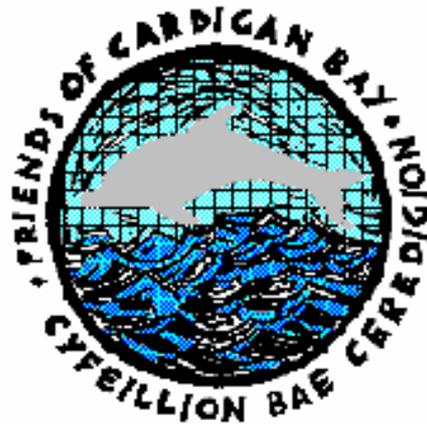


Friends of Cardigan Bay:
Sarns Pilot Surveys 2004



By Philip Hughes.

Preface

The aims of these initial pilot surveys carried out on two of the Cardigan Bay Sarnau, were to investigate these unusual sublittoral reefs as a potential resource for marine mammals and seabirds, with particular attention being paid to the presence of Bottlenose dolphin (*Tursiops truncatus*) and Harbour porpoise (*Phocoena phocoena*). Additional information on the Atlantic grey seal (*Halichoerus grypus*) and the general bird populous present on the Sarns at different tidal times was also recorded. It is hoped that this early work may provide a valuable foundation for future monitoring and also promote further research into these unique areas.

Abstract

The 2004 Sarns pilot surveys were undertaken in order to establish whether there was any evidence to support reports of cetaceans, particularly Bottlenose dolphin (*Tursiops truncatus*) and Harbour porpoise (*Phocoena phocoena*) present on the two lower Sarnau, Cynfelin Patches and Sarn-y-Bwlch in Cardigan Bay.

Additional information of bird species present and pinnipeds would also be recorded. Between April and October a full 10 days of surveys were completed. Analysis of the results concluded that there were Bottlenose dolphin present on both Sarns, and sightings data indicated that foraging activity was in evidence, particularly at times near high water and on spring tides.

The survey work on Sarn Cynfelin also identified one particular area as a possible hotspot for cetacean activity, mainly foraging. It is a recommendation of this survey that future benthic investigations by divers should be carried out, hopefully to establish what prey animals were of interest at this site.

There were no encounters with Harbour porpoise, although adhoc sightings suggest that they are present at certain times. The survey did show a presence of Atlantic grey seal (*Halichoerus grypus*) on or near the reefs, possibly feeding. It is also a recommendation that future ongoing monitoring should continue, and include a more detailed seabird survey of the area.

Methodology

As these were initial pilot surveys, two different types of line transects were designed and subsequently tested for their suitability. Diamond shaped transects as designed by The Whale and Dolphin Conservation Society (WDCCS) after Hilby and Hammond (1989; ICW, 2000) were deployed, having been initially shortened to fit over a uniform area of the Sarns. The second design was a more straightforward parallel line transect that was later deemed more suitable in their ability to encapsulate the more linear formation of the Sarns. This would then allow our vessel to pass in closer proximity to the reef crowns where possible upwellings are more likely to occur.

The surveys were undertaken utilizing the group's 5.5metre inflatable workboat and incorporated the use of both pre-determined line transects, and areas of multiple spot sampling survey techniques. When on transect lines, a steady speed of 6-8 knots was adhered to when sea conditions allowed, and at no time were surveys carried out in anything above a sea-state 2. Any sea-state higher was deemed unsuitable for the purposes of this survey, we would also have to take into account our reduced height of eye from the inflatable compared with a larger vessel.

Two trained observers were on watch at all times, with an environmental log being kept by the other crew members while on transect. This log sheet was filled out every 15 minutes and the following data was collected: *Time, Observers, Latitude and Longitude, Course over ground (vessels heading), Speed over ground, Depth (Metres from sea surface), Water temperature (Sea surface), Sea state (Beaufort), Swell height, Wind force (Beaufort), Wind direction, Cloud cover, Glare, Visibility, Precipitation, Craft present.* If cetaceans were encountered then a second sightings sheet was duly filled in and the following data recorded: *Date, Time (Start of encounter), Time (End of encounter), Species, Total number of individuals, Number of adults, Number of juveniles, Number of calves, Bearing, Distance, Initial direction of travel, Lat/Long (Start of encounter), Lat/Long (End of encounter), Associated wildlife, Behaviour, Reaction to craft and Tidal information.*

All sightings while spot sampling and traveling to and from the Sarnau were recorded along with separate details of encounters with associated wildlife such as seals and seabirds.

It was anticipated that there may be a need to investigate benthic features on the Sarnau and prior arrangements with local diver's to utilize *Sea-search* techniques for sublittoral recording was agreed upon.

All cetacean records, including Log sheets detailing total effort and routes followed along with sightings data sheets, will be forwarded to the joint cetacean database.

Diagrams 1-2 & 3-4 overleaf show the two different transect designs applied to both Sarn Cynfelin and Sarn-y-Bwlch .

Introduction

The Sarnau of Cardigan Bay (Sarn Cynfelin, Sarn Badrig and Sarn-y-Bwlch) are unusual shallow sub-tidal reefs, and are included in the candidate Pen Llyn Ar Sarnau Special Area of Conservation (cSAC). All three Sarns extend in a general direction of west from the mainland and the longest St Badrig extends some 24km offshore.

These Sarnau are thought to be relics of glacial moraine deposited during the last ice age and washed clean by the sea to leave mounds and ridges of boulders and cobbles (Foster 1970). For our pilot surveys we intend to focus on the two most southern Sarnau, Sarn Cynfelin and Sarn-y-Bwlch.

Sarn Cynfelin starts from below the farmhouse at Wallog situated on the cliffs between Borth and Clarach near Aberystwyth and extends some 14 kilometres offshore and is bisected by a 5 metres deep channel approximately half way along its length. Charted depths as shallow as 1.5 metres have been recorded, both near the mid-channel and, also, near to its western prong or outermost extremities to seaward (Admiralty chart 1972).

Sarn-y-Bwlch is the smallest of the three Sarns extending some 6 kilometres offshore out from Pen Bwlch point at Tywyn in Gwynedd, and again with charted depths as shallow as 0.3 metres (Admiralty chart 1972).

Fast tidal streams and strong wave action are reputed to have a profound influence on the marine communities present, and the reefs are characterized by a large number of species resistant to scour and coverage at times by sand. Algal communities are dominant on much of the reefs with growths of foliose Red and Brown algae forming dense beds in places. The Brown Algae *Chorda filum*, and *Laminaria saccharina*, and red algae flourish on or near the reef crowns, while the number of algal species increases with depth. In certain parts of the reefs there are extensive underwater forests of Sea-Oak (*Halidrys siliquosa*). Rich animal dominated biotopes are found in the deeper parts of the reef, including crustaceans, cninadarians, sponges, and hydroids and encrusting bryozoans.

To the north of both Sarns on the sheltered sides lie fine sand habitats, which are reportedly rich in bivalve molluscs (JNCC 1999). The reefs in summer also support good populations of fish, such as Pollock (*Pollachius pollachius*), Bass (*Dicentrarchus labrax*), and Black Bream (*Spondylisoma cantharus*) (local information).

The purpose of these initial pilot surveys were to establish whether there was evidence to suggest that these two habitats were of interest as a resource to cetaceans, particularly Bottlenose dolphin (*Tursiops truncatus*) and Harbour porpoise (*Phocoena phocoena*), and, if so, would there be activity in evidence to suggest any possible hotspots on these reefs. We would also be looking for any possible correlation between sightings and certain tidal flows and states i.e. high and low tidal times and neap and spring tides. During the surveys we also would be looking for any evidence of upwellings on the Sarns and would be assessing tidal speeds across them.

Additional information on any encounters with the Atlantic grey seal (*Halichoerus grypus*) and populations of seabirds present would also be recorded along with any sightings of marine turtles.

It is hoped that this preliminary work may lead to a more detailed examination of the Cardigan Bay Sarnau as a marine habitat, possibly supporting a wide range of species including cetaceans. If we can during these surveys identify any potential hotspots for cetacean activity, particularly foraging and feeding, then it would be a worthwhile exercise to deploy local divers to conduct a general benthic survey of the area.

Previous FoCB Bottlenose surveys of central Cardigan Bay have indicated that there may be cetacean activity on these unique reefs, and numerous anecdotal reports, particularly from local charter boat operators, also suggest this. Therefore, our hypothesis for these surveys is that : There are cetaceans particularly Bottlenose dolphin and Harbour porpoise utilizing both of these Sarns as a possible resource for foraging and feeding, and that there may be more concentrated activity at certain tidal states and times.

Results

In total, 10 out of the full 12 days of survey work were undertaken between April and November. Unfortunately, the inclement weather encountered in July, and especially August, meant that our remaining two trips to Sarn-y-Bwlch at Tywyn were not carried out. Again an early fine spell in September was overshadowed by strong easterly winds making any offshore work impossible. October was to prove equally disappointing. However, there was a good start to the season and results obtained were encouraging. Details are given below in tables 1 & 2. Figures 5 & 6 also show the location of these sightings on both Sarns:

Cetaceans and pinnipeds

Table 1 **Sarn Cynfelin**

Species	Total Number	Adults	Juveniles	Date & Time	Location	Tidal Info *	Notes
BOTTLENOSE DOLPHIN (<i>Tursiops truncatus</i>)	12	10	2	11/05/04 14:00 hrs	52°27'.46 004°06'83	HW 14:13 hrs 3.7m Neaps	Foraging & Feeding
	8	6	2	06/07/04 12:30 hrs	52°27'.10 004°08.51	HW 11:34 hrs 4.6m Springs	Foraging & Travelling
ATLANTIC GREY SEAL (<i>Halichoerus grypus</i>)	1	1	N/A	06/06/04 18:30 hrs	52°26'.00 004°15.70	HW 23:23 hrs 4.9m Springs	Foraging
	1	1	N/A	09/09/04 16:15 hrs	52°27'.30 004°05.60	HW 18:15 hrs 3.5m Neaps	Foraging

* Tidal times given are for Aberystwyth. High water for Tywyn (Sarn-y-Bwlch) is approximately 20 minutes later than Aberystwyth.

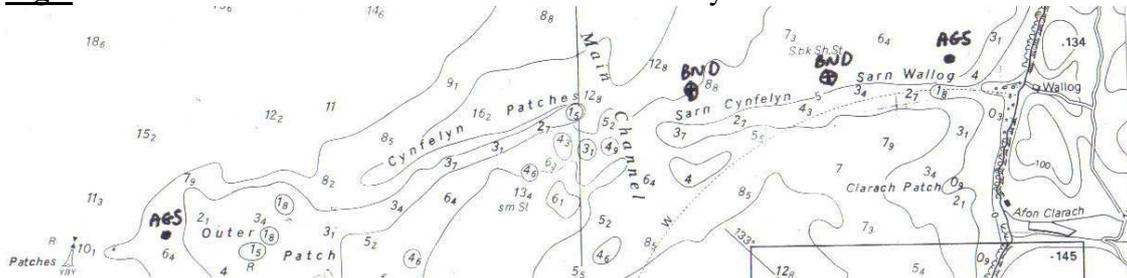
Table 2

Sarn-y-Bwlch

Species	Total Number	Adults	Juveniles	Date & Time	Location	Tidal Info *	Notes
BOTTLENOSE DOLPHIN (<i>Tursiops truncatus</i>)	2	1	1	05/08/04 14:15 hrs	52°36'.00 004°08.00	HW 11:47 hrs 4.7m Springs	Foraging With Calf
ATLANTIC GREY SEAL (<i>Halichoerus grypus</i>)	1	1	N/A	05/08/04 14:15 hrs	52°36'.00 004°08.00	As Above	Feeding

All animals were positively identified and there were no encounters with Harbour porpoise (*Phocoena phocoena*) at either Sarn Cynfelin or Sarn-y-Bwlch.

Fig 5 below shows the location of encounters on Sarn Cynfelin:



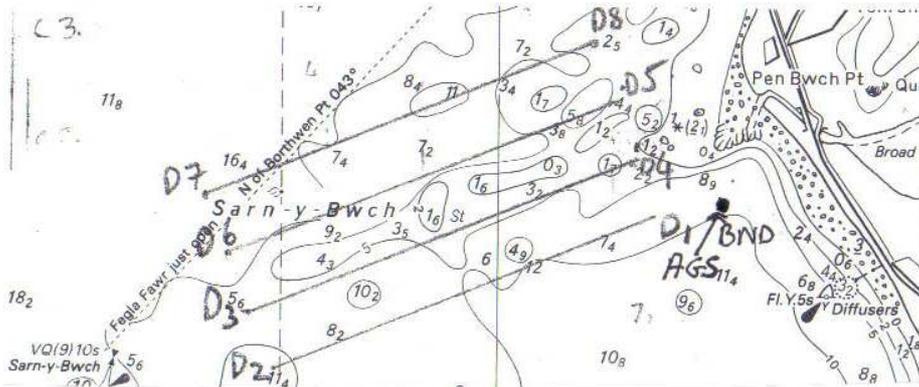
BND= Bottlenose Dolphin
AGS= Atlantic Grey Seal

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Not to be used for navigation.

Figure 6 below shows sightings locations at Sarn-y-Bwlch.

Figure 6



BND=Bottlenose Dolphin
AGS=Atlantic Grey Seal

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Not to be used for Navigation.

At Sarn-y-Bwlch there were no actual encounters while on transect. However, after just coming off effort, a Bottlenose dolphin and young juvenile were observed just to the south east of the Sarn, along with an Atlantic grey seal.

Tidal Flow speed

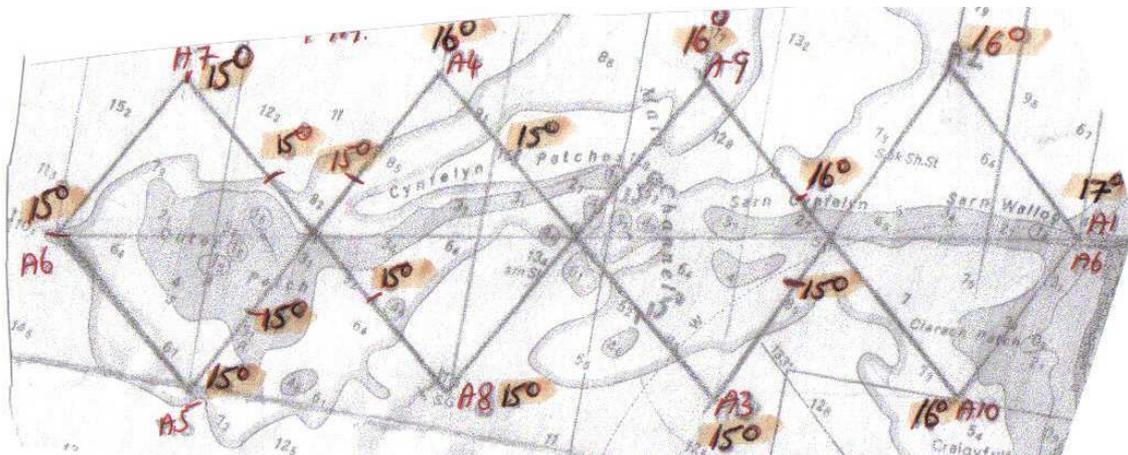
No accurate information was recorded, this was due mainly to the lack of a suitable flow meter, however, several good observations were made over the course of this survey and will be discussed later on in this report.

Upwellings

Again no accurate scientific evidence, but surface sea water temperature differences were recorded on one transect on Cynfelin early on in the season. Figure 7 below shows details of this as recorded on the 6th June 2004. Time of survey: 1650-1943hrs.

Tidal information: High water at 2323hrs Height of tide: 4.9m Low water at 1809hrs.

Figure 7. Showing surface water temperature variation on Sarn Cynfelin. (For tidal info please see above).



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Not to be used for Navigation.

Sea Birds.

A variety of Sea birds were encountered on both Sarns, and although this project was not intended to be a detailed specific bird survey the following species list represents individual or groups sightings on the two Sarnau for this year (2004):

Cormorant (*Phalacrocorax carbo*)

Shag (*Phalacrocorax aristotelis*)

Gannet (*Morus bassanus*)

Manx shearwater (*Puffinus puffinus*)

Storm-petrel (*Hydrobates pelagicus*)

Fulmar (*Fulmaris glacialis*)

Herring gull (*Larus argentatus*)

Great Black-backed gull (*Larus marinus*)

Black-headed gull (*Larus ridibundus*)

Kittiwake (*Rissa tradactyla*)

Guillemot (*Uria aalg*)

Razorbill (*Alca torda*)

Sandwich tern (*Sterna sandvicensis*)

Eider (*Somateria mollissima*)

Common scoter (*Melanitta nigra*)

Velvet scoter (*Melanitta fusca*)

Red-breasted Merganser (*Mergus serrator*)

Great Crested grebe (*Podiceps cristatus*)

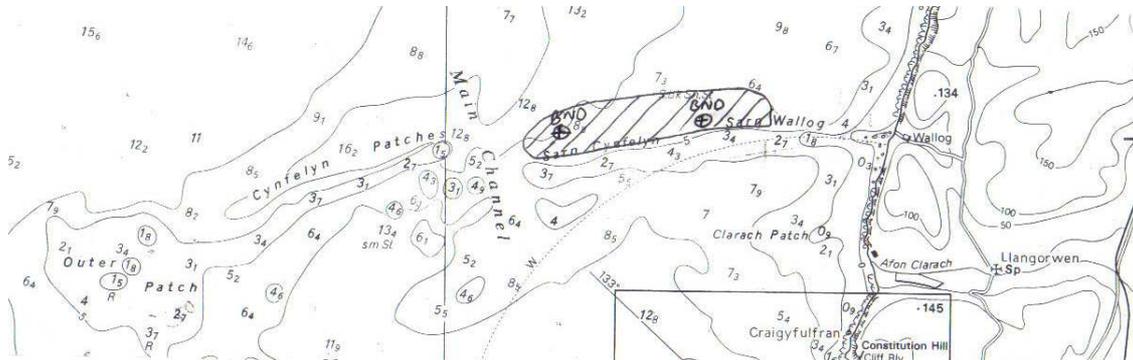
Anecdotal reports suggest that assorted Skuas also pass through and may be present in the area. This year (2004) the Great Skua (*Stercorarius skua*) has been reported in August and the Long-tailed Skua (*Stercorarius longicaudus*) in May. Additionally Red throated divers have been sighted in winter on Sarn Cynfelin by local bird enthusiasts.

Discussion

Early season activity in May saw our workboat literally besieged by a pod of initially 2, then 8, and, finally, 12 Bottlenose dolphin (*Tursiops truncatus*) out on our local Sarn 'Cynfelin'. After a very playful encounter lasting over 30 minutes we then observed these animals resume a very concentrated foraging behaviour just to the north of a linear inshore bank on the sarn.

See fig 8 outlined below. NB: The first encounter in May is the closest inshore.

Fig 8.



BND= Bottlenose Dolphin sightings.

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Not to be used for navigation.

Again in July, we also observed a pod of 8 Bottlenose dolphin just to the west of this location, but still to the immediate north of this linear bank. Later anecdotal information provided by a local diving club also suggested a further two encounters with a large group of Bottlenose dolphin near to this exact location.

Our own observations of these animals suggested that they were staying down on the bottom for fairly long periods of time, and were most definitely focusing on the same spots respectively. Admiralty chart information suggests a sea bed characterized by a mixture of sand, gravel, and broken stone, bearing in mind that this is old survey data and could have changed slightly over time. It was our intention to put divers down at this location for further benthic investigation, but unfortunately the last few months of the season did not allow for this due to the inclement nature of the weather.

The fact remains that these animals were most definitely attracted to this area. This was witnessed on more than one occasion, when we just happened to be there, and at those particular times. The question remains do they frequent this area on a regular basis? And if so what are they foraging for?

Information given by JNCC (1999) suggests that there are areas to the north of the Sarns with a fine sand habitat rich in bivalve molluscs, while adhoc reports by local divers suggests that there are cephalopods also present on the Sarns, namely the Lesser octopus (*Eledone cirrhosa*) which has been observed in or around areas of strewn boulders.

We have also observed from the boat that there are large aggregations of Starfish probably Commons (*Asterias rubens*) and plenty of common Spider crab (*Maja squinado*) also present on the very inshore regions of the reef.

It was a recommendation by the Hiscock report in 1986 that Sarn Cynfelyn required much further sublittoral investigation of its biological content, and the writer would firmly agree with this statement.

We certainly feel that we have identified an area on Sarn Cynfelin that is of apparent interest to Bottlenose dolphin, and these sightings occurred at or around times of high water. So does this indicate a preference for possibly deeper water while foraging, or is there more general sublittoral activity particularly by Teleosts at these times? We did actually witness on our first encounter in May a Bottlenose dolphin actually pursuing a large fish close to the surface, possibly a Bass (*Dicentrarchus labrax*) or Pollock (*Pollachius pollachius*), but we were of the opinion that this was a separate incident to the overall foraging activity.

There was no immediate evidence of any upwellings at these locations and we feel that it is now only by deploying divers, that we may start to answer our questions more fully, and in turn start to build up valuable information on possible prey species of Bottlenose dolphin.

At Sarn-y-Bwlch we also encountered a Bottlenose dolphin with a juvenile just off our transect, and fairly close to the main beach,. The foraging behaviour gave the observers the opinion that the adult (the mother, presumably) was possibly teaching the juvenile foraging techniques. Most definitely there were fish present at this location, as an Atlantic grey seal proved to us, surfacing close to our boat and throwing two Atlantic mackerel (*Scomber scombrus*) high into the air!

It would seem that the Sarns do provide an area of interest for pinnipeds, as well as Bottlenose dolphin, with two sightings inshore, and one well offshore near to the western prong on Cynfelin. This is one location that we would like to investigate further. Our surveys did not record any Harbour porpoise (*Phocoena phocoena*), but it is well known that these animals frequent areas of stronger tidal races and according to Hiscock (1986), the western prong on Cynfelin may well be such a place where stronger tidal streams are encountered.

It is hoped that with a more suitable boat for next year that we may look at this in a little more detail. On the subject of tidal speeds across the Sarns, we could not accurately measure this due to the lack of suitable equipment. However, observations made by our experienced skipper and crew have indicated that the races across the inner most part of Sarn Cynfelin (approximately 2km from Wallog) may well be much greater than suggested by JNCC (1999) who state that a typical tidal speed across the Sarns is one knot on neap tides and one and a half knots on springs tides.

While we found no immediate evidence of upwellings, anecdotal information suggests that they are apparent on Sarn-y-Bwlch, and indeed from purely a mariner's perspective, surface sea states encountered do seem very different to that of Sarn Cynfelin. This is very subjective indeed but warrants much further investigations on both reefs.

One of our surveys on Sarn Cynfelin on the 6th June did show some interesting variations in surface sea water temperatures across the sarn (See fig 7. in results). However, measurements would need to be repeated to prove meaningful, and the relevance of such information would need to be analyzed by a suitably qualified oceanographer familiar with surface current movement and variations in Cardigan Bay. We would, however, be keen to repeat this transect again to see if we could replicate any similar results.

Our surveys also showed that the Sarns support a variety of seabird species, and this is in addition to previous Friends of Cardigan Bay surveys that identified the Bay as an important area for wintering seabirds. For this season's work only, we have observed many rafts of birds on the Sarns at different locations and times. On one such survey (13th

June) our volunteers witnessed over 100+ Gannets (*Morus bassinus*) performing spectacular aerial dives feeding in the shallow areas out on the western prong of Sarn Cynfelin. This certainly suggested the presence of shoals of Whitebait or similar fish at this location and a similar feeding frenzy in the middle of this reef was also encountered. Our visitations to Sarn-y-Bwlch showed a large presence of Cormorants (*Phalacrocorax carbo*) foraging and feeding out on the reef.

Anecdotal sightings reports provided by a local bird group also indicated a presence of passing Skuas, the Long tailed skua (*Stercorarius longicaudus*) in May this year and the Great skua (*Stercorarius skua*) in August. At the time of writing (November 2004) we have also observed the first Red Throated divers (*Gavia stellata*) out on Sarn Cynfelin. In all this information leads us to believe that a future detailed seabird survey should be carried out on the Sarnau, both during the summer and winter months.

Conclusions

Our 2004 surveys have provided us with a small snapshot of cetacean movements on Sarn Cynfelin and Sarn-y-Bwlch. These Sarns are large sea areas to monitor especially Sarn Cynfelin and the highly mobile nature of these animals can make them very elusive indeed. However taking this into account our overall results given as 6 days of survey on Sarn Cynfelin with 2 separate encounters (totalling 18 Bottlenose dolphins), and 4 days on Sarn-y-Bwlch with 1 encounter (totalling 2 Bottlenose) effectively means that we can accept the first part of our hypothesis, that there are Bottlenose dolphin (*Tursiops truncatus*) present on the Sarns and also utilizing the area for foraging and possibly feeding. Unfortunately we have no sightings of Harbour porpoise (*Phocoena phocoena*) to confirm their presence.

Our limited data also shows that these sightings of Bottlenose dolphin occurred at or around times of high water, although we would need a lot more sets of sightings data to maybe show this statistically. However, based on this minimal evidence we could possibly accept the second part of the hypothesis, with recommendations that further work is done in this area to determine patterns or correlations with times of high water. It would seem from our very limited results that the Sarns as a whole may well support a wide range of species to include: cetaceans, pinnipeds and seabirds, let alone a wealth of sublittoral species. It is only with accumulated actual sea-time spent out on these reefs that we can start to form a fuller picture of site usage and species present.

A further recommendation of this report is that we need to establish a good working relationship with local fishermen and charter boat skippers; these people spend a considerable amount of time out on the reefs during the course of a season. With this in mind FoCB is keen to establish a central data base for such information if bridges can be built and a good working relationship effected.

It would also be of great benefit to accurately measure the tidal races across the reef crowns and outer prong, and that further investigations into the presence of upwellings would be advantageous.

Additional information on sublittoral species present on the Sarns and particularly in areas where we have observed foraging behaviour by Bottlenose dolphin, may in turn allow us to identify possible prey species for these animals, and in doing so greatly improve our knowledge on this subject.

We feel it would be of great benefit not only to continue these surveys, but also to expand on them, to include a more detailed benthic survey, and also conduct a more specialized seabird recording program of these areas.

Acknowledgments

Friends of Cardigan Bay would like to thank the Countryside Council for Wales for their continued support and generosity.

We also extend much gratitude to the many volunteers who gave their time so freely and at times endured a variety of sea conditions in order to complete these pilot surveys.

References

Admiralty 1972. All map extracts included in this report are from Admiralty Chart Cardigan Bay Central Part 1972, new edition 1987. Reproductions are by permission of the controller of Her Majesty's Stationery Office and the UK Hydrographical Office (www.ukho.gov.uk). Licence agreement HO 1809/041012/01.

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