (HER 27213). A much more degraded and fragmentary V-shaped stone fishing weir was also identified (HER 27211).

10.14.8 It was clear from the work at Dunster Beach that some of the features mapped by the NMP survey (Dickson and Crowther 2008) were not post-medieval or early modern fishing weirs, but instead were net lines and fish traps of much more recent (often contemporary) date, constructed with metal pipes and scaffolding poles. Although in some instances recent net lines and fish traps have made use of earlier, older stone banks as footings, it is unlikely that many stone fish weirs would have been removed only to be replaced on exactly the same line by recent net lines. The NMP report may thus have overestimated the numbers of historic fishing structures in some locales, although this premise would have to be tested in other areas of dense intertidal features such as Minehead and Bridgwater Bays.

11 Assessment of archaeological potential

11.1.1 It is anticipated that the majority of the main Phase 2 RCZAS survey programme, as in the Phase 2a pilot, will focus on the archaeology present in intertidal areas. It is these areas where historic assets are under the greatest threat (Murphy 2007: 10), but which contain some of the oldest archaeological deposits and structures, and which have the greatest palaeo-environmental potential. It is these areas that also require greatest updating and enhancement of HER/SMR records. Other potential survey areas can be prioritised based on the SMP2 plans for coastline management (Atkins Ltd 2009; Halcrow Ltd 2009), and whether for example the proposals are to 'hold the line' or to have 'managed retreat'.

11.1.2 In terms of fishing structures, the Phase 2a pilot has reinforced the notion that the areas of greatest archaeological potential are Minehead Bay, Blue Anchor Bay and Dunster Beach, St Audrie's Bay, and Bridgwater Bay, including Stolford Beach, Stert Flats and Berrow Flats. In such areas, a large number of the most visible existing features probably date to the early modern and modern periods. At least some of the V-shaped and U-shaped structures mapped by the NMP (Dickson and Crowther 2008), however, will prove to be very recent in date. Some of the structures furthest out in the intertidal zone may prove to be the earliest in date, however, and to have perhaps the greatest archaeological significance (R. Brunning pers. comm.). They may date from the Anglo-Saxon and medieval periods. These features will only be accessible at the very lowest tides. This has obvious Health and Safety and logistical implications. The main priority of work on the fishing structures must be in identifying, characterising and dating the main types, especially those earliest in date. The pilot fieldwork did not address the surviving evidence for the putt and putcher rank type fishing structures found within the inner estuary in any detail and this will need to be rectified in future.

11.1.3 Some of the earliest fishing structures will probably only be visible as small, eroded wooden stakes projecting only a few centimetres above the intertidal surface, and any stone equivalents as dispersed and diffuse banks; and so they will be difficult to identify. Repeated visits may have to be made to some areas, especially following winter and spring storms, to try and assess if drifting silts have buried some structures, or alternatively, if tidal scouring has eroded them altogether. Many will not have been recorded by the NMP, and so although the aerial photographic transcription work may have over-recorded modern fishing structures made of metal pipes and scaffolding, it will have under-recorded structures made of small wooden stakes or insubstantial stone banks.

11.1.4 There is at present little point in attempting to undertake more detailed survey and sampling work in Porlock Bay, as the movement of sand deposits there has buried much of the submerged forest present (McDonnell 2005). Peat deposits in St Audrie's Bay and on Berrow Flats and Oldbury Flats in particular should be investigated in more detail, and survey work there should be accompanied by at least some palaeo-environmental sampling, and the collection of some artefacts and faunal remains (see section 12.3 below). These areas may also potentially preserve prehistoric structures, and the potential for finds of national significance is great. The fragmentary submerged forest deposits in Minehead Bay may also require further investigation, although it was not visited during the Phase 2a pilot fieldwork, and the accessibility of these deposits is unknown.

11.1.5 Intertidal areas at Stroat, Aylburton, Sharpness, Hills Flats, Aust, Northwick, Gravel Banks and Avonmouth, Portbury and Portishead, Woodspring Bay and Sand Bay were not examined during the Phase 2a pilot, and will have to be examined during the main Phase 2 fieldwork. Although the SMR/HER searches and NMP studies did not reveal many features in these areas other than some fishing structures, their true archaeological potential is largely unknown. Additional riverbank areas along the Parrett, and the Severn along the upper reaches of the RCZAS survey area, will also have to be surveyed.

11.1.6 The results of the Phase 2a pilot fieldwork indicate that rocky foreshore areas in the intertidal zone outside Watchet Harbour, in Helwell Bay/Doniford Bay and at Guscar Rocks have very low archaeological potential, suggesting that this is true of all such locales. The main Phase 2 fieldwork would thus be better focused on other intertidal areas.

11.1.7 Although the ridge and furrow, rhynes, gripes and other surviving earthworks along the inner Severn in Gloucestershire have been mapped as part of the NMP (Dickson and Crowther 2008), the Phase 2a pilot fieldwork suggests that in certain areas there is greater archaeological complexity visible on the ground than was apparent from historic aerial photographs. If time and resources permitted, some selected areas of earthworks such as those near Awre could be surveyed in greater detail. Once again, however, the priority must be on areas under greatest threat from erosion and/or development, or where the SMP2 indicates that 'managed retreat' will be taking place.

11.1.8 Although prehistoric, medieval and Second World War archaeological features on upland heath such as Bossington Hill and Quantoxhead have been mapped in some detail (e.g. Riley 2006; Riley and Wilson-North 2001), small bays and areas of foreshore below the steep headlands and at the base of the steep combes at Selworthy Sand and Greenaleigh Point have not been examined (R. Wilson-North pers. comm.). Some features from post-medieval or early modern quarrying and agriculture may survive here. As these areas are also actively eroding, it might be worth examining them during the main Phase 2 phase, although this must remain a lower priority.

11.1.9 The riverbank, coastline and intertidal areas from Arlingham southwards down to Avonmouth, Portishead, Clevedon and Weston-super-Mare, with the exception of an area of Oldbury Flats, were not examined at all as part of the RCZAS Phase 2a pilot, as they did not form part of the interim Severn RCZAS NMP report (Fig. 3, Dickson and Crowther 2007), as outlined above in section 7.1.1. This includes areas at Berkeley and Slimbridge. These locales will therefore require fieldwork during the main Phase 2 fieldwork. The archaeological potential of many of these areas is quite high, with medieval, post-medieval and early modern fish weirs and putcher ranks recorded at Gravel Banks, Severn Beach and Oldbury-on-Severn (Riley 1998a, 1998b, 1999), and around English Stones/Second Severn Crossing (Allen 2005). At Oldbury Flats, in addition to the prehistoric peat deposits and Romano-British findspots and structural remains, Mesolithic and Neolithic artefacts, human and animal tracks have also been found (Brown 2007a, 2007b).

11.1.10 Several specific survey targets also need to be investigated during the main Phase 2 RCZAS fieldwork. This includes the possible round barrow or windmill mound indicated by lidar during the NMP survey, south-east of Bays Court near Westbury-on-Severn (Catchpole and Chadwick 2009a: 7; Truscoe 2007), which could not be reached during the Phase 2a pilot fieldwork due to access difficulties. In addition, there is a curious feature adjacent to Beacon Sand south-west of Waldings Pill and south-east of Wibdon, at ST 5740 9660. It is visible from the train, and also on aerial photographs and on satellite imaging on Bing Maps and Google Earth). It appears as a sub-circular area of reeds on salt grazing land, with a raised earthwork bank around it, but a gently concave, water-retaining centre. On historic tithe maps of the area, the field is called The Wharf, and this might indicate that there was a small landing stage or dock south-west of Waldings Pill. The earthwork feature may have been connected to this.

12 Proposed Phase 2 fieldwork

12.1 Staffing

12.1.1 The basic idea of a survey team consisting of three people seemed to work very well. This is considered the minimum number of people safe to work in the intertidal zone, for if one member of the team gets into difficulties or injure themselves, there are two other people present to get help and/or to physically evacuate the team member from the intertidal zone, in advance of an incoming tide for example.

12.1.2 As outlined in section 10.14.2 above, in areas of dense and complex intertidal archaeology, it may be easier for one person to use the handheld GPS to survey features, one person to record them, and the third to take digital photographs (but see section 12.2.4 below). A three-person team also provides good coverage when walking parallel to one another across wide expanses of intertidal zone when looking for features.

12.1.3 In certain situations, however, such as surveying on relatively open upland heath or salt grazing areas, and recording from riverbanks along the inner Severn and its tributaries, it may be safe to have just two members in a survey team, but only following an appropriate Risk Assessment outcome. Similarly, if a hovercraft or other vehicle is being used, the limited space within such vehicles means that a team of two may be more appropriate, so long as trained rescue crew members are present with the hovercraft to provide health and safety backup.

12.1.4 Although a team of three people is considered appropriate for most RCZAS survey work, the amount of archaeology that will be necessary to survey in the main Phase 2 project is such that one team cannot possibly cover the study area. In order to take advantage of the lowest spring tides in areas such as Minehead Bay, Blue Anchor Bay and Dunster Beach, St Audrie's Bay, Stert Flats and Berrow Flats, it is suggested that for short periods at least, two field teams each consisting of two people should be operating concurrently, as long as they remain within visual contact with one another.

12.1.5 Additional staff working for the RCZAS Phase 2 project on a full-time basis will have to be employed by GCCAS. As well as those existing GCCAS team members who have now acquired intertidal survey expertise (Adrian Chadwick, Briege Williams and Nick Witchell), it would be extremely advantageous to recruit staff who have previous intertidal archaeology experience.

12.2 Access and Health and Safety

12.2.1 Unless English Heritage can help facilitate the free transfer of information, prior to fieldwork commencing, the Commercial Services department of the Land Registry will have to be contacted to purchase details of land ownership for certain areas, in order to arrange access for fieldwork. Given the costs involved (see section 6.3.3 above), the number of searches should obviously be minimised, and should perhaps only be considered for areas where no access via public footpaths or other public areas is possible.

12.2.2 At Berrow Flats and if possible at Stert Flats as well, it will be vital for RCZAS survey staff to access the furthest and potentially earliest archaeological features in the shortest time and in the safest possible manner. Wherever possible, use should be made of hovercraft or All Terrain Vehicles (ATVs, see Catchpole and Chadwick 2009b), progressing outwards from the shoreline; or alternatively small inflatable boats, progressing inwards from the sea. Clearly, the hire of hovercraft, ATVs and/or boats would have significant cost

implications, but might well be cost-effective through increased productivity of records and this should be examined in detail.

12.2.3 In other sections of the river such as Oldbury and Hills Flats (see below) and along the riverbanks of the upper Severn, as well as along the banks of the River Parrett and other tributaries, use of a small boat might be considered. These riverbanks are often steep with deep, sucking mud deposits, and would be extremely hazardous for survey staff to move across. In order to record the positions and details of some features as accurately as possible, two main options for the main Phase 2 field survey project are proposed:

- A boat-based survey voyage along suitable areas of each bank would compliment the methods and results of a survey undertaken along the upper Severn by the Worcestershire Archaeology Service (Hurst, Miller and Noke 2008), and might detect features at the base of the bank by the waterline not otherwise visible from higher up on dry land. In many areas to be visited, however, the risks of boats becoming grounded at low tide would be a major health and safety consideration;

- Alternatively, a laser rangefinder coupled to a handheld GPS and data logger may allow accurate points to be taken by staff without the need to get physically next to the features in question. This device could be purchased as part of the Stage 2 equipment provision (see Catchpole and Chadwick 2009b).

12.2.4 As noted in the Phase 2a pilot Project Design (Catchpole and Chadwick 2009a: 21, section 7.2.4), any contractor used to provide boats and operator will be required to abide by the MCA *Use of Small Workboats Code of Practice*, and the vessels would need to be MCA coded. Hire is likely to be expensive and require further training of staff to reach relatively few areas. It is therefore likely that use of boats would be less cost-effective in terms of the number of archaeological features accurately located than a laser rangefinder.

12.2.5 At Hills Flats, an extensive area of the intertidal zone is only accessible from the shoreline via a steeply sloping concrete sea wall, with no convenient steps or other access points. Here, very careful consideration will have to be given as to how this area can be surveyed safely. Once again, several options for the main Phase 2 field survey project are suggested:

- A boat could be used to gain access to the intertidal zone from the river, negating the need to climb down the sea wall (but see discussions in section 12.2.2 and 12.2.3 above). Obviously, staff would have to have suitable small boat training;

- An ATV could be used to drive along the intertidal zone at low tide, allowing staff to enter and exit the area in the most rapid possible time. The potential amphibious capabilities of these vehicles would also provide health and safety reassurance in the event of sudden rising tides, although they would not be able to cope with being fully afloat in the strong Severn tides. Staff training in their use would again be necessary;

- Fixed lines may have to be put in place so that staff members can rappel down the sea wall onto the intertidal zone, but the lines might have to be monitored to make sure that they are not disturbed or vandalised whilst staff are out surveying, and once again, survey staff will have to have suitable training in such work;

- Alternatively, a laser rangefinder coupled to a handheld GPS and data logger could again be employed to take readings safely from the top of the sea wall (see section 12.2.3 above). Again, this method is likely to represent the most cost-effective and rapid method of survey, with a disadvantage being that small features or finds may not be visible from a distance.

12.2.6 Although it was not visited as part of the Phase 2a pilot fieldwork, the island of Steep Holm may have to be surveyed as part of the main RCZAS Phase 2 project, although as much of its archaeology is not under direct threat it will probably remain a low priority. Any work there will obviously involve boat trips to and from the island, and may even require a survey team to spend the night on the island if that is permissible.

12.2 IT and recording equipment and methodologies

12.2.1 Given the problems with the technical support received during the pilot phase (9.2 above), it is recommended that new data logger/GPS equipment and software suppliers are investigated for the main Phase 2 fieldwork stage. Alternatives are known to be manufactured by Topcon and Magellan. If multiple survey teams are necessary for some of the RCZAS project (section 12.1.4 above), then an equivalent number of sets of handheld GPS units will be required. For the timescale of the Phase 2 survey, it may be more cost effective to purchase rather than rent such equipment, but the costings for this will have to be carefully assessed. English Heritage advice that RCZAS survey needs to be rapid and cost effective and that a sub-metre level of accuracy is not required from GPS survey (P. Murphy per comm.) will be taken into account.

12.2.3 Further communication with other RCZAS teams would help with the choice of equipment, software and methodology. There were issues during the pilot fieldwork with repeating experiments and methodological developments that have already been tried out by other people and organisations in the past. Ideally, the chosen software should be compatible with a wide range of widely used formats, and should avoid proprietary licensing agreements.

12.2.4 As outlined in sections 10.14.2 and 12.1.2 above, each survey team should normally consist of three people, with one person using the handheld GPS to survey features, one person recording them, and the third person taking digital photographs. However, the nature and format of the recording may need to be rethought. Filling-in detailed digital recording forms with a stylus on a touch screen was often cumbersome, and as it utilised the same piece of handheld data logging equipment as the GPS this was often very inefficient. In areas with numerous and/or complex features it would not be possible for one person to do all of this recording. Although the printed recording sheets in general worked well and were relatively simple to use, these would not be practical in cold, wet and windy conditions.

12.2.5 Another possibility is for the person doing the recording to use a digital voice recorder to dictate descriptions and notes concerning features according to a series of written prompts, and this information could later be entered onto a database or onto digital recording forms held on the RCZAS project laptop, or transferred from voice recordings using commercial transcription software packages. This could be done at high tide when no intertidal surveying was possible. If no waterproof/water resistant recorders are available, than Aquapack waterproof cases similar to those used during the Phase 2a pilot for the satellite telephone and mobile telephones could be purchased for the recorders, provided that these do not muffle sounds too much.

12.2.6 The required accuracy of the survey records is an issue that needs to be resolved. Many handheld GPS units have sub-metre accuracy in two-dimensions (X and Y co-ordinates), but the Z or height readings are less accurate, only to within 4-5 metres, and not to any fixed margin of error that can be later compensated for. The Z co-ordinates obtained during the Phase 2a pilot fieldwork were completely inaccurate. The RCZAS Project Brief stated that for each site identified, an accurate co-ordinate should be taken using a GPS with a differential correction (DGPS) in order to improve the accuracy of data to +/- 3m (Murphy 2007: 12, section 6.9). If it is a requirement of the main Phase 2 RCZAS fieldwork

that three-dimensional modelling takes place, than larger, more accurate differential GPS units will be required, at least for some areas such as peat shelves. In many instances, however, it may be that errors of +/- 1-3m are acceptable (R. Brunning pers. comm.). It currently appears likely that two units capable of greater than 3m accuracy would be preferred by English Heritage to one more accurate (and more expensive) unit. Requests could be made to English Heritage survey teams to assist with more detailed recording where sites requiring this are identified.

12.3 Sampling and artefact retention

12.3.1 The need to take wood samples for species ID, radiocarbon (^{14}C) dating and/or dendrochronology dating is an important issue that requires further discussion prior to the planning of the main Phase 2 RCZAS fieldwork, as does the necessity of taking samples of peat for dating and palaeo-environmental purposes, and alluvial sediments. The retention of artefacts and faunal remains also needs considered discussion.

12.3.2 The need for dating of different classes of fish weir was highlighted in the Phase 1 reports (Dickson and Crowther 2007, 2008; Mullin 2008). There is a compelling argument that especially with those features suspected of being early in date, and/or those that are poorly preserved and highly susceptible to erosion, sampling for species ID and dating purposes should be undertaken at the same time as the recording (R. Brunning pers. comm.), rather than being left to a separate (and as yet unconfirmed) Phase 3 programme, as originally proposed in the Project Brief and the Updated Project Design (Catchpole and Chadwick 2009a: 37, section 10.9.3; Murphy 2007). There is no guarantee that wooden features would still be present and/or accessible in the future – those formed from small stakes may well be buried by silts or eroded altogether by tidal action. Similarly, although the original Project Brief specified that the collection of non-organic finds would be minimised (Murphy 2007: section 6.12), some artefacts and faunal remains associated with peat or alluvial deposits may be eroded and lost following recording, but before they can be sampled in future fieldwork.

12.3.3 It has also been suggested that timber samples should be taken from each shipwreck identified, if it is suspected that they are more than 250-300 years old (R. Brunning pers. comm.). Although this would probably only apply to a few examples, this would also have implications for the logistics and timescale of fieldwork.

12.3.4 Clearly, if such sampling does take place during the main Phase 2 RCZAS project, this would increase the amount of time that staff would spend in areas such as Minehead Bay, Blue Anchor Bay and Dunster Beach, St Audrie's Bay, Stert Flats and Berrow Flats. In the long run, however, this would be more cost effective, as repeat visits would not be required in order to obtain samples. Particularly in Stert Flats and Berrow Flats, if survey staff did have access to a hovercraft, ATV or boat, this would greatly facilitate the transportation of samples from the intertidal zone back to the shore.

12.3.5 If suitable storage facilities were made available, samples could always be taken even if there were no immediate plans to analyse them as part of the Phase 2 fieldwork programme. Additional funding for analyses could then be sought in the future.

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Figure 1: Severn Estuary RCZA Survey Area

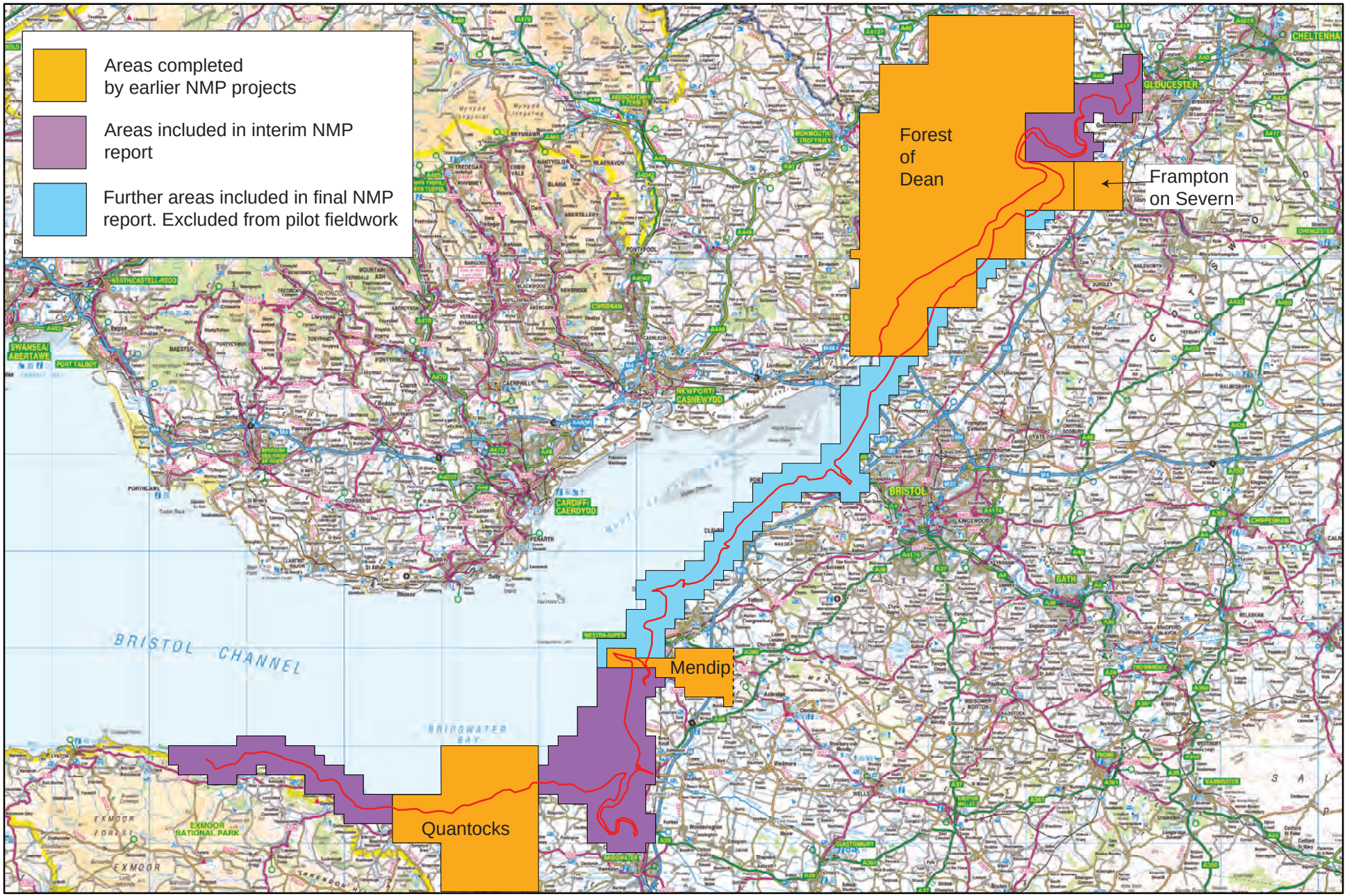


Figure 2: NMP coverage

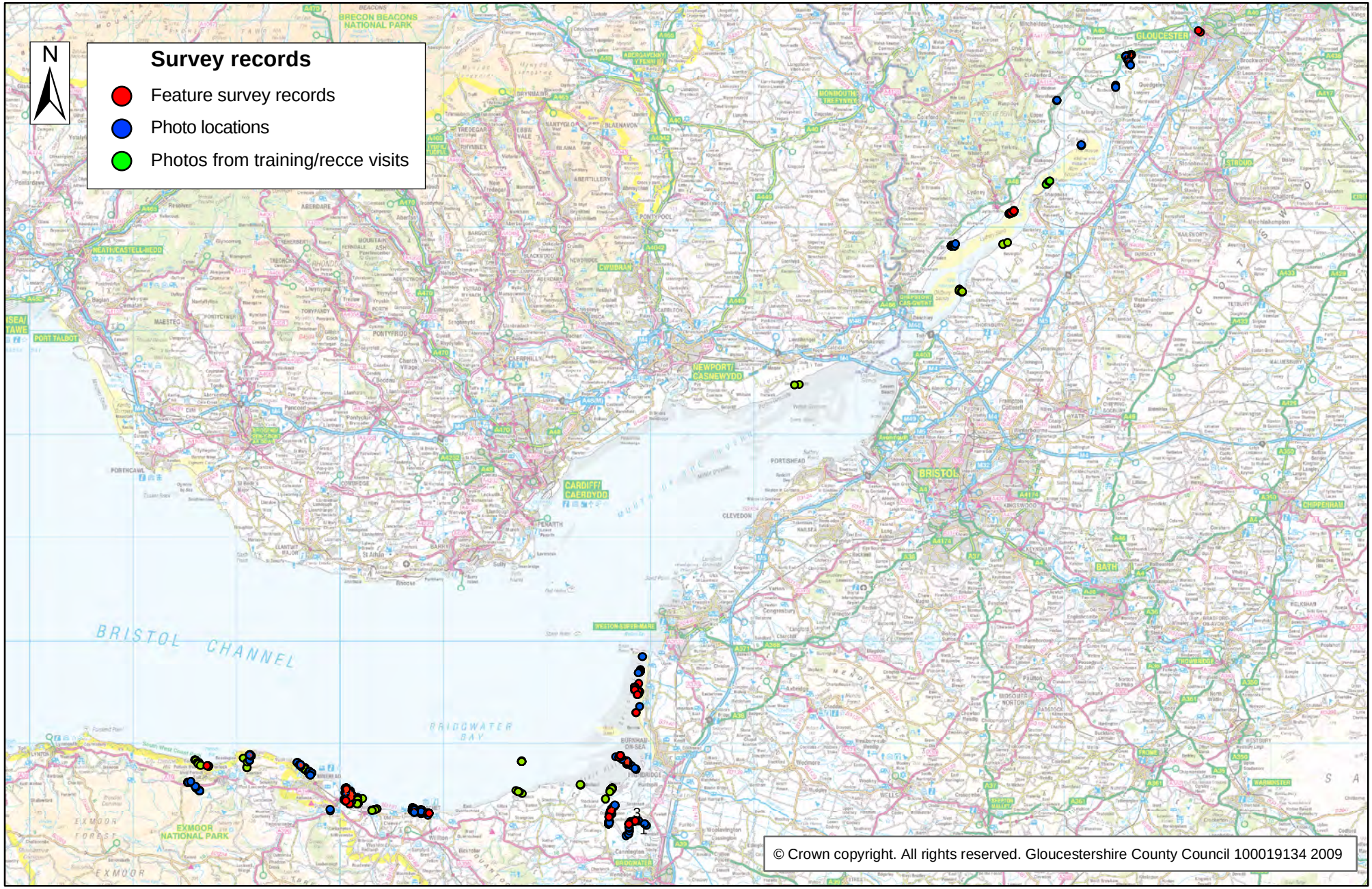


Figure 3: Locations visited and recorded during RCZAS Phase 2a

1:500,000

0 25 km

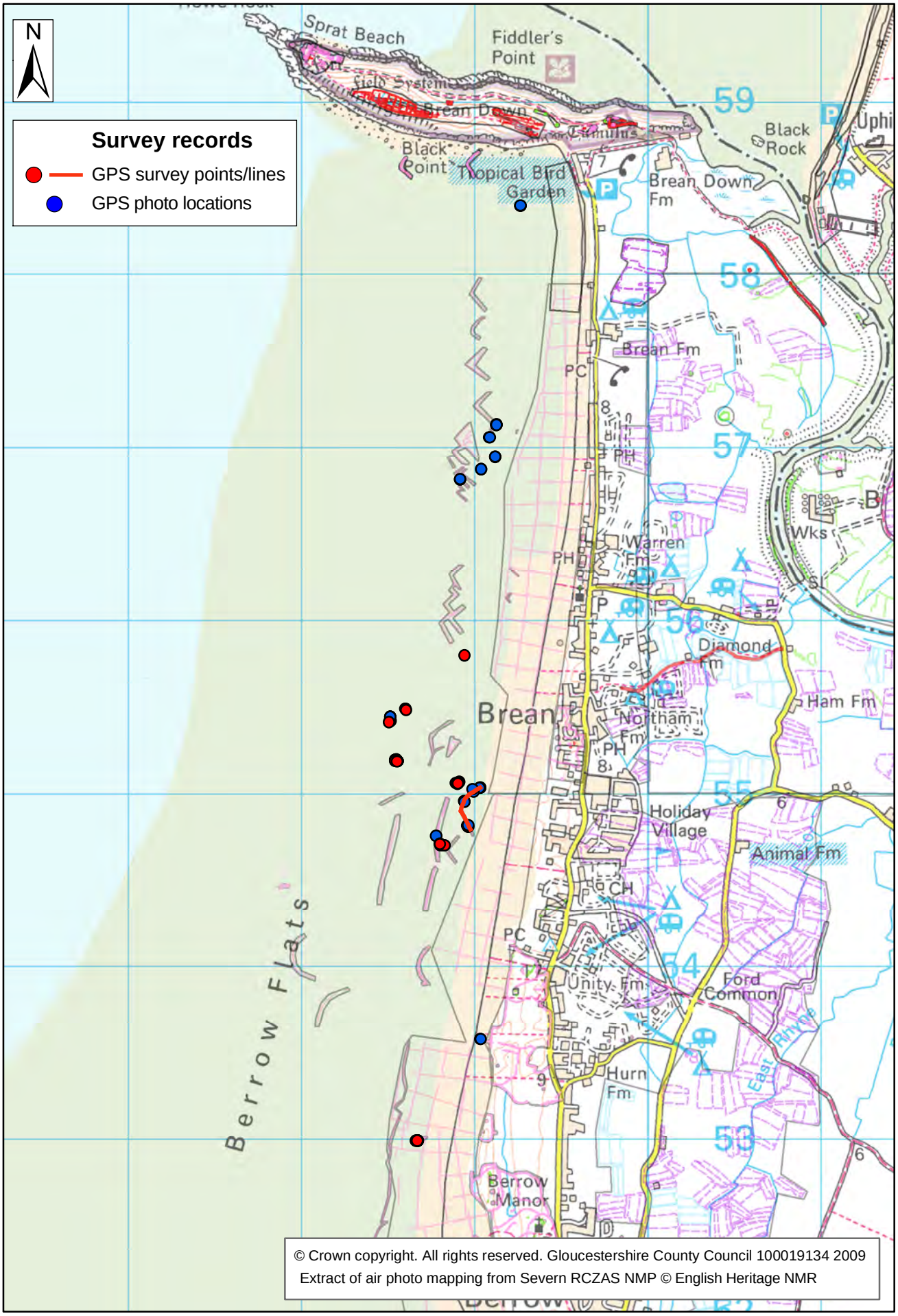


Figure 4: Detail of survey records made at Berrow Flats (NMP mapping in background)

1:30,000

0 1,000 m

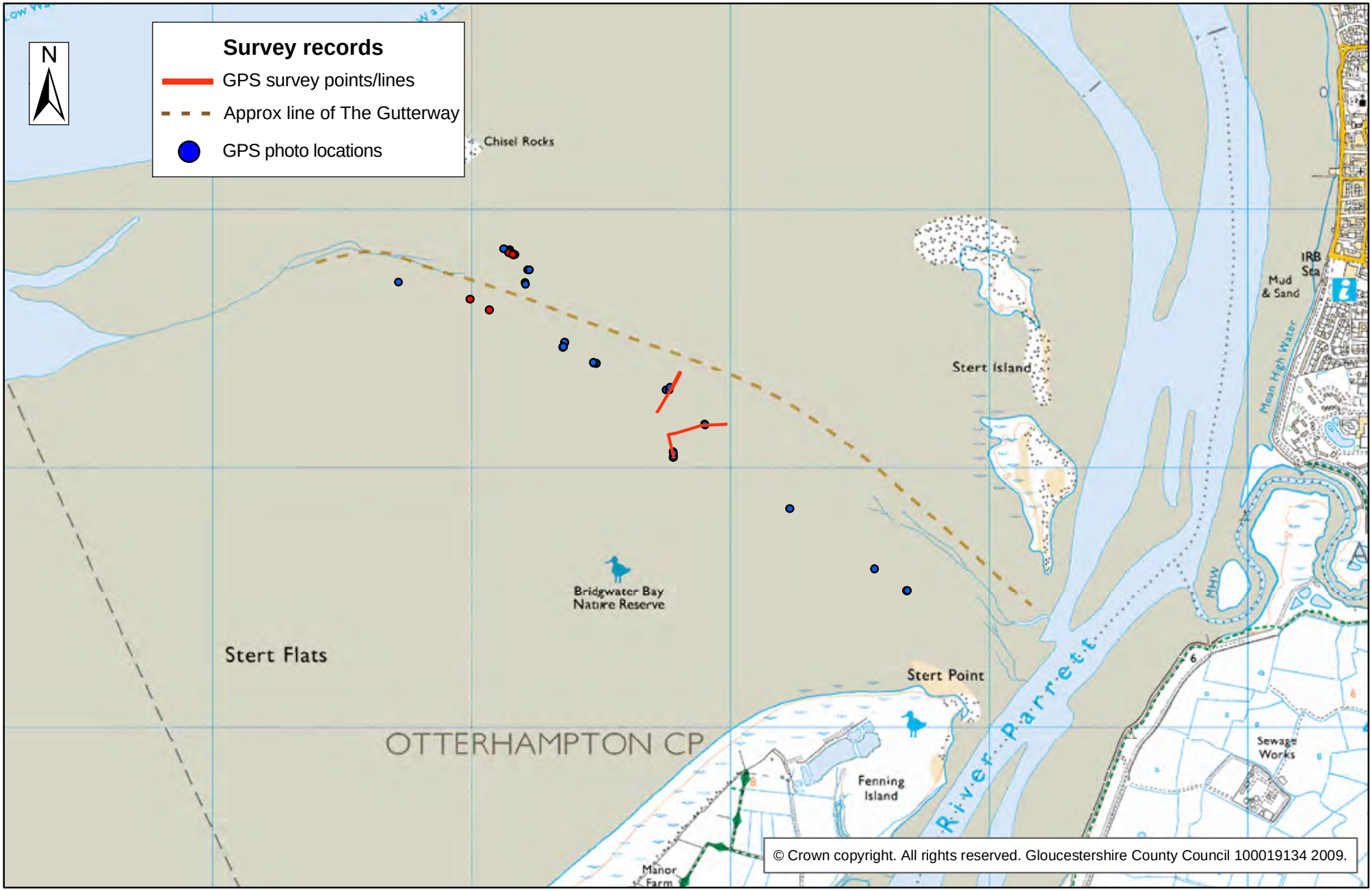


Figure 5: Survey records from Stert Flats

1:20,000

0 1,000 m

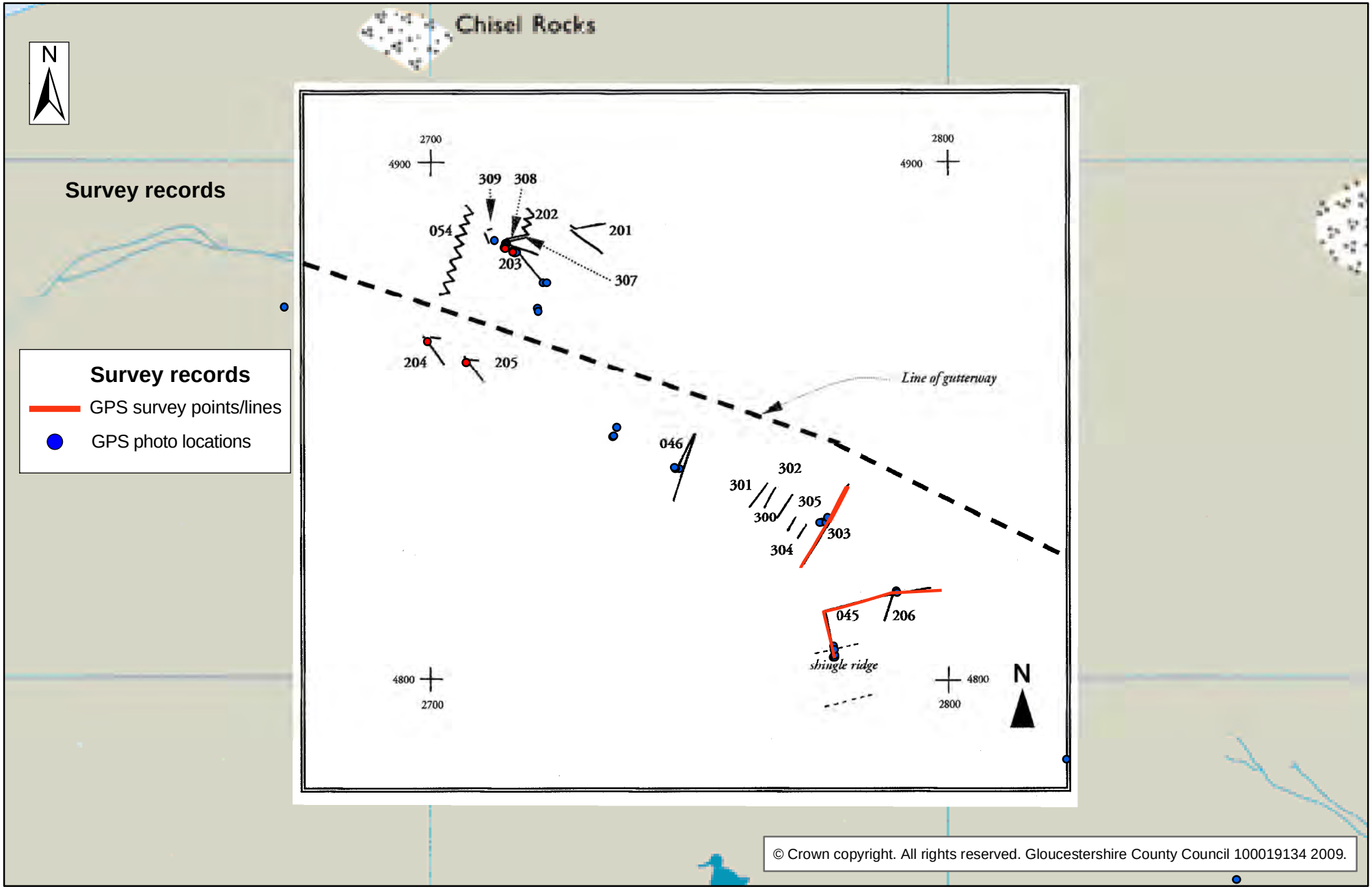


Figure 6: Detail of survey area at Stert Flats, in comparison with previously surveyed features (Brunning 2008: 69, fig. 1).

1:10,000

0 500 m

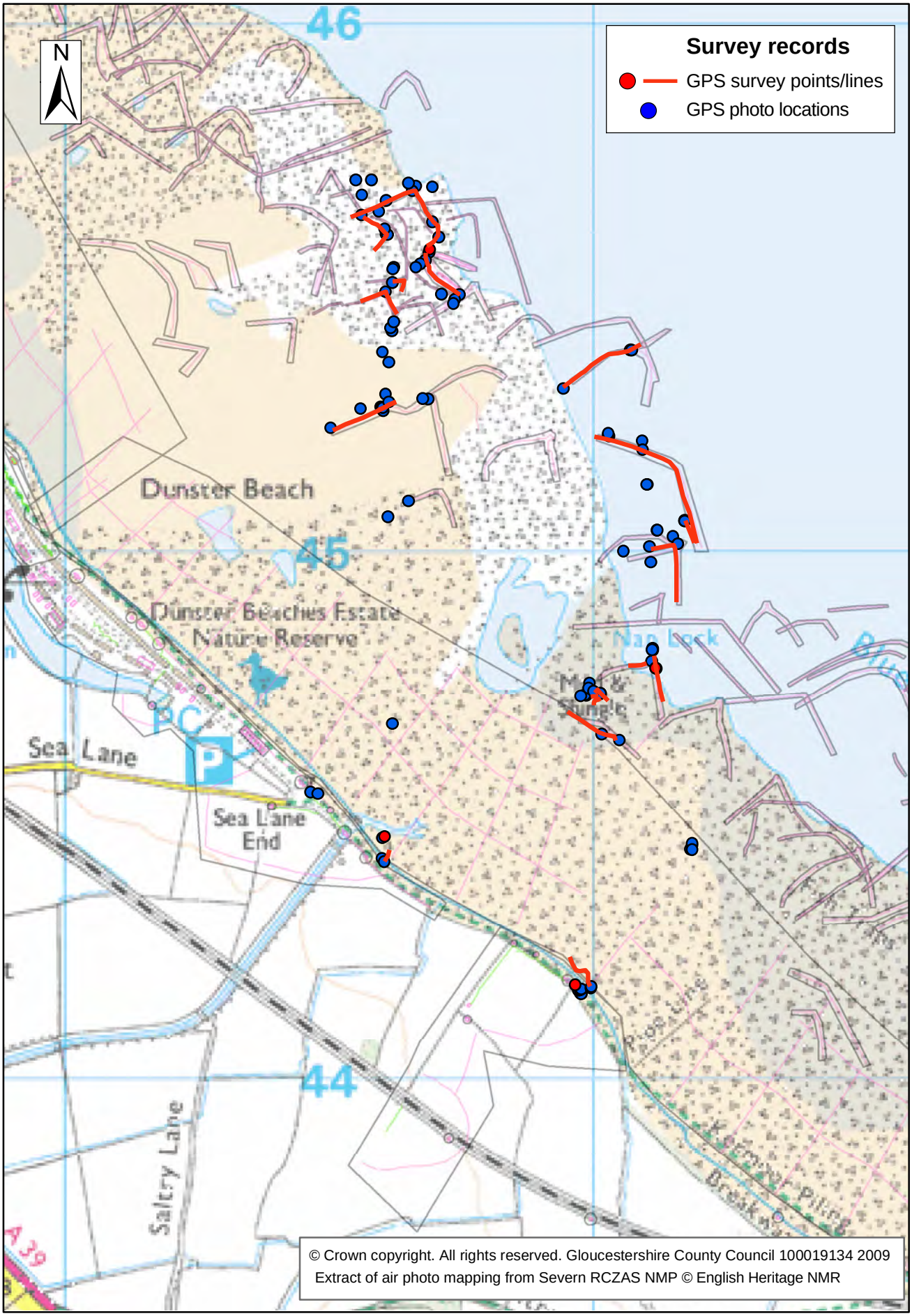


Figure 7: Survey records from Dunster Beach over NMP mapping

1:10,000

0 500 m

Plates

Plate 1: Nick Witchell of GCCAS using the Trimble GeoXT and Geobeacon to record a feature (a concrete base) at Lilstock Harbour, Somerset.

Plate 2: Nigel Nayling (right) training GCCAS staff in the recognition of wood species and waterlogged wooden structures, on the Gwent Levels near Magor Pill, South Wales.

Plate 3: The side of one of the stake and wattling 'bays' identified in the riverbank near Elmore Back Farm, Gloucestershire.

Plate 4: The northern end of the earthwork known as the 'Great Wall' near Elmore, Glos. Note the difference in the height between the fields on either side of the bank.

Plate 5: Possible timber revetment on the south-western edge of Grange Pill, Glos.

Plate 6: Worked timber beam with rectangular mortise hole, Guscar Rocks, Glos.

Plate 7: Possible fish house on the Severn riverbank near Awre, Glos.

Plate 8: The Grade II Listed former fish house at Collow Pill near Newnham, Glos, now renovated and used as a small fishing museum.

Plate 9: A possible former gamekeeper or fish keeper's cottage near Bollow, Glos, with later additions used for farm storage. A demolished privy is at the extreme left of the picture.

Plate 10: Remains of one of the better preserved trows south-west of Lydney Harbour, Glos.

Plate 10: A less well-preserved vessel south-west of Lydney Harbour, Glos.

Plate 11: Part of the linear stone and timber feature (Glos SMR 53258) south-west of Lydney Harbour, Glos.

Plate 13: Nick Witchell recording a Second World War gun emplacement on Bossington Hill, Somerset (Som HER 7298).

Plate 14: Adrian Chadwick standing next to one of the lines of large posts immediately outside of the entrance of Watchet Harbour, Som.

Plate 15: Briege Williams and Nick Witchell recording one of two overlapping stone fish weirs at Culver Cliffs, Minehead, Som. (Som HER 7810 and 7813).

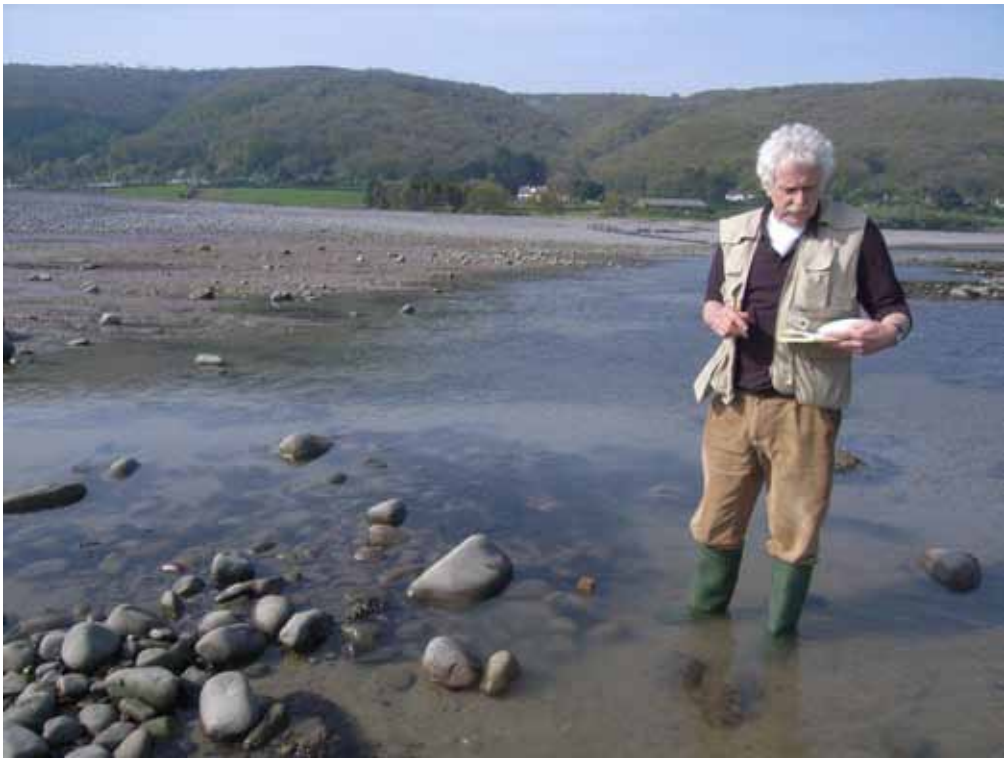


Plate 16: Richard McDonnell next to the site where aurochs remains were excavated at Porlock Bay, Porlock Weir, Som.

Plate 17: The apex of the most well-preserved example of three stone fish weirs in Porlock Bay, Porlock Weir, Som. (Som HER 7907/7908).

Plate 18: The BARB hovercraft *Spirit of Lelaina* on Berrow Flats, with structures to the north (right on the photograph) formed of small wooden stakes, Bridgwater Bay, Som.

Plate 19: Previously unrecorded peat deposits on Berrow Flats, Bridgwater Bay, Som., with Brean Down in the background. At the right of the photograph the bovid pelvis is just visible.

Plate 20: Adrian Chadwick and Nick Witchell observing one of the known shipwrecks recorded on Berrow Flats, Bridgwater Bay, Som. (Som. HER 2860).

Plate 21: Detail of a probable timber fishing structure formed from small roundwood stakes on Berrow Flats, Bridgwater Bay, Som. This illustrates the difficulties in identifying such features, and how vulnerable they are to erosion.

Plate 22: Briege Williams recording the probable timber fishing structure on Berrow Flats, Bridgwater Bay, Som. Note the shallow scouring line around the stakes. The island of Steep Holm is in the background.

Plate 23: A shipwreck previously recorded by the Severn NMP aerial survey along the south-western bank of the River Parrett at North Clyse near Combwich, Som. This photograph well illustrates the hazardous deep, sucking mud present along the riverbanks.

Plate 24: Nick Witchell recording a well-preserved pillbox on the north-eastern bank of the River Parrett near Pawlett, South Gloucestershire (South Glos HER 11596).

Plate 25: Nick Witchell, Briege Williams and Dr Vanessa Straker (far right) examining a stake-built timber structure on Oldbury levels, Oldbury on Severn, South Glos. The seaweed hampers identification of such slight features.

Plate 26: Large L-shaped, stake-built fish weir on Stert Flats, Som. (Som. HER 12650). Hinkley Point power station is in the background.

Plate 27: Double stakelines of a fishing related structure (possibly originally for putts or putchers) on Stert Flats, Som. (Som. HER 12652). The Gutterway is in the far background.

Plate 28: Dr Richard Brunning sampling a timber stake from the apex of a V-shaped fishing weir on Stert Flats, Som. (Som. HER 27938). The part of the stake protruding above the intertidal surface has been markedly eroded by tidal scouring.

Plate 29: Briege Williams and Toby Catchpole recording lines of modern metal net supports, stone net weights and associated stone clearance on Dunster Beach, Som.

Plate 30: Briege Williams and Toby Catchpole recording a stone and timber built V-shaped fishing weir on Dunster Beach, Som. (Som HER 27267).

Appendix A – Risk management forms

A1 General risk assessment

A2 Pre-survey site specific assessment form

A3 Daily survey log

Hazard/Risk and Risk Rating	P	S	RF	Control Measures and Residual Risk	P	S	RF	Responsibility
1) General procedures	2	3	6	• Field survey team will consist of 2-3 staff • Weather predictions to be noted before survey work, and tide times and tidal windows to be noted • NO lone working under any circumstances • Staff to inform line manager of times of absence from office • Designated office 'buddy' to be informed of times of visits, safe arrival at site and safe exits, and to be responsible for calling field team • Staff to complete a Daily Field Survey Log for each survey visit/day • Staff to complete entry in GCC calendar noting arrival at and estimated leaving time of offsite location • Location of nearest A&E to be noted on survey visit and contact forms • Mobile phones to be carried at all times with the back up facility of the satellite phone; staff to be familiar with the use of the satellite phone	1	3	3	GCC staff
2) Emergency/accident whilst driving to and from GCC base to site	2	4	8	• Mobile phones to be available for use in case of emergency, but not to be used by driver whilst driving • Staff not to drive tired and to allow adequate rest breaks • All equipment to be safely stowed in transit • Follow GCC safe driving at work procedures	2	2	4	GCC staff
3) Foreshore stability – soft foreshore; staff become stuck in soft sediments	2	4	8	• Staff to check in with Coastguard before entering areas of particularly dangerous	1	4	4	GCC staff

P = Probability: 1 = remotely possibly but known occurrence; 2 = occasional occurrence; 3 = fairly frequent occurrence; 4 = regular occurrence.
S = Severity: 1 = negligible injuries; 2 = minor injuries; 3 = major injuries; 4 = single fatality; 5 = multiple fatalities
RF = Risk Factor (frequency x severity): 1-4 = tolerable; 5-7 = moderate; 8-11 = substantial; 12 + = intolerable

				foreshore within survey area • Lifejackets and harnesses to be worn on soft foreshores and ranging poles to be carried to test the ground for stability • Throwing lines to be carried by team members • Staff to contact emergency services promptly if initial efforts at self-help/rescue are unsuccessful				
4) Operations near water – staff fall in water	1	4	4	• Lifejackets and harnesses to be worn at ALL times when in intertidal zone and on riverbanks	1	2	2	GCC staff
5) Range Operations – staff stray into firing range with live firing/demolition taking place	1	5	5	• Staff to know locations of and to avoid active ranges	1	2	2	GCC staff
6) Ordnance – staff injured by discarded live ordnance	1	5	5	• Staff to not approach or pick up suspicious objects • Staff to evacuate area immediately and notify the Coastguard	1	2	2	GCC staff
7) Containers / dangerous chemicals	2	3	6	• Staff not to approach containers on farmland or washed up on the beach that may contain harmful substances • Staff to avoid the area and inform Coastguard if necessary	1	1	1	GCC staff
8) Presence of harmful trace elements, heavy metals, and/or harmful diseases in riverine and coastal waters and sediments (Hepatitis A and B, Weil's Diseases, etc)	2	**4**	8	• Staff to check the cleanliness of beaches and waterways, proximity to outfalls, industrial waste discharges etc as part of site specific risk assessment • Staff to ensure that inoculations for Hepatitis A and B, and Tetanus are in date • Staff to ensure that clean water and anti-bacterial handwash is available and to wash hands thoroughly before food and drinks are consumed during fieldwork • Staff to monitor selves for flu-like symptoms occurring after survey work	1	3	3	GCC staff

P = Probability: 1 = remotely possibly but known occurrence; 2 = occasional occurrence; 3 = fairly frequent occurrence; 4 = regular occurrence.
S = Severity: 1 = negligible injuries; 2 = minor injuries; 3 = major injuries; 4 = single fatality; 5 = multiple fatalities
RF = Risk Factor (frequency x severity): 1-4 = tolerable; 5-7 = moderate; 8-11 = substantial; 12 + = intolerable

				(e.g. Weil's Disease) and seek prompt medical advice				
9) Foreshore working – trip and slip hazards; staff cut off by the tide	2	3	6	• Staff to enter survey areas by publicly accessible safe access points • A designated member of staff to be responsible for checking the state of the tide and arranging the safe times for survey visits • Tidal windows for access to site to be checked each day and noted on the Daily Field Survey log • Staff to pay particular attention to exit and egress points from the foreshore and to establish that sufficient time is available to exit from foreshore before high tide • Higher areas of foreshore to be noted and used as access corridors wherever possible • Cliffed areas with headlands and/or limited access to be vacated before tide comes in • Staff to note prominent trip hazards on site during survey to feed back into Site Specific Risk Assessment Procedures • Survey work to be undertaken only in daylight hours • Staff to take particular care w hen walking or scrambling over rocky or uneven foreshore areas • Staff to look out for broken glass, rusty cans and other sharp edged objects and to bring these to the attention of co-workers so that they can be avoided	1	3	3	GCC staff
10) Welfare – risk of sunburn, heat stroke, exposure, hypothermia	2	2	4	• Staff provided with base layers and breathable, waterproof clothing, and to have layers of clothing which can be	1	2	2	GCC staff

P = Probability: 1 = remotely possibly but known occurrence; 2 = occasional occurrence; 3 = fairly frequent occurrence; 4 = regular occurrence.
S = Severity: 1 = negligible injuries; 2 = minor injuries; 3 = major injuries; 4 = single fatality; 5 = multiple fatalities
RF = Risk Factor (frequency x severity): 1-4 = tolerable; 5-7 = moderate; 8-11 = substantial; 12 + = intolerable

				added to or removed • Safety wellingtons and salopettes to be worn where appropriate, as identified in site specific RA • High protection sunblock and sunhat to be used where appropriate • First Aid kit to be carried and a qualified First Aider to be part of the team • Hot or cold drinks to be available • Survival bags to be carried in rucksacks and in vehicle as part of First Aid kit				
11) Unstable cliffs – staff injured by falling rocks	2	4	8	• The stability of any cliffs to be investigated as part of the site specific risk assessment procedures • Staff to avoid working under, resting or sheltering under unstable cliffs • Hard hats to be worn if it is necessary to work close to the base of unstable cliffs	1	4	4	GCC staff
12) Sand dunes collapsing and burying staff – risk of suffocation and crushing	1	5	5	• Staff to avoid carrying out survey work under overhanging dune edges, and in areas where accumulating sand remains loose and liable to subsidence • Staff to avoid climbing onto dune crests where down slopes are particularly steep and precipitous	1	4	4	GCC staff
13) Entering potentially unstable military buildings, risk of falling rubble – risk of head and other injuries	1	4	4	• Hard hats to be worn as appropriate • Avoid base of cliffs • Avoid entering pillboxes etc	1	3	3	GCC staff
14) Staff entering areas where vehicles or lifting cranes are operating – risk of being run over	1	4	4	• High-viz jackets and/or tabards to be worn • Communicate with contractors and agree safe access and safe systems of work	2	3	3	GCC staff
15) Construction vehicles working on beaches and flood defences – staff injured by construction vehicles	1	4	4	• High-viz jackets and/or tabards to be worn • Communicate with contractors and agree safe access and safe systems of work • Note to be taken of area that	2	3	3	GCC staff

P = Probability: 1 = remotely possibly but known occurrence; 2 = occasional occurrence; 3 = fairly frequent occurrence; 4 = regular occurrence.
S = Severity: 1 = negligible injuries; 2 = minor injuries; 3 = major injuries; 4 = single fatality; 5 = multiple fatalities
RF = Risk Factor (frequency x severity): 1-4 = tolerable; 5-7 = moderate; 8-11 = substantial; 12 + = intolerable

				vehicles are working in and staff to avoid this				
16) First Aid – minor injuries and major injuries	2	2	4	• Survey team to include a staff member with a current First Aid qualification. • A First Aid kit to be carried by a team member at all times • Staff to take particular care of trip hazards, sharp edges/points and splinters when surveying intertidal structures and to notify co-workers • Location of nearest Emergency Department to be recorded and noted by staff • If severe or life-threatening symptoms are present, seek emergency evacuation from the foreshore and help immediately	2	2	4	GCC staff
17) Any additional risks noted by GCC staff				•				GCC staff

P = Probability: 1 = remotely possibly but known occurrence; 2 = occasional occurrence; 3 = fairly frequent occurrence; 4 = regular occurrence.
S = Severity: 1 = negligible injuries; 2 = minor injuries; 3 = major injuries; 4 = single fatality; 5 = multiple fatalities
RF = Risk Factor (frequency x severity): 1-4 = tolerable; 5-7 = moderate; 8-11 = substantial; 12 + = intolerable

Emergency Contacts:

Name	Role	Telephone	Address
Adrian Chadwick	Project Officer	01452 425681 Mobile: ***** ******	GCC Main Telephone Number: 01452 425681
Toby Catchpole	Senior Project Officer	01452 425681 Mobile: ***** ******	GCC Main Telephone Number: 01452 425681
Paul Nichols	Senior Project Manager	01452 425681 Mobile: ***** ******	GCC Main Telephone Number: 01452 425681
Nearest A & E:			
Coastguard: HM Coastguard Swansea Operational Area : Marsland Mouth, North Devon /Cornwall Border to River Towy, Camarthen		999 ask for Coastguard 01792 366534	HM Coastguard Swansea Mumbles Swansea SA3 4EX

GLOUCESTERSHIRE ARCHAEOLOGY SERVICE: PRE FIELDWORK CHECK LIST

Site name: SMP division:

	CHECKED	ACTION NEEDED/COMMENTS
SURVEY AREA TOPOGRAPHY		
ACCESS ROUTES. ANY OTHER LIMITATIONS TO ACCESS ON OR OFF SURVEY AREA		
LANDSCAPE TYPE(S)		
GROUND TYPE(S)		
SCALE OF LANDSCAPE HAZARD (1-5) – 1 = MILD PERIL, 5 = EXTREME HAZARD		
LOCATION OF PUBLIC PATHS		
NAME AND ADDRESS OF NEAREST A&E HOSPITAL		
ENVIRO CONSTRAINTS		
VISUAL CHECK FOR PROTECTED SPECIES, CHECK GIS FOR ENVIRO DESIGNATIONS		
PRESENCE OF WILDFOWL		
SITE FACILITIES/RULES		
PARKING		
NEAREST TOILET FACILITIES		
FULL INTER-TIDAL ZONE PPE REQUIRED? – LIFEJACKETS, THROWLINES, SAFE ACCESS ROUTES ETC.		
ACCESS ISSUES		
RIGHTS OF WAY ON AND TO SITE?		
NAME AND ADDRESS OF LANDOWNER		Need to contact? Done?

Also complete and sign page 2

GLOUCESTERSHIRE ARCHAEOLOGY SERVICE: PRE FIELDWORK CHECK LIST

Site name: SMP division:

HEALTH AND SAFETY TICKLIST SITE SPECIFIC HAZARDS OR EQUIPMENT	**PROB THAT PRESENT? ✓ or X**	**ACTION REQUIRED**
WATER – TIDAL / RIVER		
WATER – STANDING		
BOAT / HOVERCRAFT		
WEATHER –TEMPERATURE / WIND / LIGHT PROBLEMS		
MUD / QUICKSAND		
UNEVEN / UNSTABLE / SLIPPERY SURFACE		
UNSTABLE STRUCTURES		
FALLING ROCKS / RUBBLE		
SEWAGE OUTFALL		
NEEDLESTICK INJURIES		
LIVESTOCK / ANIMALS (INC. LEPTOSPIROSIS RISK)		
HAZARDOUS SUBSTANCES (E.G. FARM CHEMICALS)		Where possible identify exactly what substances are present to allow COSHH assessment
GROUND CONTAMINATION		
ASBESTOS		
SHARP OBJECTS (METAL, GLASS ETC)		
ACCESS / BOUNDARY ISSUES		
OVERHEAD SERVICES		
PUBLIC AND VISITORS (INCLUDING CHILDREN)		
VIOLENCE/AGGRESSION		
ELECTRICAL EQUIPMENT		
OTHER USERS OF AREA		
NOISE		
LONE WORKING		Not allowed under any circumstances
OTHERS		
FURTHER COMMENTS		
DATE AND INITIALS:		

V01 MARCH 2009

Task Information	
Site name/Survey area	
Archaeological aims and tasks	Non-intrusive survey of:
Date/s task is to be undertaken	
Tide times	GMT LWT (Time and level): HWT (Time and level):
Safe tidal window (BST)	
Foreshore access/exit point	
Any obstacles to access	
Weather forecast (previous day)	Wind speed: Direction: Rainfall and sea conditions:

Contact telephone numbers	**Coastguard (Swansea): 01792 366534** Landowners:
Nearest Emergency Department	

Communications	Mobile phones		Satellite phone		Whistle		Induction/ briefing given	
Safety and rescue	Ranging poles		Lifejackets		Throw ropes		Safety wellies/ boots	
	Water proofs		High-viz tabards		Toilet/ hand washing facilities		Compasses	
	Sunhat		Sunblock		Shelter		Food and Drink	

Health and Safety Risk Assessment Process	
RA completed by Date	Adrian Chadwick, Project Officer Tel: 01452 425681

Emergency Contacts:

Name	Role	Telephone	Address
Adrian Chadwick	Project Officer	01452 425681 Mobile:	GCC Main Telephone Number: 01452 425681
Toby Catchpole	Senior Project Officer	01452 425681 Mobile:	GCC Main Telephone Number: 01452 425681
Paul Nichols	Senior Project Manager	01452 425681 Mobile:	GCC Main Telephone Number: 01452 425681
Nearest A & E:			
Coastguard: HM Coastguard Swansea Operational Area : Marsland Mouth, North Devon /Cornwall Border to River Towy, Camarthen		999 ask for Coastguard 01792 366534	HM Coastguard Swansea Mumbles Swansea SA3 4EX

Appendix B – Record sheets

B1 Phase 2a recording sheet

B2 Phase 2a timber/wreck recording sheet

GLOUCESTERSHIRE ARCHAEOLOGY SERVICE: RCZAS survey sheet

SMP Area:	**Process unit:**	**Cell:**	**Record no:**
Local HER No.:	**NMR No.:**	**Previously recorded?** Yes No	

Access

Accessed
Access blocked
Seen – no access
Access prevented – landowner
Access prevented – conditions

Landscape Type

Riverbank
Ditch / rhyne / grype
Salt marsh / salt grazing
Intertidal
Cliffs / headland
Sand dunes
Heathland / moorland
Grassland
Cultivated
Built up
Other :

Ground type

Vegetated
Rock
Cobbles / pebbles
Sand
Other :
Mud
In water
Built over

Condition of feature

Good
Poor
Bad
Destroyed
Not located
Unknown

Possible date of feature

Unknown
Prehistoric
Romano-British
Medieval
Post-medieval
Modern
Still in use

State of tide

Dimensions of feature (if not recorded on GPS)

Length:
Height / depth / thickness:
Width:
Orientation (compass):

Photographs Yes No

Drawn Yes No

OD Height	**Initials**	**Date**

Feature type – Stone structure

Fish weir
Wall
Groyne
Building
Slipway
Wharf / quay
Breakwater
Revetment
Base
Dam
Post support ring
Net weight line
Cairn
Other :

Feature type – Metal structure

Fish weir
Putt / putcher rank
Fishing netline posts
Groyne
Building
Breakwater
Revetment
Base
Other military structure
Anti-tank / beach obstacle
Mooring post(s)
Crane / derrick
Signal light / horn
Other :

Feature type – Metal and stone structure

Fish weir
Post support ring
Fishing netline posts
Wall
Groyne
Building
Wharf/quay
Breakwater
Revetment
Base
Anti-tank / beach obstacle
Mooring post(s)
Other :

Feature type – Wood structure

Fish weir
Putt / putcher rank
Fishing platform
Fishing netline posts
Trackway
Fence
Building
Wharf / quay
Breakwater
Mooring post(s)
Revetment
Base
Other :

Feature type – Concrete structure

Wall
Groyne
Building
Slipway
Wharf / quay
Breakwater
Revetment
Base
Pillbox
Other military structure
Anti-tank / beach obstacle
Other :

Feature type – Concrete and metal structure

Anti-tank/beach obstacle
Wall
Groyne
Building
Breakwater
Revetment
Base
Wharf / quay
Mooring post(s)
Other :

Feature type – Stone and wood structure

Fish weir
Post support ring
Building
Wharf / quay
Breakwater
Revetment
Base
Other :

Feature type – Brick structure

Wall
Groyne
Building
Wharf / quay
Breakwater
Revetment
Base
Pillbox
Other :

GLOUCESTERSHIRE ARCHAEOLOGY SERVICE: RCZAS survey sheet

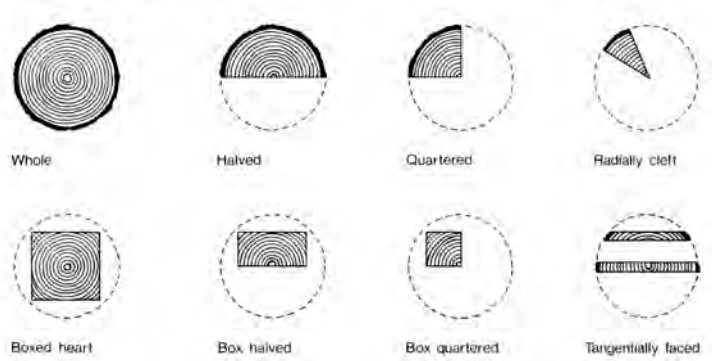
Feature type – Wattle / hurdle structure

Fish weir	Revetment
Trackway	Building
Revetment	Fish basket
Fence	Other:

Size of materials in feature type

Largest	*Smallest*
Length:	Length:
Width:	Width:
Height / depth:	Height / depth:

Timber conversion / sketch



Tool marks / tally marks_____

Joints and fixings_____

Surface treatment_____

Species / condition_____

Feature type – Earthworks

Ditch

Rhyne	Grype	Water meadow	Decoy	Moat	Enclosure
Hillfort	Wood boundary	Field boundary	Ha-ha	Other :	

Bank

Sea wall	Flood defence	Enclosure	Hillfort	Wood boundary	Field boundary
Ha-ha	Emplacement	Other :			

Ditch and bank(s)

Moated site	Enclosure	Hillfort	Motte and bailey	Other :

Mound

Windmill	Barrow	Motte	Refuge	Starfish / AA	Other :

Ridge and furrow

Broad	Narrow	Curved	Straight	Pronounced	Flattened

Building platforms	*DMV / SMV*	*Holloway*	*Other* :

Other feature types

Stone clearance (for nets and weirs)		Peat deposits	Palaeochannel	Submerged forest	Red hills
Artefacts	Faunal remains	Human remains	Footprints / tracks	Coppice stools	Other :

Samples taken Yes No

Wood (C14)	Wood (dendro)	Wood (other)
Bone	Shell	Sediment / soil
Peat (enviro)	Peat (C14)	Charcoal (C14)
Red hill	Other :	

Artefacts retained Yes No

Pot	Animal bone	Human bone
CBM	Stone	Wood
Metal	Glass	CP
Leather	Other :	

Additional description / notes_____

GLOUCESTERSHIRE ARCHAEOLOGY SERVICE: RCZAS wreck / timber record sheet

SMP Area:	**Process unit:**	**Cell:**	**Record no:**
Local HER No.:	**NMR No.:**	**Previously recorded?** Yes No	

Access

Accessed
Access blocked
Seen – no access
Access prevented – landowner
Access prevented – conditions

Landscape Type

Riverbank
Ditch / rhyne / grype
Salt marsh / salt grazing
Intertidal
Cliffs / headland
Sand dunes
Heathland / moorland
Grassland
Cultivated
Built up
Other :

Ground type

Vegetated
Rock
Cobbles / pebbles
Sand
Mud
In water
Built over
Other

Condition

Good
Poor
Bad
Destroyed
Not located
Unknown

Possible date

Unknown
Prehistoric
Romano-British
Medieval
Post-medieval
Modern

State of tide

Dimensions (if not recorded on GPS)

Length:
Height / depth / thickness:
Width:
Orientation (compass):

Photographs Yes No

Drawn Yes No

OD Height

Initials

Date

Feature type – Wooden wreck

Sides

Clinker
Butting planks
Carved wood (logboat?)
None
Unknown

Hull planking

Single layer
Multiple
None
Unknown

Hull fastenings

Iron
Cu alloy
Cord
Wooden pegs
None
Unknown

Hull caulking
Hull sheathing
Rudder
Sternpost
Stempost
Keelson
Transoms
Mast steps
Decking
Engine mounts
Propeller(s)
Other machinery

Feature type – Metal and concrete wrecks

Hull fastenings

Iron
Cu alloy
None
Unknown

Hull caulking
Hull sheathing
Rudder
Sternpost
Stempost
Keelson
Transoms
Mast steps
Decking
Engine mounts
Propeller(s)
Other machinery

Feature type – Non-structural / loose timbers

Fastenings

Iron
Cu alloy
Cord
Wooden pegs
None
Unknown

Planking

Single layer
Multiple
None
Unknown

Evidence for working?

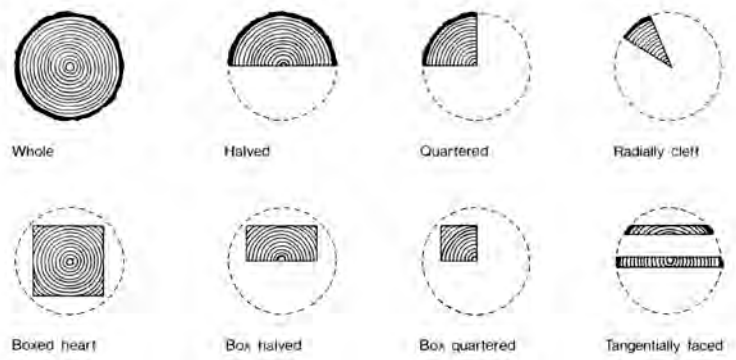
Record overleaf ►

GLOUCESTERSHIRE ARCHAEOLOGY SERVICE: RCZAS wreck / timber record sheet

Size of materials

Largest	*Smallest*	*Or, average size*
Length:	Length:	Average length:
Width:	Width:	Average width:
Height / depth:	Height / depth:	Average height / depth:

Timber conversion / sketch



Tool marks / tally marks_____

Joints and fixings_____

Surface treatment_____

Species / condition_____

Samples taken Yes No

Wood (C14)	Wood (dendro)	Wood (other)
Sediment / soil	Peat (enviro)	Peat (C14)
Charcoal (C14)	Other :	

Associated artefacts Yes No

Pot	Animal bone	Human bone
CBM	Stone	Wood
Metal	Glass	CP
Leather	Other :	

Additional description / notes_____

Appendix C – Fieldwork records

C1 Summary of digital records.

C2 Digital record fields.

C3 Exemplar written site records for Stert Flats and Dunster Beach.

RCZAS Phase 2a field survey digital record summary

When	Where	Fastmap job	ESRI shapefiles	GPS photos
3rd April	Elmore	Elmore	Elmore (string)	309-348
7th April	Guscar Rocks	N/A	N/A	349-367
9th April	Magor Pill (training day outside RCZAS area)	N/A	N/A	370-382
14th April	Hawkins Pill & Bays Court, Westbury on Severn	N/A	N/A	394-436
15th April	Lydney Level/ Lydney Sands	Lydney	LydneyPOINT	427-473
16th April	Lydney Level/ Lydney Sands	Lydney2	LydneyRCZASSTRING, LydneyRCZASPOINT	474-533
20th April	Bossington Hill	BOSSINGTONTEST	Bossington_test (string)	534-555
21st April	Watchet	Watchet	WatchetRCZASSTRING	556-591
22nd April	Minehead	Minehead	MineheadRCZASSTRING	592-661
23rd April	Porlock	Default	Porlockpoly, porlockpoint2, porlockpoint3	662-745
24th April	Helwell/Doniford Bays	staudries	donifordRCZASSTRING, donifordRCZASPOINT	746-759
27th April	Berrow Flats	Berrow	berrowRCZASSTRING, berrowRCZASPOINT	765-807
28th April	Berrow Flats	Berrow	berrowRCZASSTRING, berrowRCZASPOINT, berrowpoint	808-835
8th June	River Parrett (N from Combwitch)	Combwitch	combwitchRCZASSTRING, combwitchRCZASPOINT	849-921
17th June	Oldbury on Severn	Oldbury	OldburyRCZASSTRING	923-938
22nd June	Stert Flats	Stert	stertRCZASSTRING, stertRCZASPOINT	948-991
23rd June	Blue Anchor Bay (Dunster)	Dunster1	dunster1RCZASSTRING, dunster1RCZASPOINT	992-1042
24th June	Blue Anchor Bay (Dunster)	dunster2	dunster2RCZASSTRING, dunster2RCZASPOINT	1045-1099
25th June	River Parrett (W from Pawlett)	river Parrett 2	pawlettRCZASSTRING, pawlettRCZASPOINT	1100-1140
30th June	Gloucester City Centre bench marks	benchmark test	benchmark_test	N/A

NB Shapefiles merged into string/polyline (pilot stringrecords.shp), point (pilotpointrecords.shp) and polygon (porlockpoly.shp) files for dissemination. All GPS photos merged into single point shapefile (mergedpilotphotolocations.shp).

Digital record fields used during Severn RCZAS pilot fieldwork

POINT FIELD	STRING FIELD	NAME	SIZE	TYPE	OPTIONS IN RADIO OR LISTS (NOTES)
2	1	RECORD NO.	5	NUMERICAL	(DAILY OR SITE BASED SEQUENCE)
3	2	RECORDER	3	TEXT	
4	3	DATE	6	TEXT	
5	4	SMP AREA	4	RADIO	SEV ND&S
6	5	PU-CELL	6	TEXT	(UPDATED TO DRAFT SMP2 PUS)
7	6	PREV-REC?	7	RADIO	Y N UNCLEAR
8	7	HER-NO	8	TEXT	
9	8	NMR-NO	8	TEXT	
10	9	ACCESS	25	LIST	ACCESSED ACCESS BLOCKED SEEN NO ACCESS ACCESS PREVENTED LANDOWNER ACCESS PREVENTED CONDITIONS
11	10	LANDSCAPE TYPE	20	LIST	BUILT UP CLIFFS/HEADLAND CULTIVATED DITCH/RHYNE/GRYPE GRASSLAND HEATH/MOORLAND OTHER INTERTIDAL SAND DUNES RIVERBANK SALT MARSH/SALT GRAZING
12	11	GROUND TYPE	20	LIST	BUILT OVER COBBLES/PEBBLES IN WATER MUD OTHER ROCK SAND VEGETATED
13	12	CONDITION	20	LIST	BAD DESTROYED GOOD NOT LOCATED POOR UNKNOWN
14	13	POSS DATE	14	LIST	MEDIEVAL MODERN POST-MEDIEVAL PREHISTORIC ROMANO-BRITISH STILL IN USE UNKNOWN
15	14	LENGTH	8	NUMERICAL	(2 DECIMALS I.E. 1.23)
16	15	HEIGHT-DEPTH-THICKNESS	8	NUMERICAL	(2 DECIMALS I.E. 1.23)
17	16	WIDTH	7	NUMERICAL	(2 DECIMALS I.E. 1.23)
18	17	ORIENTATION	7	TEXT	
19	18	PHOTOS	1	TOGGLE	Y N
20	19	DRAWN	1	TOGGLE	Y N
21	20	DESCRIP	25	LIST	BRICK CLEARANCE

POINT FIELD	STRING FIELD	NAME	SIZE	TYPE	OPTIONS IN RADIO OR LISTS (NOTES)
					CONCRETE CONCRETE & METAL EARTHWORK NEGATIVE EARTHWORK POSITIVE FAUNAL REMAINS METAL METAL & STONE NATURAL FEATURE OTHER PEAT STONE STONE & WOOD WATTLE OR HURDLE WOOD
22	21	TYPE	25	LIST	ARTEFACTS BANK BARROW BASE BREAKWATER BUILDING BUILDING PLATFORM CAIRN COPPICE STOOLS CRANE-DERRICK DAM DECOY DITCH DMV-SMV EMPLACEMENT ENCLOSURE FAUNAL REMAINS FENCE FIELD BOUNDARY FISH BASKET FISH WEIR FISHING PLATFORM FLOOD DEFENCE FOOTPRINTS-TRACKS GROYNE GRYPE HA-HA HILLFORT HOLLOWAY HUMAN REMAINS LINE NET POSTS & WEIGHTS LINE NET WEIGHTS MOATED SITE MOORING RING OR POST MOTTE MOTTE & BAILEY MOUND OTHER OTHER MILITARY STRUCT PALAEOCHANNEL PALAEOCHANNEL FILL PEAT DEPOSIT PEAT SHELF PILLBOX POST SUPPORT PUTT-PUTCHER RANK RED HILLS REFUGE REVETMENT RHYNE RIDGE & FURROW ROUNDHOUSE SEA WALL SIGNAL LIGHT OR HORN SLIPWAY STONE CLEARANCE SUBMERGED FOREST TRACKWAY UNKNOWN

POINT FIELD	STRING FIELD	NAME	SIZE	TYPE	OPTIONS IN RADIO OR LISTS (NOTES)
					WALL WATER MEADOW WHARF-QUAY WINDMILL MOUND WOOD BOUNDARY WRECK WW2 BEACH OBSTACLE
23	22	LARGEST-L	7	NUM	(2 DECIMALS I.E. 1.23)
24	23	LARGEST-W	7	NUM	(2 DECIMALS I.E. 1.23)
25	24	LARGEST-H	7	NUM	(2 DECIMALS I.E. 1.23)
26	25	SMALLEST-L	7	NUM	(2 DECIMALS I.E. 1.23)
27	26	SMALLEST-W	7	NUM	(2 DECIMALS I.E. 1.23)
28	27	SMALLEST-H	7	NUM	(2 DECIMALS I.E. 1.23)
29	28	TIMB CONV	20	LIST	BOX HALVED BOX QUARTERED BOXED HEART HALVED QUARTERED RADIALLY CLEFT TANGENTIALLY FACED UNKNOWN WHOLE
30	29	TOOL MARKS	25	TEXT	
31	30	FIXINGS	25	TEXT	
32	31	SURFACE	25	TEXT	
33	32	SPECIES	25	TEXT	
34	33	TIMBER COND	25	TEXT	
35	34	R&F TYPE	8	LIST	CURVED N/A STRAIGHT
36	35	R&F WIDTH	8	LIST	BROAD N/A NARROW
37	36	R&F HT	10	LIST	FLATTENED N/A PRONOUNCED
38	37	SAMPLES	25	LIST	BONE CHARCOAL-C14 CHARCOAL-SPECIES NO OTHER PEAT-C14 RED HILL SEDIMENT-SOIL SHELL WOOD-C14 WOOD-DENDRO WOOD-SPECIES
39	38	FINDS KEPT	25	LIST	ANIMAL BONE CBM CP GLASS HUMAN BONE LEATHER METAL NO OTHER POT STONE WOOD
40	39	COMMENTS	99	TEXT	

Monday 22nd June
Site: Stert. Meet Richard McDonnell and Richard Brunning at 8.00 AM Steart car park –
High Tide: 06.58 (Burnham) Low 13:43 BST
Staff on site: TC, BW, NW
Notes: TC

Fastmap Job: Stert. **ESRI shapefiles:** stertRCZASSTRING, stertRCZASPOINT. **GPS Photographs:** 948-991.

Purpose of the day was training/familiarisation. RMcD had advised that limited recording time would be available and the day would be best spent walking out as far as possible to be shown the archaeology of the area and to get an idea of the potential hazards. The records and photographs taken therefore don't reflect everything that was visible.

Beautiful sunny morning, afternoon clouded over. Met on time and made the long trawl from Dowells Farm car park out to Stert Point. Walked out from the point along the south of the Gutterway walking NE for c. 500m before turning NW avoiding the quicksand (see UPD fig. 11). The first few photos (up to 951) show the general scene walking across the sand and occasional shallow mud while we were waiting for the tide to go out.

The first feature recorded (all were recorded to check location against previous surveying rather than in detail) was a large L shaped fish weir (045 on RB's plan, HER12650) formed of many small stakes (photos 952-955). RB said it was post-med. The eastern end was only just emerging from under the water and although we recorded one continuous line, the previous plan had indicated a further arm (RB 206, HER 27935, visible on the left of photo 958) which wasn't recorded with the GPS. The eastern most part of the line recorded was narrower and the stakes appeared to either be larger (or just better preserved?)(photos 957-8). Previous surveying of this and subsequent features was pretty accurate when compared to the GPS records we made, with a difference of 4-13m. NMP locations are generally less accurate.

There was a series of straight double lines of stakes (300-305 on RB's plan) one of which was recorded to check location (RB 303, HER 27949, photos 959-962). The Richards said these features were net lines of fairly recent date. A further double line, of multiple phases, was photographed (RB 046, HER12652, photos 963-966).

At about this point RMcD pointed out that there were more net lines than visible at his earlier visits, suggesting that there had been some scouring and lowering of the surface in this area. As all the features that we recorded or photographed appear on RB's earlier plan we don't know how accurate this suggestion is, which means we need to go back and do a full GPS survey of everything that is currently visible as a state of play record. There are certainly many small V shaped weirs on the NMP that we saw no sign of (although the two to the north of our route thus far would have been underwater when we passed). Both the Richard's agreed that the low channel to the south of the gutterway (that the net lines crossed) appeared deeper and a more significant feature than they remembered.

As we continued west we should have been passing through a plethora of small v-shaped fish traps recorded by the NMP. There was little sign of these. The area was characterised by a shelf of hard clay which had been rounded into a series of parallel ridges with pebbles collected in the furrows, presumably by the tide (photo 967). My Argyll wellies came in useful as Nick and Briege in their cheapo Dunlops were skidding all over the place. In a couple of places vague lines of stones were photographed (968-9), at right angles to the underlying

ridges in the clay, these may well be anthropogenic but are not in locations previously recorded, including by the NMP.

The unexploded mine recorded on the HER had been exploded by the forces bomb disposal unit last year (HER 12649), leaving somewhat of a crater in the sand and large chunks of aluminium shrapnel were found scattered over several hundred metres.

At the westernmost area that the Richards said was safe we put a couple of spots location points on the apex of V shaped fish weirs (RB 204, HER 27939 and RB 205, HER 27940) that Richard B had previously sampled.

Beyond this point the dry ground tapered to a narrow isthmus (photo 970) and we were advised to turn back. A lot of timbers were visible to the south of this area but we were strongly advised against going in that direction because of the risk of quicksand. We headed back east and crossed the gutterway which had drained sufficiently to be safe to wade across.

The Richards were alarmed at the lack of features visible in the area to the north of the gutterway as they had expected this to be the highlight of the day. A shallow but extensive layer of mud had been deposited over the area (photos 971-974, 990) and it was hoped that this was obscuring features rather than that they had been entirely eroded. The mud became deeper to the west and the attempt to look at the long conjoined row of weirs (RB 054) was abandoned.

The southern part of RB's feature 203 (HER27938) was only just visible (photos 972-3) but further north a significant number of stakes were visible (photos 975-990) but it was difficult to discern structures or relate to the existing plan (photo 978). RB asked us to take a spot record of the location of a previous sample he had taken (western spot in this area, difficult to relate to a specific HER record) and he also decided to take a further dendro sample stake from the apex of weir 203 (HER 27938), in case nothing was left next time someone came out, which was also spot located (photos 982-989).

By this time (12:40) we'd been walking since 8:00, the children were getting tired and fractious and wanted their lunch and as we knew it was an hour and a half's walk back to the van we headed in. By the time we got back I was relieved that everyone else felt the need to collapse on the grass in the car park as well. Good day though. Drove to Dunkery Beacon B&B for showers then back to Dunster for tea. I never enjoyed a pint of Stowford Press so much.

Tuesday 23rd June
Site: Blue Anchor Bay (Dunster) sample transect recording
High Tide 07:24 (Minehead), Low 13:15 BST
Staff on site: TC, BW, NW.
Notes: TC

Fastmap Job: Dunster1. **ESRI shapefiles:** dunster1RCZASSTRING, dunster1RCZASPOINT. **GPS Photographs:** 992-1042.

Preamble:
At the preliminary day out at Dunster with RB and Buzz on 13 March we'd discussed how best to deal with an area that was so dense with features and how to decide actually what to record when we had no way of dating things just from looking at them. We agreed that we should come out and walk a couple of transects across this beach and record everything to test where we got to. As it turned out we still decided that we wouldn't get across the beach if we recorded stop nets made out of lines of scaffold poles, these were recorded by GPS photo with (usually) a spot record made of the end from which they were photographed.

One of the major issues was the unreliability of the GPS handheld and the fact that many of the features to be recorded were huge. It didn't really make sense therefore for one person with the handheld to walk along fish weirs locating them and then have to write descriptions using the fiddly little keyboard. We had to have three members of staff in these locations so that there were two to get anyone injured back in. It therefore seemed sensible for one person with handheld to locate features, another to photograph and the third to write descriptions using old fashioned technology (shorthand notebook and biro). This generally worked very well, although bad weather would have made it difficult. It also took a fair amount of co-ordination between team members, to the extent that I got accused of barking orders at Nick. One other point that came out of the day was that although the GPS camera can survive being dropped in the sea, if you don't wipe the bit of glass that covers the lens cover dry afterwards you still don't get very good photos. If you're used to a SLR then the separate viewfinder can catch you out on this.

Although the beach runs NW-SE we didn't trust the GPS enough to lead us on a pre-determined line across it and decided to walk a N-S NGR line. This day we walked out along 300600 and back in along 300700. We recorded everything that crossed this line or that was visible from it so we can safely say that we recorded everything visible on or between these two lines on the day. Overall this day was felt to be a great success (the next one not). Conditions were very good although it got a bit too hot. The photographs suggest that the conditions were murky but it didn't seem so at the time. The tide took a long time to start to go out, we hung around from 8:30 till 9:30 waiting for it go out far enough to be worth recording anything. When it did go out though it went much further than it had on either of the other two days we spent at Dunster.

The remainder of this note is mostly transcribed as written by NW straight from the site notebook (in italics), with photo numbers and HER refs etc. added. NW wrote descriptions for everything that went into the GPS handheld (hopefully).

Site record:
Notes NW, GPS TC, photos BW.

1. Single line of stakes. Modern wood not coloured. Curving. Variation in sizes. Groyne. Softwood. Recorded as is within transect. One of a series of modern groynes on this part of the beach.

String. Only really recorded because we were waiting for the tide to go out and to clarify roles and recording. Unsurprisingly there was no sign of the grid of WWII anti-aircraft obstructions recorded by the NMP in this area. Photos 992-3.

2. Single large post-trunk. Straight pieces of wood nailed to the top (attaching signs?). Mooring post? Poss used to measure depth of water. Single trunk with branches cut off. Vertically driven into ground. TC – spot record. Photo 994 (not pretty).

TC - Photos 995 & 1041 – V-shaped scaffold pole line (HER 27214) recorded before and after tide out.

GPS only working intermittently. Kept losing sat fix even in the open on a good day. Hasn't had these probs before. Walking a gridline for transects means we are more held up, as the tide retreats depending on topography, which the transect doesn't follow. Decided not to record fishing structures with metal scaffold poles.

*3. Fish weir. Recorded on NMR. Very poorly preserved. Spread out ridge of small boulders with m gaps. Eastern arm becomes difficult to follow, appears that there are other fishing weirs present, unclear where one stops and others begin. Concentration of wooden stakes along apex (*seaward side*) of western arm, mostly oak? Closely packed mixture of timber, quartered boxed and whole pieces. Poss mix of species, hard to identify.*

4. Extent of wood assoc. with structure 3. Wood is only visible a few cm above ground level.

TC- photos 996-1004 are of 3 and 4. HER 27261 (taken from NMP) indicates a much larger structure and that we only recorded the western arm. Even on the way back when we took photos of a scaffold pole structure (1039-1040) standing right on the eastern arm of this weir we didn't notice it. If the stone element of the structure had been slightly more dispersed we wouldn't have noticed it at all but it is only on checking the slight ridge of pebbles that we noticed any timber stakes at its front. This indicates two things, firstly that wood fish traps can be nigh on invisible and stone fish traps are hard to see on pebble beaches (which we already knew) and more importantly that in future we need to check every NMP (or other existing) record on the actual spot rather than just walking past in the general area or eroded stakes could very easily be missed.

Photo 1006 – pebble mound around a pole at the end of a net line. Couldn't be tied in with any of the visible surrounding structures.

Photos 1007-8 show the U shaped scaffold pole weir that cuts 5. (HER 27222). There was no sign on ground of HER 27220.

5. V-shaped fish weir, has been disturbed and cut by modern oval fish weir (with scaffold poles) on the eastern arm. Comprises boulders (30-40cm) spread out up to 5m wide. No wood visible but has quite a lot of sediment over and between boulders. 2-3 layers of boulders thick in places, still fairly well consolidated, with one breach in the wall. No timbers observed but likely to be buried under sediment. Centre line recorded.

TC – photos 1005, 1008-10. Feature is slightly misplaced on NMP/HER mapping but maybe the NMP recorded its centre line when it was more intact?

6. Very small V-shaped structure (remnant of larger feature?) Making use of natural bank. Centre line recorded. Poor condition, surviving best at apex where it is 2-3 layers thick in places, sparse and spread out on each arm. No timber observed, but structure is covered in places by sand.

Also passed some banks which may be features but were very unclear, some photos were taken only.

TC – Photos 1011-12 are of feature 6, which is recorded on the HER as 22727. We saw no sign of HER 22728, or of the linear weirs (net lines) 27237 and 27238.

Photos 1013-14 are of another pebble mound around an assumed post, which must be the banks referred to by NW.

*7. Substantial V-shaped weir, using topography of a ridge to the east (*TC – think he means west*). Up to 4.5m wide. Distinct apex. No wood observed. Arms well built up 0.5-1m visible above water level. Central part is about 0.5m deep. NW-SE (*right*) arm is lower and more spread than NE-SW (*left*). Relatively well preserved. Boulder construction (0.30-0.40m diam). Eastern side becomes unclear at recorded extent and is also truncated by modern scaffold pole weir. Over the SW arm built on bank, width is unclear as is using the natural incline of the bank.*

TC – photos 1015-23 are of 7., which is HER 27234. Photos 1024-5 are of it being cut by the modern scaffold net line (9. below). This was entirely clear of stones which suggests that it has been revamped more recently than most. The easternmost bit of this feature as recorded may be another later weir, there were two breaches along it's length that might be trap sites or just breaches, it was very spread and indistinct, as with all these GPS string records just the centre line was recorded.

NB for Chris Webster - we didn't go over the pebble/boulder ridge to the west so have nothing to say about HER nos. 27229, 27230, 27239.

8. Fish weir. U-shaped. E-W orientated apex more substantial. W end built over bank of &. Eastern side is very sparse. Up to 2m wide spread, majority single line of boulders (up to 0.3-0.4m). No timber identified within structure.

TC – Hooray a previously unrecorded if unprepossessing fish weir. Uses a small part of the extent of 7. Photo 1027 (check angle to confirm it is actually showing this one).

*9. Modern scaffold pole line (GPS has joined with last fish weir, which it is not!) (*TC – corrected in shapefile version*). Single point record showing start of scaffold line – pebbles and boulders cleared approx 1.5m either side of line to allow for nets.*
TC – Photo 1026 taken from point at south end of line net scaffold poles 9. Photos 1028-1031 are general shots of the area that we walked to and the sea prevented us going any further, it having passed low tide time. From here on in we were heading back down NGR line 300700.

10. May be continuation of E arm of feature 7. Sparse single boulder layer, breached in places. Poor condition. No timber observed. Recorded further to the east appears to be a second V which may be a separate weir. More banks extend further to the east in an apparent continuous raft of weirs with the water flushing west to east with the natural slope.

Continued beyond our investigation area. Higher up there are large flat areas with no structures at all.

TC – Photos 1032-1038 were taken of numerous low degraded and confusing banks or pebble spreads in this area. The best preserved bit that we recorded closely matches HER27258 so it has obviously been derelict for some time. Photograph 1036 clearly shows a bank running along the line of the western arm of HER27219 but we can't have thought it worth recording at the time. Whether this was because it wasn't obvious at the time or because we'd been on our feet for six hours without a break and wanted to get back isn't now clear. Where features had been easy to pick up

Photos 1039-40 were to locate a further scaffold pole net line. There was no sign of HER 27261 or 27215 in this area.

Photo 1041 was of net line HER27241 as already mentioned and 1042 of the natural ridge that forms the west side of the tidal pond that remains at lowest tide, marked as NAP lock on OS plans.

Wednesday 24th June
Site: Blue Anchor Bay (Dunster) sample transect recording
High Tide: 08:15 (Minehead), Low 13:58 BST
Staff on site: TC, BW, NW.
Notes: TC

Fastmap Job: dunster2. **ESRI shapefiles:** dunster2RCZASSTRING, dunster2RCZASPOINT. **GPS Photographs:** 1045-1099.

Preamble:
Continued recording from the previous day. As the tide had taken so long to go out on Tuesday we had a leisurely full English and watched the red deer on Exmoor from the balcony at Dunkery Beacon before setting off. Even so, when we arrived at the beach at 9:30 the tide was in and the beach was about 20m wide (photo 1045, c.f. 1099 when we got back to the van). It wasn't worth even starting to record the WWII remains at the head of the beach until after 11:00, which wasn't a good start to the day. There was a strong onshore wind all day which meant we wasted a lot of time standing at the edge of the water waiting for it to recede. We had intended to walk out up 301000 and back down 301100 but there were few features on the gravel ridge to the east side of the tidal pond and Nap Lock and we ended up recording up to 301200 in zigzags following the tide out, staying out longer than we would if recording on the way back and walking straight back in once we'd reached the point where the tide wasn't going to go any further that day. We'd just about had it with the temperamental handheld which required rebooting throughout the day and frequently lost a signal despite it being hard to imagine a more open setting than hundreds of metres out on a beach 2km from the nearest contour line. Although it felt at the time that the tide hadn't gone out anything like as far as the day before, the OS suggested that we had walked the full extent of the beach and we just reached the furthest out fish weir mapped by the NMP. It didn't feel like such a successful day, even though we got more features on the GPS than on the day before, everyone was totally knackered from the previous two days and generally wanted to go home and lie down. Something to bear in mind if we plan any all week away trips next year. The caravan café at Dunster beach car park with its supplies of tea, fizzy pop, chips and ice cream (not all at once - although Nick could have given it a go) was the saving grace.

Site record:
Notes BW, GPS TC, photos NW.

11. Destroyed pill box, concrete with outer pebble layer. Broken up and in a pile on foreshore. Same as one in car park. There is another one approx 100m NW. Occ metal reinforcing. There is a line of vertical posts all the way along the beach from the outlet all the way to the other end where there is some sort of tower. Beach defence.

TC – Pillbox HER 15328. Photos 1046-49. Modern beach defence photos 1050-53.

12. Line of Sandstone blocks, just on the seaward side of the wooden defence posts. Large stones, not shaped, possible beach defence. Onshore wind so 2.5 hours after high tide still only 200m exposed from shore.

TC – Photos 1054-55. Photos 1056-59 - bored and having an enforced break waiting for the tide to go out.

13. Modern net line constructed with metal scaffold poles and stakes. Some associated stone net weights embedded in sand. 12:50 tide is still going out v. slowly, 1 hour until low tide and hardly anything is exposed.

TC – Photos 1060-61. Presumably Her 27279 although more than usually offset from that one. It's a shame that neither the NMP or HER records that we have give any info about construction, i.e. whether it's a stone bank or line net, it would be useful to know this.

14. L shaped pile of stones and pebbles. Possibly associated with 15 and 16. Function not clear as odd shapes. Man made.

15. Wiggly line of banked up stones. Possibly associated with 14 and 16. Function not clear, man made.

16. Curved line of banked up stones. Possibly associated with 14 and 15. Function not clear, man made.

TC – Photos 1062-69 show 14-16. Not previously recorded. Best guess is that it appeared that 15 and 16 may have functioned to funnel the flow of water off the gravel bank to the west into more normal fish trap shaped feature 14. The area between 15 and 16 and inside 14 was cleared of stones. Best photo of 14 is 1068, of 15 is 1064 and there isn't really one of 16, it's behind 15 (which has the ranging rod) on the right hand side of 1067.

17. Western arm of fish trap, v-shaped. Apex fairly eroded, built across stream of water. Banked up pebbles. HER no. 27267. Eastern arm recorded separately as 18. Arm is quite badly eroded.

18. Eastern arm of v-shaped fish trap, same as 17. Round wood stakes found near to apex, 4 stakes. South end goes into bank of pebbles so is not clear. Stakes are underneath bank, exposed where bank has been washed away. 1 is round piece of softwood, 2 are unclear and 1 is cut oak.

*19. (*Point record on*) Wooden stakes referred to above. No clear pattern to group.*

TC – 17-19 are elements of HER 27267, shown on photos 1070-74. The gap at the apex was so large that we thought best to record as two separate lines. We saw no sign of HER nos. 27268, 27269, 27270 or 27274. As the photographs show, the area was sandy and we have to assume that these were either net lines or stone banks from which the stones have been moved to the features we did see.

Between 144800 and 145000 is a series of metal stop nets which have not been recorded but have been photographed.

TC – photo 1075 is of a pebble around a metal pole, now recumbent, 1078, 1083-4 show unrecorded metal post net lines.

20. V-shaped fish trap, amorphous and unclear, degraded but as it is in a patch of sand its construction is visible. More of a layer of stones than a pile, which are fairly spread out. Slightly covered by sand. Lots of gaps within the structure. Nick found a monster whelk at the apex. Apex is v. degraded. A nice starfish was found nearby.

TC – 20 is HER 27211, photos 1079-80. Starfish 1081-2. We saw no sign of HER 27212.

21. Single line of large stones in a large arc probably a line of net weights.

TC – 21 is HER 27213, photos 1085-7, 1090

22. Single line of large stones in a short line, runs adjacent and parallel with S end of 21. Has a small pile of stones at each end as post supports for metal stakes.

TC - Photos 1091-2.

23. Wiggly line of metal stakes and associated stone net weights. About another 21 posts visible out to sea from where we are starting recording, heading inland. As the tide was so slow going out we zigzagged between 301000 and 301200 and then walked back in a straight line as at least 45 mins past low tide.

TC - 23. is on line of HER 27217 and continued out to sea beyond what was exposed on this day. Photos. 1088, 1089, 1093-8. We saw no sign of HER 27216 although it appears to be present running to the left of photo 1097, right at the water edge, and appears to be another stop net line of single stones.

It would be interesting to see in more detail how these features that are now all line nets appear on the detailed NMP/HER records as it seems unlikely that they would have been mapped in so much detail if they were known to be lines of scaffold poles. It also seems unlikely that stone fish weirs would have been removed and replaced on exactly the same line which would have involved far more work that putting line nets in a new location where there is less stone to clear. Probably needs a bit of investigation.

Dunster beach March 2009

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