

**OTTER (*LUTRA LUTRA*) ACTIVITY AND HABITAT AVAILABILITY ON THE  
PEMBROKESHIRE COAST AND MILFORD HAVEN WATERWAY,  
WITHIN THE PEMBROKESHIRE MARINE CANDIDATE SPECIAL AREA OF  
CONSERVATION.**



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**A report for the Pembrokeshire Marine SAC Relevant Authorities Group**

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## 1. PROJECT AIMS

The aims of the project are to:

- Determine the present actual or potential level of otter activity along the coastline and estuaries of the Pembrokeshire Marine SAC (and within the marine environment);
- Assess habitat quality and availability for otters (for feeding, resting and breeding), on coastal streams and associated coast line, and factors affecting otter distribution;
- Establish the range of marine species taken by otters (using spraint analyses), and relate findings to major coastal features, such as kelp forests and sandy bays;
- Recommend a monitoring protocol and methodology for otter activity along the coast.

## 2. SCOPE OF PROJECT

The Pembrokeshire Marine SAC extends southwards from Ynys Barry (to the north of St. David's Head), to Manorbier, and includes the Milford Haven Waterway.

For ease of recording data, and for the interpretation and discussion of results, survey sites are separated into two geographical areas:

- The Open Coast
- The Milford Haven Waterway

### ***The Open Coast***

The coastline within the survey is approximately 107km long, and has 27 rivers and small streams flowing into the sea (Map 1)

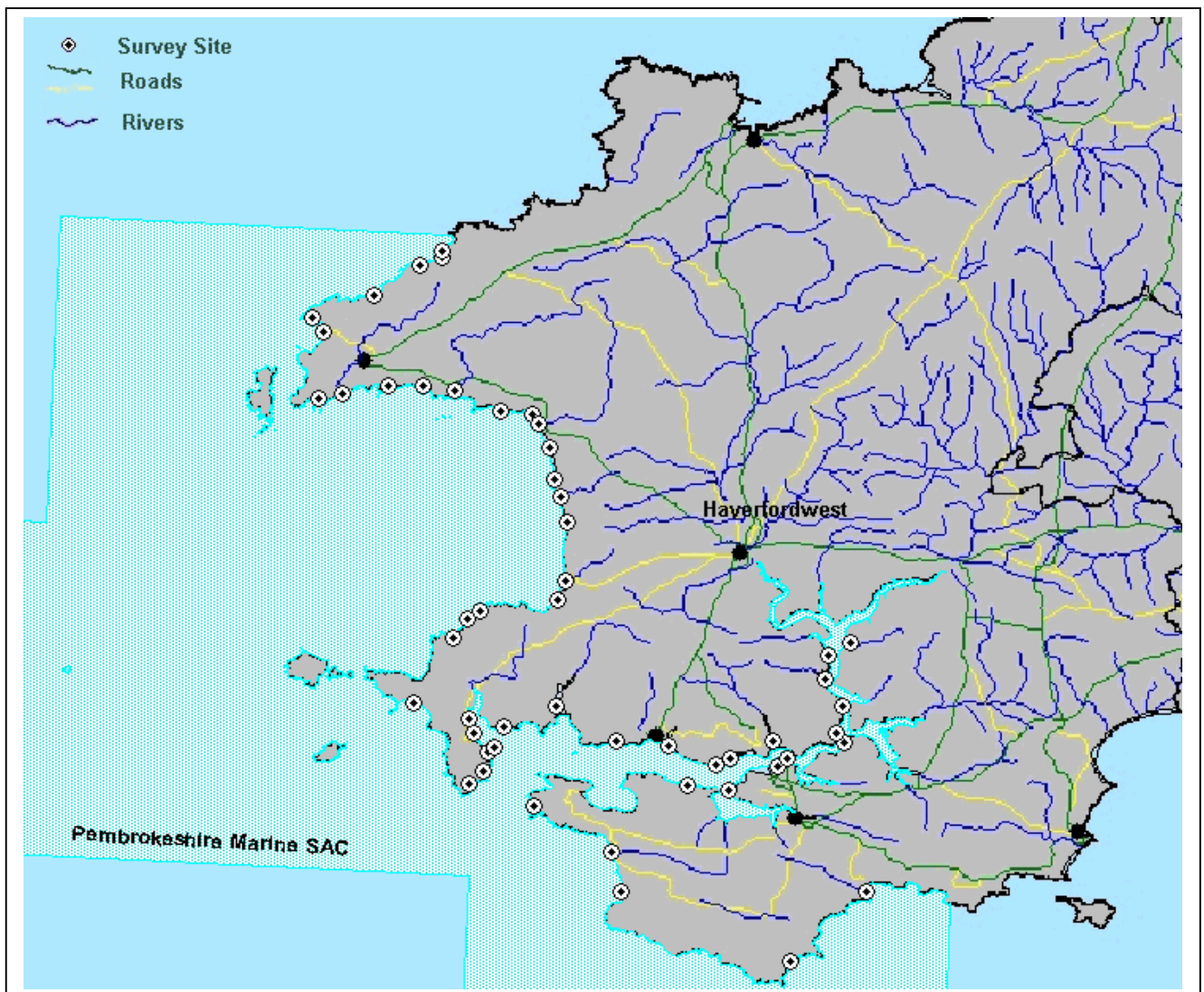
Some streams have a total length of several kilometres (for example, the River Solva and Freshwater West stream), but many are less than 2 km long. The distance (along the coast), between nearest neighbour coastal streams ranges from a few hundred metres up to 13 km. However, for most streams, the nearest neighbour distance is between 1km and 3km

### ***The Milford Haven Waterway***

The Milford Haven Waterway (defined as upstream of St Ann's Head to tidal limits including the Daugleddau) has a shoreline length of approximately 64 km and is fed by 18 streams.

Surveys for this project concentrate on the Milford Haven Waterway downriver from the confluence of the Western and Eastern Cleddau rivers, as little is known about otter distribution and activity in this part of the estuary. Evidence from previous surveys and sightings indicates that the Western Cleddau downriver from Haverfordwest, and the Eastern Cleddau downriver from Canaston bridge, have been well used by otters since the 1980s (G. Liles unpub. data; S. Evans, pers comm.).

**Map 1: Extent of Survey**



### **3. THE OTTER (*Lutra lutra*) IN PEMBROKESHIRE**

The distribution of otters on freshwater systems in Pembrokeshire has been monitored regularly since the late 1970s. Information from the Otter Survey of Wales (Andrews *et al*, 1986; Andrews *et al* 1993); a study of otter distribution on the Western Cleddau (Jenkins, 1982); Otters in Wales; and surveys carried out by the rivers team of the Countryside Council for Wales, indicates that otters are widespread within the county.

Before the start of this project, systematic surveys for otters along the south-west Wales coast had not been carried out, and otter usage of the Pembrokeshire coastline, coastal streams, and the estuary was poorly understood. Historical information from casual spraint surveys and otter sightings did suggest that otters were making use of the coast, but the level, and distribution of otter activity was unknown. In 1998, for example, spraints were collected from a few streams close to the coast in Pembrokeshire, as part of a pilot project to determine whether otters take marine prey (G. Liles, unpublished data). Sightings of otters have been recorded, for example, from Broadhaven (where an otter was seen eating a crab); in the sea off Abercastle; and in the sea off Dinas Aberbach. Otter signs and sightings have also been recorded at a few other sites along the coastline of Wales (G. Liles, unpublished data).

The Pembrokeshire Marine SAC is likely to be particularly important for otters because, in this part of south western Pembrokeshire, many of the inland rivers and streams are small and unlikely to provide all the otter's food requirements throughout the year. Dense cover on some coastal streams may also provide daytime resting sites and ideal breeding habitat.

The only relatively large river in this part of Pembrokeshire is the Western Cleddau. Some of its tributaries in the lower reaches (near Haverfordwest), rise within 3 km of the coast, and are close to the source of some coastal streams. Lying between the Western Cleddau and the coast are several very small rivers (such as the River Solva; River Alun; Brandy Brook; the Pembroke River), with main river lengths of 10 to 20 kilometres. In addition, there are numerous very small (<5 Km long), streams that flow directly into the sea.

### **4. A REVIEW OF THE ECOLOGY OF EURASIAN OTTERS UTILIZING MARINE AND ESTUARINE HABITATS.**

#### ***Home range & habitat utilization.***

Eurasian otters inhabit freshwater, brackish and marine environments. Whilst some animals live entirely in one type of environment, many occupy home ranges that include freshwater streams, estuaries and the coast. Otters living on the coast however must have access to fresh water streams and pools for drinking and washing (Kruuk & Balhary, 1990; and Moorehouse, 1988). Most studies on otter ecology have been based on marine – living populations.

Radio telemetry and spraint survey studies of otters in Scotland (Kruuk, 1995; & Macdonald & Mason, 1980) show that otters living exclusively on the coast have smaller home ranges than those in river environments. On Shetland, for example, the average distribution of animals is one adult otter for each kilometre of the coast, with

each otter using several kilometres of shore (Kruuk, 1995). On river systems, typical home ranges are 20 to 40 Km (Green *et al*, 1984).

Coastal living otters use only a fairly narrow strip of both land and water along the coast, with males making more use of exposed rocky shores rather than sheltered areas. In Shetland, otters show a strong preference for gently sloping peaty coastlines without agriculture and cliffs.

The types of resting sites used by otters in marine and estuarine habitats are similar to those found in freshwater systems, although coastal otters generally have fewer dens than those living in freshwater. On the west coast of Scotland and Shetland, resting sites are found in cavities amongst rocks, holes in peat, and rabbit burrows in sand dunes (Watson, 1978; & Moorehouse, 1988). In Wales, coastal and estuary resting sites include reed beds (for example, Oxwich Bay on the Gower, and the River Teifi estuary), tree root systems, and scrub (G. Liles, pers. obs.).

### **Prey and feeding.**

Coastal otters can hunt as far as 100m offshore in water over 10m deep, but most feeding is done much closer to shore and in water less than 3m deep (Nolet *et al* 1993). In Shetland, 62% of observed dives occurred within 20m of the shore.

The prey species taken by coastal otters has been studied in Shetland (e.g. Nolet & Kruuk, 1994), Norway (Heggberget, 1993 and 1995; Heggberget & Moseid, 1994), and Portugal (Beja, 1991 & 1996). Results indicate a preference for slower swimming flatfish and other bottom dwelling species, such as eelpout (*Zoarces viviparus*), rockling (*Ciliata mustela*), sea scorpion (*Taurulus bubalis*), and butterfish (*Pholis gunnalus*). In Norway, cod (*Gadus morhua*) is probably the most important species for coastal otters (Heggberget, 1995). Other large species taken by otters include saithe (*Pollachius virens*) and Pollack (*P. pollachius*), lumpsuckers (*Cyclopterus lumpus*), and dogfish (*Scyliorhinus canicula*). Smaller species, such as the 15 spined stickleback (*Spinachia spinachia*) and gobies (Gobiidae) are also taken.

The main hunting areas for otters on the coast are largely determined by the habitat preferences of prey species. Rockling and sea scorpion are closely associated with exposed, boulder shores supporting the algae Gigartina, and thong-weed (*Himanthalia* sp). Eelpout is common on sheltered shores, amongst knotted wrack (*Ascophyllum* sp) and bladder wrack (*Fucus vesiculosus*). Butterfish are found in both rocky and sheltered shores. Prey species that are numerous in the shallow subtidal zone include the 15 spined stickleback and gobies.

The diet of otters in brackish water in large estuaries is less well known. In south west Portugal, eels (*Anguilla anguilla*) and grey mullet (*Chelon labrosus* and *Liza* spp.) form a major part of the diet of otters (Beja, 1991).

Marine fishes are highly mobile, and many species have habitat requirements that change seasonally and daily (Potts & Swaby, 1993). Consequently, the availability to otters of marine prey species varies throughout the year in both coastal and estuarine environments, and may also vary in different parts of the otter's range. In Norway, where Gadidae, flatfish, Cottidae, lumpsuckers, Salmonidae and Labridae form 95% of fish weight in otter diets, the amount of each species taken remains relatively constant in each season. In Shetland however, potential prey is very abundant in mid summer (especially eelpout in august), but scarce in late winter and spring (Kruuk 1995). In Portugal, Beja (1991) found seasonal variations in otter diet on the coast with wrasses (mostly *Symphodus melops*, *Coris julis*, *Labrus bergylta* and *Ctenolabrus rupestris*) taken less frequently in the summer, but blennies (mostly

*Coryphoblennius galerita*, *Blennius gattorugine* and *B. pholis*) more frequently, and rocklings more frequent in the autumn. Otter diet in brackish/freshwater estuary sites in the same study displayed a much larger seasonal variation than in the marine sites. Fresh water species dominated the diet in spring and summer, and marine prey was most important in the autumn and winter. Grey mullet (thought to be the typical prey for otters inhabiting Portuguese estuaries) is most frequent in the diet in the winter and spring.

### **Threats**

Direct threats to individual otters, such as oil spills (Heggberget & Moseid, 1995, and Conroy, unpub. data); fish traps (Jeffries et al, 1984); and road mortalities (Philcox et al, 1999), can have a serious impact on otters, especially where populations are scarce. In Wales, several otter road mortalities have been recorded within a few hundred metres of the coast, suggesting that otters are travelling between the coast and inland watercourses (Liles & Colley, 2000).

Indirect factors, such as habitat loss on estuaries and coastal watercourses, and declines in fish populations, may pose a major potential threat to otters and their use of coasts and estuaries.

## **5. METHODOLOGY**

### **5.1 Site Surveys.**

As otter access to, and use of, marine environments is dependant on fresh water (see Section 4 above), surveys started at sites where rivers and streams met the open coast, and the shore of the Milford Haven Waterway. The 1:25000 scale Ordnance Survey map was used to locate coastal and estuarine rivers and streams, and all were selected for survey regardless of size.

A total of 29 survey sites were identified for the Open Coast, and 28 for the Milford Haven Waterway. (see Map 1)

It was assumed that the way in which surveys would be carried out at sites along the open coast would vary from site to site, and would be significantly different from those carried out in the Milford Haven Waterway. Coastal streams meet the coast at small bays flanked by steep high cliffs (e.g. Aber-pwll), wide sandy bays (e.g. Porth-mawr), through narrow estuaries (e.g. R. Solva), and over cliffs as waterfalls (e.g. Porth y Dwfr). In each of these situations the opportunities for otters to climb onto dry land, and therefore the number of sprainting sites available for survey, can vary greatly. In the Milford Haven Waterway, however, much of the foreshore is accessible to both otters and people, and long stretches can be searched for otter signs.

Surveys were carried out between August and November 2002 on foot, except for one day's survey by boat (with the help of the Water Ranger - joint funded by the Pembrokeshire Coast National Park Authority and Milford Haven Port Authority), to investigate inaccessible stretches of coast on the eastern side of St. Ann's Head.

Data were collected on a specially designed survey form (Appendix 1), and survey sites located on large scale maps (see Appendix 3).

Photographs were taken at several sites to provide a visual record of typical features,



including: sprainting sites; habitats; inaccessible cliffs; otter access routes (see Appendix 3).

All data are entered into the Otter Database (an Access database developed by the author and Stephen Lewis for the Otters & Rivers Project and Countryside Council for Wales), and in spreadsheet format.

## **5.2 Otter Distribution**

Evidence for otter activity at a site depends on the presence of droppings (spraints) and/or prints. In an attempt to record only those otter signs likely to be left by otters visiting and marking at or near the marine environment, only signs actually on the coast or shoreline (distance variable), and within 100m of the sea on freshwater streams and rivers, were recorded as positive.

At each survey site, all potential sprainting sites (usually obvious features that are accessible to otters), were examined for the presence/absence of spraints. Potential sprainting sites include: bedrock promontories; grass tussocks; boulders; caves; tree root cavities; man-made structures such as low walls; and ledges under bridges.

Spraints at each sprainting site were counted, and their relative “age” recorded as:

- “fresh” – very oily, usually with a strong, characteristic aroma;
- “recent” – dry, hard and compact, and retaining the strong aroma;
- “old” – no longer compact, but crumbly (when dry), and little aroma.

At sites where no otter signs were found, potential sprainting sites were described and recorded.

Other signs of otter activity such as paths through vegetation, rolling sites, and food remains, were also recorded.

At open coast sites the search was carried out along rivers and streams immediately upriver from the coast, and along the coast and shore (including bays, estuaries and harbours). The distance that could be searched along the shore varied from site to site, and ranged from only 50m of coast at some small bays flanked by high cliffs, to 2 km at Newgale Sands. On coastal streams, the distance upstream that could be surveyed was determined by access to the banks. At most sites the watercourse was enclosed in dense cover leaving only a short stretch of stream (often less than 50m) that could be searched.

Along the Milford Haven Waterway much of the shoreline was accessible at low water and surveys for otter signs could be carried out along the edge of the estuary. Surveys started from the confluence of rivers and streams entering the estuary, and as with open coast sites, all potential sprainting sites were searched for signs. Site surveys were based on km lengths of shoreline (similar to the way in which surveys are carried out on freshwater systems).

Additional information was gained from otter sighting records that were sought from people living close to the open coast and coastal streams, and near the Milford Haven Waterway shoreline, and otter road mortalities close to the coast (Bradshaw & Slater, 1999).

### **5.3 Habitat Assessment**

At open coast sites, habitat and landscape features suitable for otter use were recorded separately for:

- The coast, estuaries, bays and harbours;
- Watercourses flowing directly into the sea (for a length of 100m or more).

At the Milford Haven Waterway sites, habitat and landscape features were recorded for:

- The shoreline

At all sites (open coast and the Milford Haven Waterway), a search was made for habitat likely to provide otters with breeding and resting sites. Sites were recorded as “actual”, “possible” or “potential”, depending on the level of evidence of use by otters. For “potential” sites, an additional criterion - the size and security of cover available - was also used.

Landscape features likely to be important to otters were recorded at all sites. Features include: sloping or stepped rocks within cliffs that would provide otter access to feeding/sprainting platforms above high water; caves with rocks or ledges above high water; and large areas of wrack-covered rocks that might support fish populations.

Threats to otters (for example, crustacean traps, disturbance, pollution, road traffic) were assessed at each site.

### **5.4 Spraint Collection**

All spraints, regardless of relative age, were collected and stored in plastic bags (normally one bag for each site).

Spraint collection bags were labelled with the site number and the date of collection.

Bags containing spraints were frozen for storage.

### **5.5 Spraint Analyses**

Spraints (frozen) were placed in a 500ml glass beaker with 10-50ml of biological detergent to break down mucus bonds etc. Beaker filled with warm water (room temp) and left to stand for approximately 24 hrs. After this time, the contents were strained through a 0.5mm sieve and washed with cold water to remove dirt etc. The contents were placed on a filter paper and left to air dry for about 1 hour. Any identifiable remains were removed and the remainder discarded. Fish vertebrae (caudal, thoracic and ventral), and fur, feathers and bones of mammals were identified using standard keys. The total number of vertebrae of specific species was counted for each spraint.

## 6 RESULTS

Details and exact locations of otter signs, potential sprainting sites, and key habitat features (including photos taken whilst in the field) for each of the open coast and Milford Haven Waterway survey sites are found in Appendix 3 of this report.

A summary of the results for otter distribution and habitat quality on the coast and coastal streams, and within the Milford Haven Waterway is given below.

### 6.1 Otter Distribution: The Coast & Coastal Streams

Otter signs were found close to the shore at 13 of the 29 survey sites (Table 1 Coastal Survey Sites: Summary Data and Map 2a.). Some sites where no signs were found close to the shore are known to be used by otters for example Broad Haven at Bosherton Lakes, and the Solva estuary. At Broad Haven, otter prints have been found in the sand (B. Haycock, pers comm.), and an otter was seen eating crabs in 1996 (R. Foster, pers comm.). In the Solva harbour an otter was seen chasing a salmon in 2000 (Mrs. Sendel, pers comm.).

Evidence for otters using the coast and the sea was very strong at all 13 positive sites. Otter signs were found on the coast or in bays at 5 of the 13 sites, some with spraint on cobble beaches leading down to the sea. At the rest, signs were found at the watercourse outflow, typically within 2m of the shoreline.

A range of ages of spraints was found:

- 10 fresh
- 51 recent,
- 67 old

Fresh spraints were found at 5 sites: Frainslake; Freshwater West; Mill Haven stream; St. Bride's Haven stream; and Porth Clais.

A range of sprainting sites are used by otters, including grass promontories at the stream outflow, bedrock promontories, big rocks and ledges, beach cobbles (usually following the course of the stream to the sea) and a cave. Road and footpath bridges close to the shore also provide good spraint sites (see Plate1).

Monitoring sites for future surveys were identified at almost all of the 29 survey sites, including potential sprainting sites at negative survey sites.

Additional information: a dead female otter was found on Caer Bwdy Bay (a positive survey site), by Ian Bullock in 2001. Reliable, recent otter sightings have been reported in the sea off Penpleidiau headland (Km 27), in May 2000; in Solva harbour in January 2000; and at Broad Haven (Km 48), where a female and two cubs were seen. Details of coastal otter sightings are shown in Table 2.

**Plate 1: Coastal Sprainting Sites (arrows show spraint found during survey).**



Castlebeach MHW 3.1



Castlebeach MHW 3.4



Mill Haven Open Coast 20



Castlebeach MHW 3.2



Porth Lysgi Open Coast 6



Caer Bwdy Bay Open Coast 8

**Table 1 Coastal Survey Sites: Summary Data**

No	SITE Name	Km	L'th	SPRAINT			HABITATS		COAST Dist Km	NOTES Otter access and site information	PREY REMAINS Fish spp. In spraint
				F	R	O	Suitable Resting Sites	Suitable Breeding Sites			
1	Abereiddy SM796 314	3	2 (-1)	0	0	0	Fen	Fen	0	Good via stream, rocks & sea pool for feeding.	No spraint
1a	Cyffredin SM796 310	3	2 (-1)	0	0	0	0	0	0	Good via stream & rocks.	No spraint
2	Aber Pwll SM784 306	4	1 (-1)	0	0	0	Bracken	Bracken	1	Good via stream & cliffs to north	No spraint
3	Porth y Dwfr SM758291	7	2 (-1)	0	0	0	Bramble	Bramble at lake	3	Waterfall – but spr. on stream & access down cliff slope.	No spraint
4	Porth Meigan SM727 278	13	1 (1+)	0	0	0	0	0	6	Good, only via stream.	No spraint
5	Whitesands SM733 272	14	2 (-1)	0	2	0	0	0	1	Good via stream, and in bay.	Eel
6	Porthlysgi bay SM730 236	21	1 (-1)	0	0	6	Dense scrub	Dense scrub	7	Good via stream. Sheer cliffs. 2 islands look accessible.	Bird
7	Porth Clais SM743 237	24	9 (-1)	1	11	8	0	0	3	Good via stream and rock platforms in long bay.	Butterfish, bank vole, eel
8	Caer Bwdy Bay SM765 243	28	3 (-1)	0	5	8	Fen + scrub	Fen + scrub	4	Good via stream. Spraint on beach	Eel, Butterfish, Salmonid
9	Porth y Rhaw SM785 243	30	1 (1+)	0	4	6	Fen	Scrub at pond	2	Good via stream and at south of bay.	Eel, salmonids, stickleback (3 spine) Pile, butterfish.
10	Solva SM 800 236	32	13(-1)	0	4	7	0	0	2	Good via stream & in harbour	Eel, minnow
11	Porthmynawyd SM826 229	36	0.75 (-1)	0	0	1	Dense scrub	Dense scrub	4	Good via stream & up cliffs. Also 2 caves.	Nothing identifiable
12	Cwm Mawr SM843 228	38	0.75 (1)	0	0	0	Dense scrub	Dense scrub	2	Good via stream & round to Newgale.	No spraint
13	Newgale SM846 223	39	9 (-1)	0	12	7	Reeds	Reeds	1	Good via stream & to cliffs to s.	Salmonid, eel, stickleback (3 spine)
14	Bathsland SM853 210	40	2 (-1)	0	0	0	0	0	1	Good via stream & to hill to n.	No spraint
15	Black Cliff SM854 194									Not suitable for surveys.	

**KEY**

No. Survey Site number (for open coast)  
 Km The kilometre stretch in which the site lies  
 L'th: Length of the stream in Km.  
 (-1) Stream < 1km from nearest neighbour stream headwaters  
 (1+) Stream > 1km from nearest neighbour stream headwaters

Spraint: "F" = fresh; "R" = recent; "O" = old.  
 Coast (Dist Km) Distance in kilometres from previous survey site.

**Table 1 (Continued) Coastal Survey Sites: Summary Data**

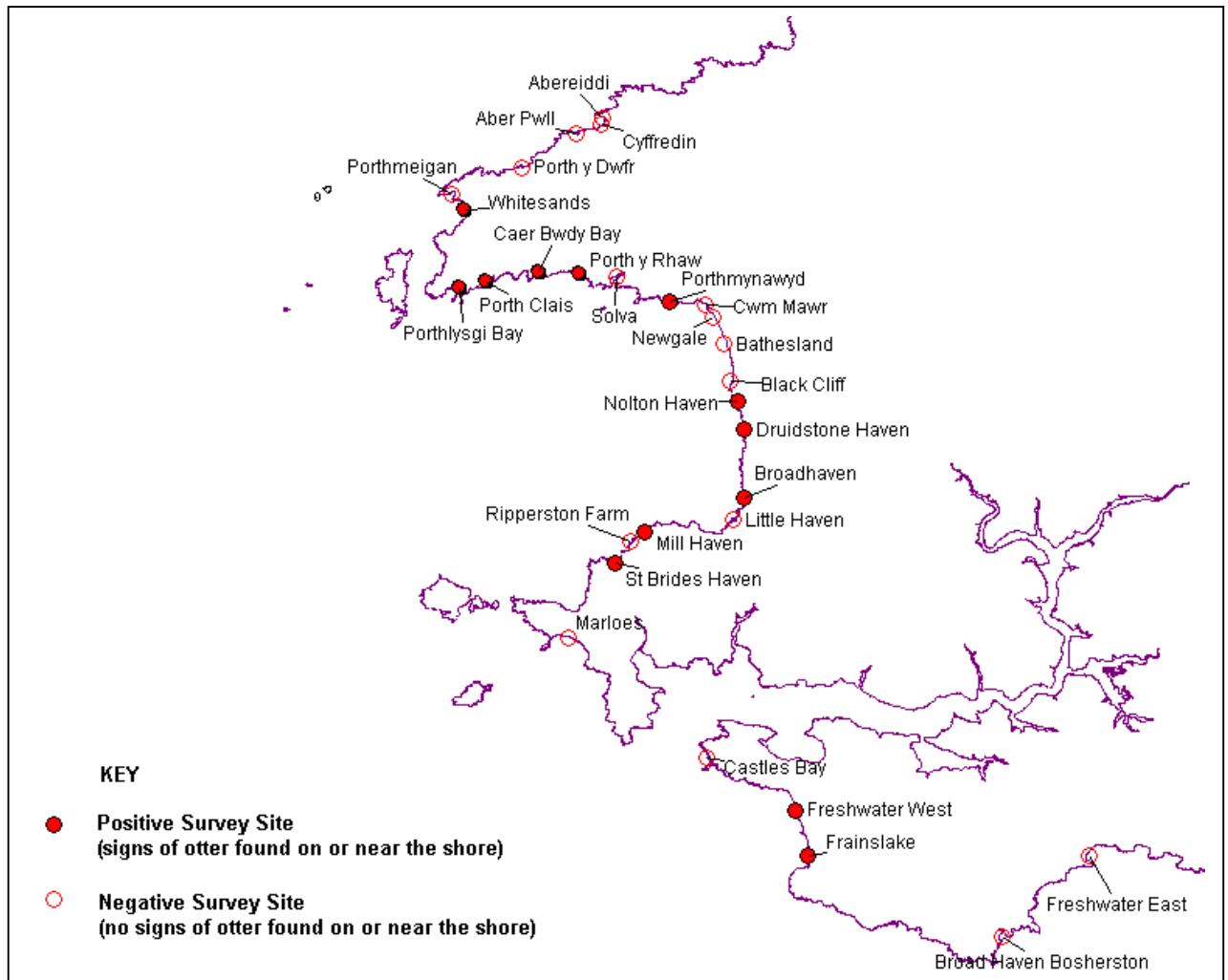
SITE		SPRAINT			HABITATS		COAST		NOTES		PREY REMAINS
No.	Name	Km	L'th	F	R	O	Resting	Breeding	Dist Km	Otter access and site information	Fish spp. In spraint
16	Nolton Haven SM857 185	43	3(-1)	0	0	0	0	0	3	Good only via stream.	No spraint
17	Druidstone Haven SM864 172	44	1 (-1)	0	0	2	Bracken	0	1	Good via stream. To south in bay, grass slope to cobbles. No cover.	Invertebrate
18	Broad Haven SM861 135	48	4 (-1)	0	4	0	Woods	Woods	4	Haroldston bridge good via stream. PO bridge good via stream.	Salmonid, pike
19	Little Haven SM856 130	49	2 (-1)	0	0	0	0	0	1	Good only via stream	No spraint
20	Mill Haven SM815 125	53	2 (-1)	3	1	5	Scrub + boulders in bay	Scrub + lake with scrub	4	Good via stream & both sides of bay. Breeding recorded on lake.	Eel, salmonids, bird (rail ?)
21	Ripperston fm SM809 119	55	0.5 (-1)	0	0	0	0	0	2	No access – high sheer waterfall.	No spraint
21a	St. Brides Haven SM801 111	56	2 (-1)	1	0	3	0	0	1	Good via stream & on north side of bay	Eel, invertebrate
22	Marloes SM781 076	67	1 (-1)	0	0	0	bracken	0	11	Good via stream & into caves.	No spraint
23	Castles Bay SM844 023	75	1 (-1)	0	0	0	0	0	8	No access – waterfall	No spraint
24	Freshwater west SR885 997	81	9 (-1)	2	5	3	Reeds	0	6	Good via stream and all along bay via dunes.	Eel, Rockling, Sea Stickleback (15 spine)
25	Frains Lake SR890 976	84	1(1+)	3	2	6	Fen	Fen & scrub at lake	3	Good via stream and in bay via dunes and up rocks at south end of bay.	Eel, rockling, Cyprinidae spp, stickleback 3s, salmonids, lumpsucker.
26	Broad Haven Bosherton SR979 938	99	6 (-1)	0	0	0	Woods around lake	Woods around lake	15	Good via stream and in by into dunes, and up Star Rock.	No spraint
27	Fresh East SS017 977	106	4 (-1)	0	0	0	Reeds	Reeds	7	Good via stream & into dunes/scrub	No spraint

**Total 10 51 67**

**Table 2 Coastal Otter Sightings.**

<b>KM</b>	<b>SITE</b>	<b>Date</b>	<b>Coast</b>	<b>Bay</b>	<b>Stream</b>	<b>SIGHTING</b>	<b>BY:</b>
14	Whitesands	2000			1	2 orphan cubs found c. 1.4km inland from Whitesands Bay and taken by RSPCA.	J. Simes, Whitesands
24	Porth Clais	05/03/2000	1			Otter seen during midday short walk west of harbour mouth swimming in large rockpool & feeding on a large fish	Sue Burton, Marloes
24	Porth Clais	01/03/2000	1	1		Otter seen first at 1100 and spent most of the day hunting at harbour mouth and on coast, feeding	J. Edwards, Gt. Yarmouth
24	Porth Clais	Nov 2001			1	Pair seen at sewage farm on the R. Alun at SM742246	Harbour master
27	n/a	May 2000	1			Seen from Penpleidiau by fisherman at 1500. Otter fishing on a rising tide.	Sian Dove.
30	Porth y Rhaw	1991		1		Otter seen hunting in Porth y Rhaw bay.	E. Daniels
32	Solva	Jan 2000		1		Large otter seen at night (in torch light), hunting salmon in Solva harbour, very close to the river outflow by the retaining wall of the lawn.	Mrs. Sendel, Solva
39	Newgale	1970		1		Seen in the 1970s, on Newgale sands.	Frank Rimming, Newgale
39	Newgale	1975	1			Otter seen running through Petrol Station forecourt to the sand dunes	Peter Gale, Newgale
39	Newgale	1985			1	Otter seen on stream just above Newgale bridge, and behind the café.	Roy Owen, Newgale
48	Broad Haven	20/03/1991			1	2 cubs seen at 1700 on the edge of the stream across the beach. Adult moved out of the culvert under the bridge and the cubs called incessantly.	Charles Mathieson.
54	Mill Haven	Nov 2001			1	Female + 2 cubs seen on lake < 1km from Mill Haven. Otters also heard whistling on a second lake behind the farm at Broadmoor.	M. Hopkins, Broadmoor Fm.
99	Broad Haven Bosherton	11/08/1996	1			Otter seen in at Broadhaven (Bosherton Lakes). Otter at western head of Bay and in sea, eating crabs. Detailed description of sighting is available.	Robert Foster, Pembroke Dock
99	Broad Haven Bosherton	Mar 1990s			1	Regular sightings of bitch + cubs in Bosherton Lakes all through the 1980s and 1990s	G. Liles, B. Haycock
104	Near Freshwater East	2002	1			Otter seen crossing coast path near Freshwater east. Otter went from area of dense scrub into field, and back into scrub.	Meg Stark, Yorkshire.

**Map 2a: Map Showing Positive and Negative Otter Survey Sites – Open Coast.**





## **6.2 Otter Distribution: Milford Haven Waterway**

Of the 28 kilometre stretches ('sites') surveyed, 26 contained signs of otters (Map 2b and Table 3. Milford Haven Waterway Survey Kilometres: Summary Data).

Spraints of all ages were found:

- 28 fresh
- 54 recent
- 103 old

Otters use a range of sprainting sites, including sites on the shoreline that are well away from fresh water streams (see Plate 1).

Fresh spraint was found in 14 of the kilometre stretches.

A survey by boat was carried out from St. Ann's Head to the north side of Dale Point (from Km 1 to Km 4). A total of 11 sprainting sites and 35 spraints were found, on dry rocks or ledges in clefts within cliffs. Most spraints were recent and old, with only 1 fresh spraint found.

Recent otter sightings have been recorded for Dale and the Gann; Hobbs Point; in a pond near Benton Castle; and on the stream flowing into Angle Bay.

Good monitoring sites were identified at 8 of the sprainting sites.

Previous surveys and sightings (G.Liles...) show that the Western Cleddau and the Eastern Cleddau (to tidal limits) have been used by otters since the 1980s until the present day. For example, the tidal reach of the Western Cleddau extends through Haverfordwest, from which there have been several otter sightings in the last 20 years (e.g. D. Frost, pers comm, G. Liles, pers. obs). In the 1990s, otter signs were found at Little Milford and Millin Cross. On the Eastern Cleddau (to tidal limits), otter sightings have been recorded in the Picton Park reedbeds (S. Evans, pers comm.), and at Blackpool Mill (G. Liles pers. obs., D. Whelton, pers comm.). Otter signs (spraints & prints) were recorded during surveys by the (then) Nature Conservancy Council and the (then) Otter Project Wales in the Picton reedbeds, at Minwear Woods and at Blackpool Mill (S.Evans, pers comm., G. Liles, pers. obs.). Otter activity was filmed in the Eastern Cleddau in 2002 (D. Whelton).

Surprisingly few otter sightings have been reported from the Milford Haven Waterway shoreline. At Dale, otters were seen in and near the Gann in November 1991 and August 1992, and both were hunting in seaweed. The gardener at Benton Castle watched two otters in 2002 in a pond immediately adjacent to the shore. At Port Lion near Llangwm, two otters were seen swimming just offshore in October 2001. On 12<sup>th</sup> June 2002, a large otter was seen foraging at the shoreline on the west side of Hobb's Point. In February 1991 an otter crossed a lane close to Angle bay and the small stream.

**TABLE 3 Milford Haven Waterway Survey Kilometres: Summary Data**

Km.	SITE Name	SPRAINT				HABITATS		NOTES Otter access and site information	PREY REMAINS Fish spp. In spraint
		SS	F	R	O	Resting	Breeding		
1	Mill Bay SM809035	2	1	2	1	Scrub	0	Boat survey. Good otter access	Marine crustacean
2	Watwick Bay SM816041	1	0	0	1	0	0	Boat survey. Good otter access	Nothing identifiable
3	Castlebeach SM819050	6	0	7	19	0	0	Boat survey. Good otter access	Eel, Bullrout, Stickleback (3 spine), Flatfish spp., Minnow, plaice, sand eel, roach, perch, unknown marine spp. Flatfish
4	Dale Peninsula SM824052	2	0	2	2	0	0	Boat survey. Good otter access	Sea stickleback
6	Dale SM812058	1	1	2	2	0	0		Eel, perch
7	Dale Bay & Gann SM814070	1	2	0	2	Scrub	Scrub	Good combination of excellent habitat and fresh water.	Minnow, eel, salmonids, stickleback (3 spine), stoneloach,
9	Monk Haven SM827063	2	0	8	11	Scrub	0		Eel, salmonids, bird (passerine spp)
14	Sandyhaven SM855075	2	0	1	2	Woodland	Woodland		Stickleback (3spine), stoneloach, eel, pipefish.
19	Gelliswick Bay SM885056	pot	0	0	0	0	0	Stream in long culvert	No spraint
22	Castle Pill SM903055	1	5	1	5	scrub	0	Good site to watch otters	Eel, 5 bearded rockling, stickleback 3s, sand eel, sea stickleback, butterflyfish, dab
25	Wear Point SM938043	3	2	1	4	0	0	Bedrock promontories	Stoneloach, minnow, butterflyfish, salmon
26	Hazelbeach SM946047	pot	0	0	0	scrub	0	Rock cliff, no access	No spraint
28	Neyland Marina SM968056	1	0	1	0	scrub	0	Estuary heavily used by boat moorings on right bank.	Stickleback 3s
32 + 33	Ferry Hill SN003062	2	1	2	1	woodland	0	Easy access into woodland.	Cod, Minnow, eel
34	Benton Castle SN005070	2	0	5	5	woodland	woodland	Pond in woodland by shore	Eel, Dab, lumpsucker, salmon, bird
36	Llangwm SM996089	3	1	4	0	Tree root	0	Easy access into woodland	Minnow, Cyprinidae spp, eel, perch
37	Knapp farm SM998097	1	2	0	0	Scrub	0	Easy access into woodland	Eel, Minnow, rockling.
39 - 41	Landshipping SN008107	6	4	5	3	0	0	Otters crossing road regularly at Landshipping Quay	Minnow, eel, salmonids, viviparous blenny, unknown marine sp.

**TABLE 3 (continued) Milford Haven Waterway Survey Kilometres: Summary Data**

Km.	SITE Name	SPRAINT				HABITATS		NOTES Otter access and site information	PREY REMAINS Fish spp. In spraint
		SS	F	R	O	Resting	Breeding		
45 - 46	Whalecombe Farm SM005052	5	2	4	8	woodland	0	Easy access up stream into woodland	Eel, saithe, stoneloach, rockling.
49	Pembroke Ferry SM975046	9	3	3	13	Cavities under trees	0	Easy otter access into woodland, but wood has little cover	
50	Hobbs Point SM967042	4	3	4	11	Dense blackthorn	Dense blackthorn	Good access into woodland in places, but no access to fresh water	
52 + 53	Pennar SM947031	4	0	2	10	Dense scrub	0	Good access into scrub	
56	Pwllcrochan SM924033	1	1	0	3	Scrub woodland	Scrub woodland	Access into scrub woodland along shoreline.	

**Total 55 28 54 103**

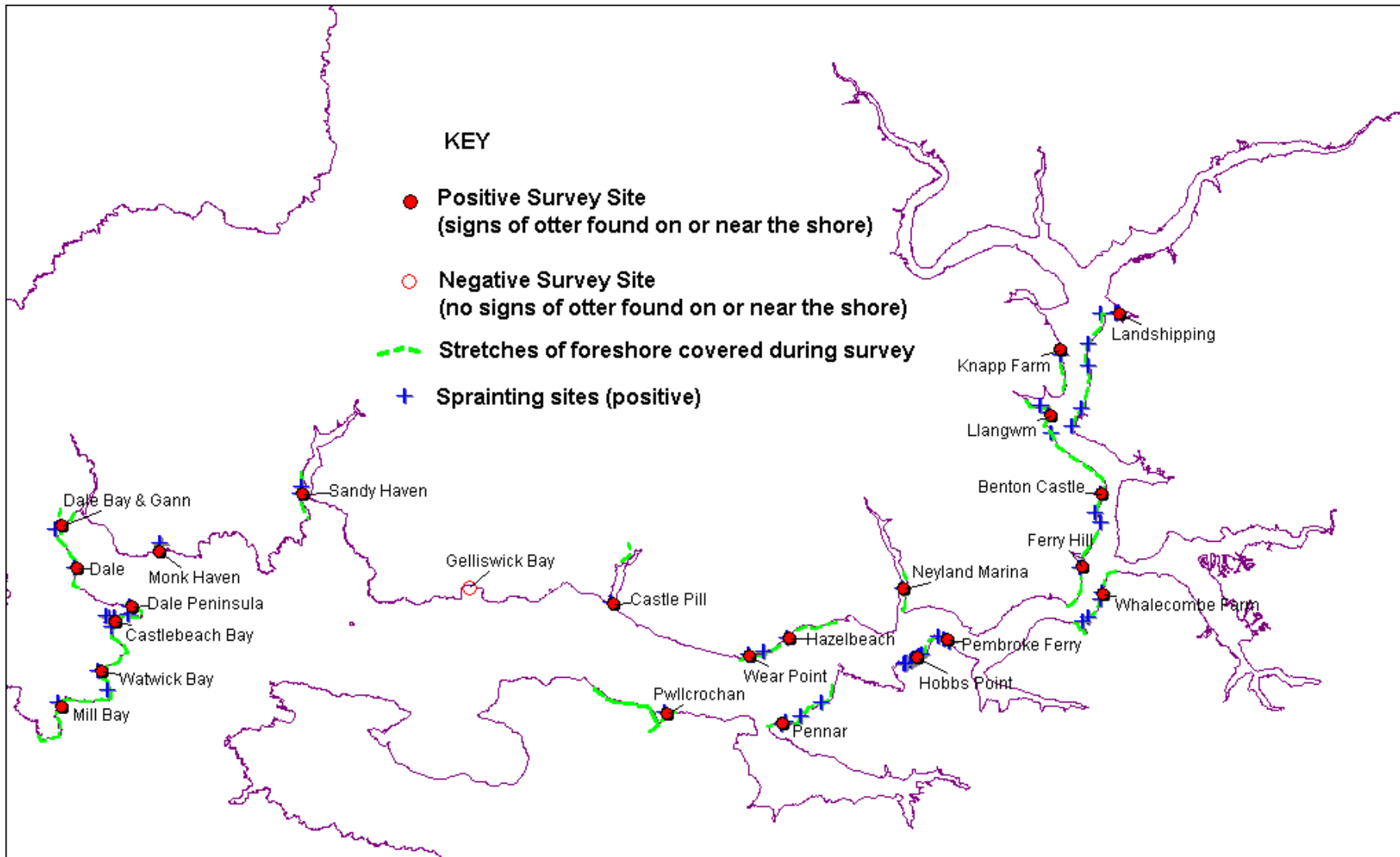
**KEY**

Km The kilometre stretch in which the site lies.  
(Main identification for waterway sites)

Spraint: SS = sprainting sites (where 'pot' = potential site, and the  
number given is the number of areas at which spraint was found)  
"F" = fresh; "R" = recent; "O" = old.

Habitats: Indicate presence of suitable resting and breeding habitats

**Map 2b: Map Showing Positive and Negative Otter Survey Sites – Milford Haven Waterway.**



### 6.3 Habitat Quality: The Coast and Coastal Streams.

Most of the freshwater streams flow through well-defined narrow valleys and provide excellent potential resting sites in usually extensive, undisturbed cover (see Plate 2). 17 Potential resting sites were identified within the following habitats:

- extensive fen
- scrub (e.g. bracken, gorse, bramble)
- woodland
- reed beds
- boulder piles

Potential (or actual), breeding site cover was found at 14 sites (see Map 3a). These tended to be extensive fen, scrub or woodland within very undisturbed narrow valleys (typically 40m wide).

Evidence to suggest that otters are, or may be breeding near the coast is known for 4 sites. Near Whitesands bay, two orphan otters were picked up 1.4km from the coast by the RSPCA in 2000 (J. Simes, pers comm.). At Broad Haven, a bitch with two cubs was seen on the beach by the stream in 1991 (C. Mathieson, pers comm.). Two cubs were seen on a lake less than 1 km from Mill Haven stream (M. Hopkins, pers comm.), and there have been regular sightings of bitch and cubs in Bosherton Lake behind Broad Haven bay (G. Liles, pers obs; B. Haycock, pers comm.).

Otters can travel easily between streams and the coast at all sites except two (Porth y Dwfr and Ripperstone farm stream), where high waterfalls make access difficult.

#### Plate 2: Typical Otter Habitat on Coastal Streams.

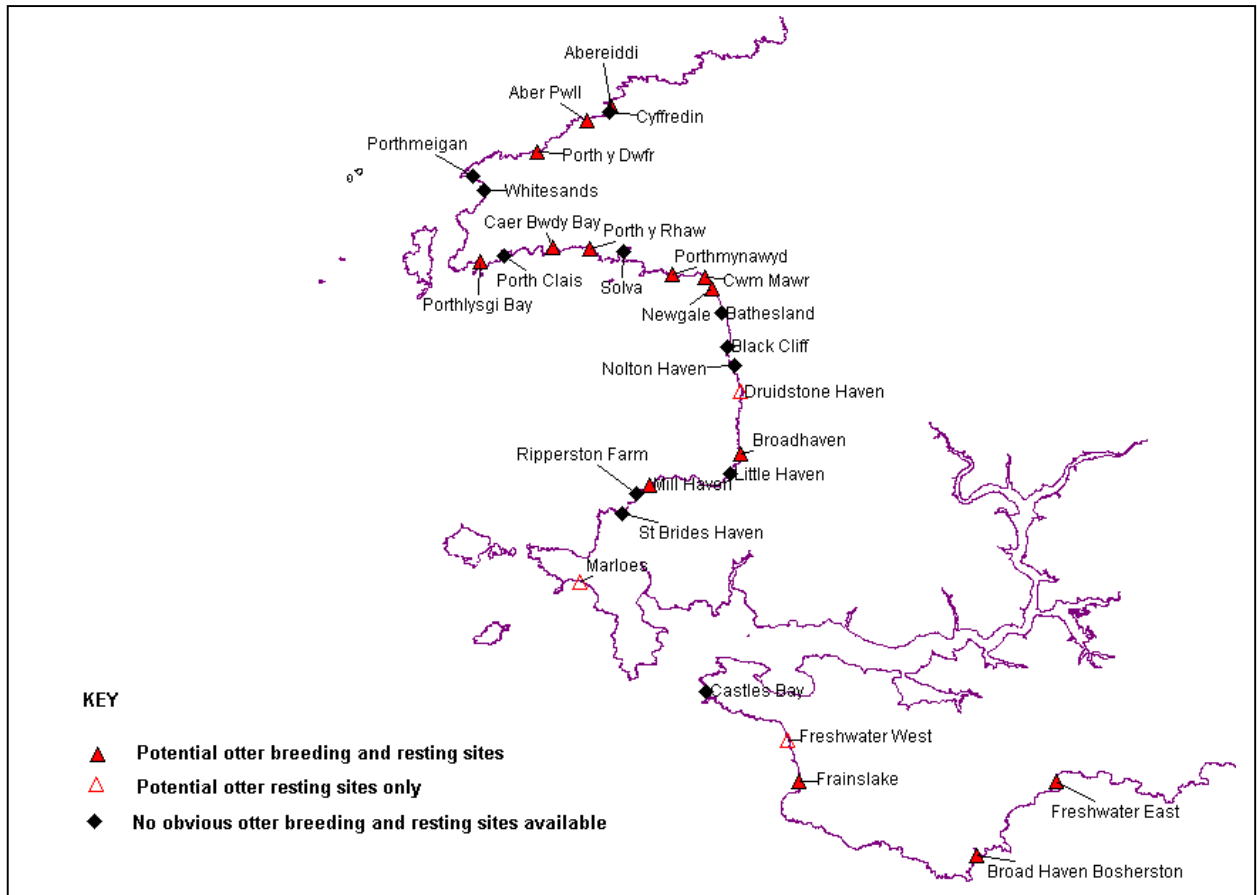


Caer Bwly Bay  
Open Coast Site 8

Aber Pwll  
Open Coast Site 2



**Map 3a: Map Showing Distribution of Otter Resting and Breeding Sites within 500m of the shore – Open Coast.**



#### **6.4 Habitat Quality: The Milford Haven Waterway**

Potential resting site cover, in woodland and scrub (see Plate 3), was found at 16 of the 28 kilometre lengths surveyed.

Wooded slopes lie adjacent to many stretches of the Milford Haven Waterway, but several cannot provide otter resting sites either because there is little ground cover, because cliffs between the shore and the woodland make access impossible, or because there is no access for otters to fresh water.

Potential breeding site habitat was found at 5 of the kilometre stretches (see Map 3b). Two of these (Dale/Gann at Km. 7 and Benton Castle pond at Km. 34), provide ideal conditions, with extensive dense cover associated with fresh water streams.

The tidal reaches of the Western and Eastern Cleddau upriver from the confluence provide two particularly important areas of reed bed habitat. On the Western Cleddau, reed beds immediately downriver from Haverfordwest provide good resting sites with ideal feeding ground. On the Eastern Cleddau, the extensive reed beds in the grounds of Picton Park provide ideal breeding site cover, and good feeding areas in the river, and in ponds within the reed beds.

#### **Plate 3: Typical Otter Habitat within the Milford Haven Waterway.**



Pwllcrochan MHW Km56



Mill Bay in MHW Km46

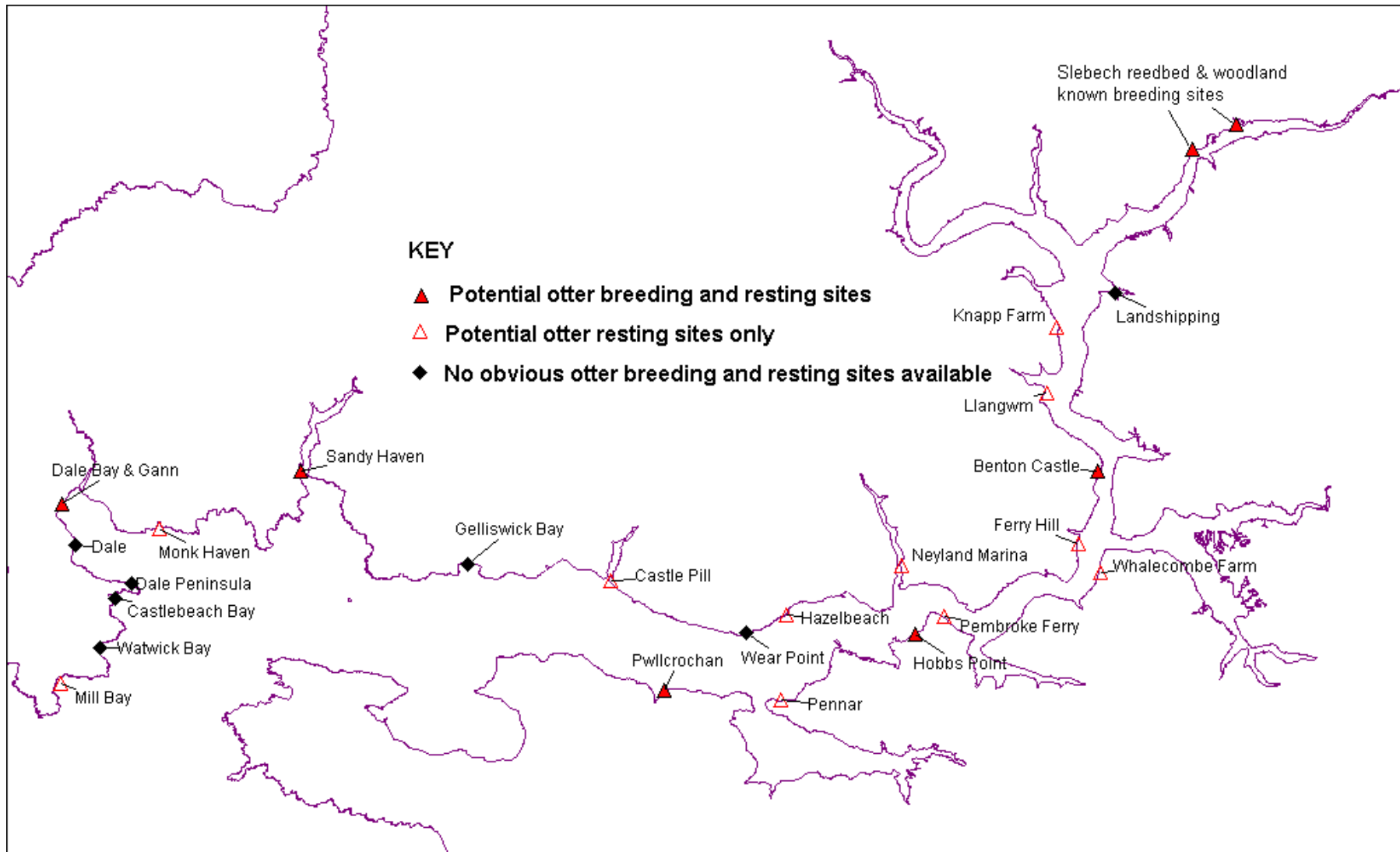


Castle Reach in MHW Km35



Ferry Hill in MHW Km33

**Map 3b: Map Showing Distribution of Otter Resting and Breeding Sites within 500m of the shore – Milford Haven Waterway.**





## 6.5 Diet

The list of species found, and numbers of vertebrae in each sample, is given in Appendix 2.

Table 4 shows the % occurrence of each prey type, and the number of spraints in which prey was found. Excluding the anadromous species, eels and salmonids, 14 marine species and 8 freshwater species were found. These proportions are significantly different from one another ( $G_{adj} = 65.64$ ,  $p > 0.00001$ ,  $df=1$ ), and suggests that marine species can play an important role in the diet of Welsh otters.

The number of marine species in spraints from the coast and the Milford Haven Waterway differed markedly. Whilst only 4 marine species were represented in spraints from coastal sites, there were 12 from the Milford Haven Waterway.

## 6.6 Threats.

Potential threats to otters and their habitats, and their likely impact on otters are as follows:

**Disturbance** – For most of the coast and the Milford Haven Waterway, disturbance from people and dogs is unlikely to be a problem. Sites where human activity might affect otter behaviour sufficiently to prevent otters using an area, particularly during the summer, include Whitesands Bay, Newgale Sands, Broad Haven by Bosherton Lakes, Freshwater East, and the marina at Neyland.

A new sport, Coasteering, may introduce disturbance to coastlines (B. Haycock, pers comm.). Coasteering is organised by some outdoor pursuit centres in Pembrokeshire on a number of stretches of coastline, including Barafundle Bay to Stackpole Quay, the Lydstep coast and near St. Davids. Groups in dry/wet suits traverse the coast between high and low tide, reaching stretches of the coast that until now have been undisturbed.

**Pollution** – No incidents of pollution were recorded at marine or fresh water stream sites during the surveys.

Major oil spills from tankers are known to affect coastal otters (J. Conroy, unpublished report). In Wales, the tanker Sea Empress ran aground in the approaches to Milford Haven in February 1996, leading to a serious oil pollution incident. Surveys for otters were carried out along the coast by the author at the time of the oil spill but no evidence of otters contaminated by oil was found. Recent and old otter signs however were found at or close to the shore at Freshwater West and in the Milford Haven Waterway. Incidents of Eurasian otters contaminated by oil have been recorded from Shetland and Spain.

In Pembrokeshire, the major threat of an oil pollution incident is likely to be greatest where coastal streams support breeding otters, and particularly if females rely on marine prey.

**Crustacean Traps** – Buoys apparently marking the location of lobster/crab pots, and often set close to land (< 100m), were seen at many sites around the coast. Although different types of pot are used, the typical entrance size is 8 inches / 200mm. As otters can get through holes of only 100mm diameter, these traps should be considered as a serious threat.

Two types of pot are used in Pembrokeshire – the parlour pot trap that has an inner chamber, and the inkpot trap that has a single chamber (B. Bullimore, pers comm.). In a review of otter deaths in crustacean traps carried out for the Vincent Wildlife Trust (Jeffries *et al*, 1984) it was concluded that the parlour trap was far more likely to kill otters than the single chamber inkpot trap (from which otters could escape). The authors describe several incidents of otters trapped in parlour pots from around the UK coastline, including a case where 22 otters were killed in South Uist over a three season fishing period.

**Habitat destruction** – Good otter habitat, that provides resting and breeding sites, exists on many coastal streams and at intervals along the Milford Haven Waterway, and there is little evidence that habitat destruction is a problem. However, these habitats (mainly fen, scrub and woodland) are vulnerable to land use change, grazing pressure, and disturbance.

**TABLE 4 Prey type with % occurrence and numbers of spraints in which they were found.**

Prey Type	% occurrence*	Number of spraints prey found in
Eel	67.3%	35
Salmonid	32.7%	17
Minnow	19.2%	10
3-Spine stickleback	17.3%	9
Bullrout	7.7%	4
Butterfish	7.7%	4
Perch	7.7%	4
Rockling	7.7%	4
Sea stickleback (15 spine)	7.7%	4
Stoneloach	7.7%	4
Dab	3.8%	2
Non-minnow cyprinide	3.8%	2
Pike	3.8%	2
Plaice	3.8%	2
Sand eel	3.8%	2
Blenny	1.9%	1
Bullhead	1.9%	1
Cod	1.9%	1
Five-Bearded rockling	1.9%	1
Lumpsucker	1.9%	1
Other flatfish spp	1.9%	1
Pipefish	1.9%	1
Roach	1.9%	1
Unidentified fish spp	5.8%	3
Avian spp	13.4%	7
Mammal spp	1.9%	1
Invertebrate spp	9.6%	5

\*calculated from presence in 52 bags containing identifiable remains  
(54 bags of spraint analysed)

## 7. DISCUSSION/CONCLUSION

Evidence from surveys and sightings suggests that the level of otter activity on the Pembrokeshire coast, coastal streams, and throughout the Milford Haven Waterway is high. The numbers and range of ages of spraints (fresh, recent and old), found at most sites indicates that visits to the coast and into the Milford Haven Waterway are frequent over a relatively long period of time. In a study of otter use of the Lleyn peninsula in North Wales (Hall, C 2002), otter signs were found within 1 km of the shore at 8 of the 10 sites surveyed, but no information on the numbers or ages of spraints is given in the preliminary report.

On the open coast, positive survey sites were found from St. David's Head around to Frainslake. Although no otter signs were found at the two sites at the east of the marine SAC (Broadhaven and Freshwater East), reliable otter sighting records indicate that otters are active along this stretch.

Although it is difficult to draw firm conclusions about the level of otter activity in the marine environment based on a one-off survey, the results certainly suggest that otter use of the sea and the littoral zone may be high. This is supported by the following findings:

- A wide range of marine species were found in spraints (particularly from the Milford Haven Waterway),
- There is good evidence, based on reliable otter sightings, and the presence of spraint, that otters visit the islands of Skomer and Ramsey,
- The boat survey at St. Ann's Head showed that otters are travelling in the sea along the cliff edge,
- Most of the coastal rivers and streams provide ideal dense, undisturbed cover for otter resting or breeding sites.

## 8. RECOMMENDATIONS FOR FURTHER WORK.

A brief outline of the aim and methodology of proposed projects are described – some may be conducted concurrently.

### 8.1 Research & Data Collection

#### ***Otter usage of the open coast.***

**Aim:** to determine the level and function of otter activity on stretches of open coast away from watercourse outflows.

**Method:** Stretches of open coast should be searched for spraints & resting site couches. Sites to be surveyed are divided into two groups:

- open coast between streams that are near neighbours (< 4 km of coast apart); and
- open coast between streams that are distant neighbours (>4 km of coast apart).

A standard survey length of 1km of coastline should be used. At each 1 km length, a boat is used to locate features along the cliff face that would be accessible to otters and provide them with a dry platform at most states of the tide. Each feature is then

accessed by the surveyor using a dry suit, and all potential sprainting sites searched for otter signs. Spraints should be collected in labelled bags for analyses.

To ensure a uniform coverage of the SAC coastline, it is suggested that for each of the nearest and distant neighbour stretches of coastline, a 1 km length is surveyed for every 4 km of coastline between watercourses. Where possible, the 1km length to be surveyed should lie approximately half way between watercourses. For all nearest neighbour and most distant neighbour stretches, a single 1 km of coast will be searched. For km 56 – 66, and km 84-98 there will be two and three stretches searched respectively.

Km numbers for coastlines between near neighbour streams (number of 1km survey stretches in brackets):

4-7 (1); 21-23 (1); 24-27 (1); 27-29 (1); 29-31 (1); 33-36 (1); 44- 47 (1); 81-83 (1).

Km numbers for coastlines between distant neighbour streams (number of 1km survey stretches in brackets):

7-11 (1); 14-21 (1); 48-53 (1); 56-66 (2); 68-74 (1) (St Ann's Head); 75-80 (1); 84-98 (3); 99-105 (1).

This gives a total of 19 x 1km survey stretches.

#### ***Otter usage of islands within the Pembrokeshire Marine SAC.***

**Aim:** To establish the likely level and function of otter usage of the main islands, Skomer, Skokholm, Grassholm, and Ramsey.

**Method:** At each island, a number of 1km stretches of coastline should be searched (Skomer and Ramsey – 3 stretches; Skokholm – 2 stretches). Survey stretches should include locations where there is anecdotal evidence of otter use (for example, South Haven on Skomer Island).

The actual method of search should be similar to the boat and dry suit survey outlined above.

#### ***Otter usage of the coast – seasonal variations***

**Aim:** To determine whether otter usage of the coast varies throughout the year, and to identify the factors (if any), that influence seasonal otter activity.

**Method:** Information on otter activity can be gained by searching coastal and Milford Haven Waterway survey sites (identified for the present project), at monthly intervals and using the survey methodology described in the main report above. Surveys can be carried out by local volunteers who will need to be trained in otter survey and data recording techniques.

A range of possible factors that might influence seasonal otter activity includes food availability; disturbance; and weather conditions. Data on each of these can be collected during monthly surveys. The investigation of otter diet and prey availability throughout the year requires a large input of effort and collaboration with Swansea University, and is described below as a separate project.

**Otter diet – seasonal variations.**

**Aim:** To determine seasonal variations in marine prey taken by otters.

**Method:** The main line of investigation is based on spraint collection and analyses. In addition, fish surveys to determine species and numbers available for otters can be carried out. This would also allow a comparison to be made with the results of similar studies carried out in Shetland (Kruuk *et al* 1988, Kruuk *et al* 1990; Kruuk *et al* 1991).

Spraint Analyses: Spraints are collected during the monthly surveys described above. Spraint collection and analyses should be carried out using the methodology described for the present project. Dr. Dan Foreman, Swansea University, has agreed to carry out analyses of spraints, and statistical analyses of results.

Fish Surveys: Little is known about the population densities of marine species around the Pembrokeshire coast. Systematic surveys for marine fish species at key sites (related to coastal spraint collection sites) will provide data that can be compared with results from Shetland. Such a comparison may indicate whether prey availability on the Pembrokeshire coast is likely to be a limiting factor for otter use of the marine environment. It will also provide base-line data so that future trends in fish populations can be monitored.

**Sightings of otters.**

**Aim:** To ensure that otter sightings on and near the coast and in the Milford Haven Waterway are reported and collated, and to increase the overall number of sightings.

**Method:** A major publicity/information campaign is needed to alert people living, working and visiting the coast and Haven that otters are active in these areas, and any sightings should be reported to one of the key organisations (e.g. Pembrokeshire Coast National Park Authority, Countryside Council for Wales).

Several sites around the coast and within the Haven have been identified as places where otters are likely to be seen. Otter watching at these sites may provide valuable information on otter activity and behaviour. Volunteers living close to these sites can be asked to watch at suitable sites, especially when fresh spraint is found nearby.

**8.2 Long Term Monitoring of Otter Activity**

Results of the present survey provide baseline information on otter usage of the coast and Milford Haven Waterway against which future repeat surveys can be compared, in order to determine trends in the level of otter usage of the marine environment.

The following protocol for monitoring otter usage of the Pembrokeshire Marine SAC is suggested:

- Otter surveys of coastal and Milford Haven Waterway sites should be carried out initially at 5 year intervals;
- Surveys should be carried out at 15 coastal and 13 Milford Haven Waterway sites, using every other site along the coast and shoreline to ensure an even distribution of sites, and both positive and negative sites (from the present survey);

- All surveys should be carried out in the same month.

In order to reduce costs, it may be possible to use local volunteers to carry out some surveys.

### **8.3 Data Management.**

For the present project, data has been entered onto the Otter Consultancy Otter Database (an Access database), and in Excel Spreadsheets. An agreement could be established to continue this arrangement over the long term.

An alternative is to set up a new system possibly within an existing database already in use for the Pembrokeshire Marine SAC, and linked to GIS mapping.

## **9. CONSERVATION ADVICE.**

Conservation management guidelines for otters will be drawn up for the Pembrokeshire Marine SAC. The major issues that should be tackled are:

### ***Potential breeding & resting sites.***

One of the most important features for otters in the Pembrokeshire Marine SAC area is the extent and quality of suitable habitats. Relatively small areas of dense cover (for example, a gorse thicket of 10m x 10m) can provide an otter resting site. Much larger areas of fen, scrub or woodland may provide ideal breeding sites. Suitable habitats exist in many coastal streams and along the shoreline of the Milford Haven Waterway. It is vital that both small blocks, and extensive areas of cover are protected from damage and disturbance.

The most likely threat to these habitats is damage (and even eventual loss) as a result of livestock trampling and grazing if fencing is not maintained. It may be possible to reduce this risk by farm visits to ensure that landowners and farmers are aware of the importance of these habitats, and to enlist their help in retaining them.

### ***Disturbance.***

Present levels of disturbance and types of human activity on the Pembrokeshire coast (for example, walking the coast path, sea fishing, boating, climbing, visiting sandy bays) are unlikely to affect otters, and even increases in the level of activities should not be a problem to otters.

Of more concern would be the introduction of new activities that created disturbance in existing otter habitats. For example, creating a footpath through extensive areas of fen or scrub in coastal stream valleys may prevent otters from using the site for breeding.

### ***Oil spills.***

Little can be done to safeguard otters from oil pollution, but information on the impact of an oil pollution incident on otters living close to the coast will add greatly to our understanding of the problem. If an oil spill occurs, surveys for otter signs should be undertaken immediately to establish whether and how otters are likely to be affected.

***Crustacean traps.***

Evidence from other parts of the UK suggests that crustacean trap, and the parlour pot type in particular, is a threat to otters. Many crustacean pots are set within a few hundred metres of the Pembrokeshire coastline, and within the Milford Haven Waterway, and are may pose a serious threat to otters.

In order to assess the threat to otters from crustacean traps, and to find ways to reduce the threat, it is suggested that research is carried out in conjunction with commercial crustacean fishermen, into the distribution, number and siting of the different designs of crustacean pots; historical information on otters trapped in pots; and a comparison of the efficiency of the different pots to catch crustaceans.

***Public awareness.***

Otter use of the coast and Milford Haven Water; why and how otters are using these environments; and where and how they may be seen, can be publicised widely amongst locals and visitors. A greater awareness of the fact that otters use the Pembrokeshire marine environments could help to generate more information on otters (through reported otter sightings), and help to protect the areas and habitats used by them.

**10. ACKNOWLEDGEMENTS**

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I'm also extremely grateful to Dr. Dan Forman at Swansea University who undertook the painstaking work of analysing spraints, and providing statistical analyses of the results.

My thanks to the various local experts from the Pembrokeshire Coast National Park, Countryside Council for Wales, and individuals outside those organisations, who provided information and advice on such issues as crustacean traps, and GIS mapping, as well as providing otter sightings records. Thanks specifically to Ian Bullock, Blaise Bullimore, Mike Camplin, Bob Haycock, Jane Hodges, Annie Poole, Claire Walker and Duncan Brown.



## 11. REFERENCES

- Andrews, E.M. & Crawford, A.K. (1986) Otter survey of Wales 1984-85. The Vincent Wildlife Trust, London.
- Andrews, E. Howell, P. & Johnson, K. (1993) Otter Survey of Wales 1991. The Vincent Wildlife Trust, London.
- Beja, P.R. (1991). Diet of otters (*Lutra lutra*) in closely associated freshwater, brackish and marine habitats in south-west Portugal. *J.Zool., Lond.* 225, 141 – 152.
- Bradshaw, A.V. & Slater, F.M. (1999) R&D Project W1-019, Dead otters: Postmortems and Tissue Analysis. R&D Technical Interim Report. Llysdynam Field Centre, Cardiff School of Biosciences.
- Erlinge, S. (1967) Home range of the otter *Lutra lutra* in Southern Sweden. *Oikos*, 18, 186-209.
- Green, J., Green, R., and Jefferies, D.J. (1984). A radio-tracking survey of otters *Lutra lutra* on a Perthshire river system. *Lutra*, 27, 85-145.
- Hall, C. (2002). A pilot study of the coastal ecology of the otter (*Lutra lutra*) in North Wales. Unpublished report.
- Heggeberget, T.M. (1993). Marine-feeding otters (*Lutra lutra*) in Norway: Seasonal variation in prey and reproductive timing. *J. Mar.Biol. Ass. U.K.* 73, 297-312
- Heggeberget, T.M. (1995). Food resources and feeding ecology of marine feeding Otters (*Lutra lutra*). In *Ecology of Fjords and Coastal Waters*. Elsevier Science B.V.
- Heggeberget, T.M. and Moseid, K.-E. (1994). Prey selection in coastal Eurasian otters *Lutra lutra*. *Ecography* 17: 331-338.
- Heggeberget, T.M. and Moseid, K.-E. (1995). Coastal otter habitats and exposure of otters to offshore oil spills. *Proceedings VI International Otter Colloquium Pietermaritzburg 1993* (eds. C. Reuther & D. Rowe-Rowe).
- Jefferies, D., Green, J., and Green, R. (1984). Commercial fish and crustacean traps: a serious cause of otter (*Lutra lutra*) mortality in Britain and Europe. Vincent Wildlife Trust, London.
- Jenkins, A.L. (1982) Otter distribution on the Western Cleddau. Vincent Wildlife Trust/ Nature Conservancy Council, Aberystwyth. 91pp.
- Kruuk, H. (1995) *Wild Otters. Predation and Populations*. Oxford University Press, Oxford.
- Kruuk, H., Nolet, B. & French, D. (1988). Fluctuations in numbers and activity of inshore demersal fishes in Shetland. *Journal of the Marine Biological Association*. UK. 68, 601-617
- Kruuk, H. & Balhary, D. (1990). Effects of water on thermal insulation of the otter *Lutra lutra*. *J. Zool. London* 220: 405-415
- Kruuk, H., Conroy, J.W.H. & Moorhouse, A. (1991). Recruitment to a population of otters (*Lutra lutra*) in Shetland, in relation to fish abundance. *J. Applied Ecol.* 28: 95 - 101
- Kruuk, H., Wansink, D. & Moorhouse, A. (1990). Feeding patches and diving success of otters, *Lutra lutra*, in Shetland. *Oikos* 57: 68 – 72
- Liles G. & Colley R, (2000) Otter *Lutra lutra* road deaths in Wales: Identification of Accident blackspots and establishment of mitigation measures. A report for the Environment Agency Wales.
- Macdonald, S.M. & Mason, C.F. (1980). Observations on the Marking Behaviour of a Coastal Population of Otters. *Acta Theriol.* 25, 19: 245-253
- Moorehouse, A. (1988). Distribution of holts and their utilisation by the European Otter (*Lutra lutra* L.) in a marine environment. MSc. Thesis, University of Aberdeen.

- Nolet, B.A & Kruuk, H. (1994) Hunting yield and daily food intake of a lactating otter (*Lutra lutra*) in Shetland. *J. Zool.* 233 no.2 pp326-331
- Nolet, B.A., Dennis, E.H., Wansink, & Kruuk, H. (1993). Diving of otters (*Lutra lutra*) in a marine habitat: use of depths by a single-prey loader. *Journal of Animal Ecology* 62, 22-32.
- Philcox, C.K., Grogan, A.L. & Macdonald, D.W. (1999). Patterns of otter (*Lutra lutra*) road mortality in Britain. *Journal of Applied Ecology*, 36, 748-762.
- Potts, G.W. & Swaby, S.E. (1993). Marine & estuarine fishes of Wales: The development of the British marine fishes database and monitoring programme for Wales. The Countryside Council for Wales/Marine Biological Association. Contract No. FC 73-01-53.
- Potts, G.W. & Swaby, S.E. (1993). Marine & estuarine fishes of Wales. The Countryside Council for Wales/Marine Biological Association. Contract No. FC 73-01-53.
- Watson, H.C. (1978) Coastal otters in Shetland. The Vincent Wildlife Trust, London.

**Appendix 1: Survey Form**

**COASTAL OTTER SURVEY: PEMBROKESHIRE**

**SITE No.** \_\_\_\_\_ **SITE NAME:**.....  
**GRID. REF.**..... **SURVEY DATE:**.....

**STREAM AT OUTFLOW**

**WIDTH:** <0.5m      0.5-1m 1-2m      2-3m      >3m

**ENTERS SEA:**

WATERFALL     THROUGH BEACH     THROUGH ROCKS

**OTTER ACCESS:** EASY       DIFFICULT       IMPOSSIBLE

**HABITAT:**

OUTFALL TO 20m:  
 20m TO 100m:

POTENTIAL **RESTING** SITES:

POTENTIAL **BREEDING** HABITAT:

**COAST**

**WITHIN 20m OF OUTFLOW** (left + right):

Rocks     Dunes     Other (describe)

**20 TO 50m OF OUTFLOW** (left & right):

Rocks     Dunes     Other (describe)

CAN OTTERS ACCESS LAND FROM SEA? (Describe sites)

CAN OTTER ACCESS SITES BE SURVEYED FOR SIGNS: YES /NO

**OTTER SIGNS**      (arrow and number sites on maps)

SITE	SPRAINT	PRINTS	PATHS	POT.SPR.SITES	OTHER

**Appendix 2a: Open Coast Spraint Analyses: Species present & number of vertebrae.**

<i>Coastal Km &amp; Site name</i>	<i>Date</i>	<i>Species Present</i>	<i>No. of Vertebrae</i>	<i>Notes</i>
Km. 14. Site 5 Whitesands Bay	-	Eel	8	
Km 21. Site 6 Porthlysgi Bay	-	Avian (feathers) Fur <i>Odonata</i> spp larvae Invertebrate		Beetle remains, fur awaiting further analysis
Km. 24 Site 7 Porth Clais	13/8/02	Butterfish Eel Bank vole	1 1 none	Very old spraint  Fur & leg bones in very old spraint
Km. 28 Site 8 Caer Bwdy Bay	-	Eel Butterfish Salmonid	9 4 3	
Km. 30 Site 9 Porth y Rhaw	-	Avian (feathers) Eel Salmonid Stickleback (3 spine) Pike Butterfish	19 6 6 4 2	Avian spp is probably a passerine
Km. 32 Site 10 Solva	-	Eel Minnow	30 1	
Km. 36 Site 11 Porthmynawyd	-	-	-	Nothing identifiable
Km. 39 Site13 Newgale Rd	12/9/02	Salmonid Eel Stickleback (3 spine) Invertebrate spp	9 2 1	Beetle species
Km. 44 Site 17 Druidstone Haven	12/9/02	Invertebrate	-	Marine arthropod ?
Km. 48 Site18 Broad Haven	-	Salmonid Pike	1 1	Eel jaw also present
Km. 53 Site20 Mill Haven	13/9/02	Eel Salmonid Avian (feather) <i>Odonata</i> spp larvae	212 1	Probable rail sp
33b (unidentified site)	-	Eel Salmonid	7 4	Also remains of very large salmon present
Llanghoran	21/9/02	Avian (feathers) Eel Salmonid Rockling	86 53 24	Anas spp
Km. 81 Site 24 Freshwater West	-	Eel Rockling Sea Stickleback (15 spine)	126 9 9	
Km. 84 Site 25 Frainslake	-	Eel Rockling <i>Cyprinidae</i> spp Stickleback (3 spine) Salmonid Lumpsucker	24 18 16 3 2 1	<i>Cyprinidae</i> spp is not minnow

**Appendix 2b: Waterway Spraint Analyses: Species present & number of vertebrae.**

<i>Waterway km &amp; Site name</i>	<i>Date</i>	<i>Species Present</i>	<i>No. of Vertebrae</i>	<i>Notes</i>
<b>Km. 1</b> Mill Bay (St. Anns Head)		Eel Bullrout Plaice Stickleback (3 spine) Flatfish Marine crustacean	52 26 24 19 1	<2cm
<b>Km. 2</b> West Blockhouse Point		Eel Unknown sp	2 2	
<b>Km. 3</b> Castle Beach		Eel Flatfish spp Minnow Roach Perch Unknown Spp	11 6 5 4 3 4	
<b>Km. 3</b> Warwick Point		Rockling Sand eel Eel Bullhead Perch Unknown spp.	8 4 1 1 1 4	
<b>Km. 4</b> Dale Fort Jetty	Sept. 2002	Sea Stickleback (15 spine)	1	Very old spraint
<b>Km. 6</b> Dale		Eel Perch	18 5	
<b>Km. 7</b> Dale		Minnow Eel Salmonid Stickleback (3 spine) Stoneloach	127 30 21 16 9	
<b>Km. 7</b> The Gann		Eel Salmonid Bullrout	48 33 3	
<b>Km. 9</b> Monks Haven		Avian Eel Salmonid	107 1	Passerine
<b>Km. 14</b> Sandyhaven Pill	-	Stickleback (3 spine) Stoneloach Eel Pipefish	9 3 1 1	

<i>Waterway km &amp; Site name</i>	<i>Date</i>	<i>Species Present</i>	<i>No. of Vertebrae</i>	<i>Notes</i>
<b>Km. 22</b> Castle Pill	-	Eel 5 bearded rockling Stickleback (3 spine) Sand eel Sea stickleback Butterfish Dab	57 19 12 5 4 3 1	
<b>Km. 28</b> Neyland Marina	-	Stickleback (3 spine)	1	
<b>Km. 32 + 33</b> Ferry Hill	-	Cod Minnow Eel	132 114 16	
<b>Km 34</b> Benton Castle	-	Eel Dab Lumpsucker Avian spp (feathers)	13 1 1 -	Salmon scale also present in spraint
<b>Km. 36</b> Llangwm	-	Minnow <i>Cyprinidae</i> spp Eel Perch	141 42 29 16	<i>Cyprinidae</i> species present is not minnow
<b>Km. 37</b> Knapp Farm	-	Eel Minnow Rockling	319 204 19	
<b>Km. 39 to 41</b> Landshipping Quay	-	Minnow Eel Salmonid spp Viviparous blenny Unknown spp	216 106 105 19 2	Unknown species looks marine
<b>Km. 45 + 46</b> Whalecombe Farm	-	Eel Saithe Stoneloach Rockling	17 6 4 2	



**Appendix 3: Detailed information of survey sites (maps, exact locations of otter signs, potential sprainting sites, key habitat features and photos)**

**[If Appendix 3 is not included within this document, the data can be obtained by contacting the Pembrokeshire Marine Special Area of Conservation Officer – see [www.PembrokeshireMarineSAC.org.uk](http://www.PembrokeshireMarineSAC.org.uk) for details. Alternatively see the distribution list at the beginning of this document.]**