

Southwest Marine Ecosystems 2009

**Convened by Dr Russell Wynn (SeaWatch SW) and Dr David Johns (SAHFOS)
Marine Biological Association, Plymouth: Monday 14 December 2009**

Introduction

0930-0940: Russell Wynn (NOCS/SeaWatch SW) and David Johns (SAHFOS)
Introduction to Southwest Marine Ecosystems 2009 and participant introductions

Oceanic processes and plankton monitoring

0940-1010: Robin Pingree (Marine Biological Association)
Phytoplankton blooms and ocean colour

1010-1030: Peter Miller (Remote Sensing Group, PML)
Satellite remote sensing of southwest UK waters in 2009

1030-1050: Claudia Halsband-Lenk (PML)
Zooplankton monitoring off southwest UK

Marine invertebrates and fish

1130-1150: Becky Seeley (MarLIN)
Significant marine life reports received by Marine Life Information Network (MarLIN) in 2009

1150-1210: Steve Trehwella (Seahorse Trust)
The Seahorse Tagging Project at Studland

1210-1230: Dirk Wilyman (NOCS)
Jellyfish strandings in southwest Cornwall in 2009

Marine megavertebrates

1310-1330: Helen Booker (RSPB)
Seabirds and climate change

1330-1350: Russell Wynn (NOCS/SeaWatch SW)
Seabird survey results from SeaWatch SW 2009

1350-1410: Alice Jones (NOCS/SeaWatch SW)
Cetacean and Basking Shark survey results from SeaWatch SW 2009

1410-1430: Sue Sayer (Cornwall Seal Group)
Grey Seals in Cornwall in 2009

1430-1450: Tom Brereton (Marinelife)
Seabird and cetacean surveys in the western English Channel in 2009

Marine conservation

1530-1550: Dave Jarvis (BDMLR)
Cetacean strandings in Cornwall

1550-1610: Tom Hardy (Cornwall Wildlife Trust)
Cornwall Wildlife Trust Seaquest Netsafe Project

1610-1630: Colin Speedie (WiSe)
Towards sustainable marine tourism – developments within the WiSe scheme

Participant list

Jason Birt (Cornwall College)
Helen Booker (RSPB)
Tom Brereton (Marinelife)
Maria Campbell (SAHFOS)
Abby Crosby (Cornwall Wildlife Trust)
Rory Goodall (Elemental Tours)
Claudia Halsband-Lenk (Plymouth Marine Laboratory)
Tom Hardy (Cornwall Wildlife Trust)
Dan Jarvis (National Seal Sanctuary)
Dave Jarvis (British Divers Marine Life Rescue)
Lesley Jarvia
David Johns (SAHFOS)
Alice Jones (National Oceanography Centre, Southampton)
Duncan Jones (Marine Discovery)
Hannah Jones (Marine Discovery)
Natalia Lopez (National Oceanography Centre, Southampton)
Kimara McCrindle (University of Plymouth)
Catherine McLellan (University of Exeter)
Sangeeta McNair (Natural England)
Fiona McNie (Natural England)
Ilya Maclean (University of Exeter)
Peter Miller (Plymouth Marine Laboratory)
Robin Pingree (Marine Biological Association)
Rhiannon Pipkin (Natural England)
Ruth Porter (RSPB)
Trudy Russell (Falmouth Marine School)
Dave Sale (Southern Sea Fisheries Committee)
Becky Seeley (Marine Life Information Network)
Colin Speedie (WiSe)
Sue Sayer (Cornwall Seal Group)
Paul St Pierre (RSPB)
Steve Trehwella (Seahorse Trust)
Dirk Wilyman (National Oceanography Centre, Southampton)
Russell Wynn (National Oceanography Centre, Southampton)

1. Phytoplankton Blooms and Ocean COLOUR

Professor Robin Pingree

MBA, PML, SAHFOS, Plymouth University (rdpi@MBA.ac.uk)

The seasonal distribution and abundance of chlorophyll *a* (*in situ* measurement, chlorophyll *a* fluorescence, ocean colour, remote sensing e.g. CZCS, SeaWiFS, Modis Aqua) in the Southwest Approaches and English Channel is examined on the basis of physical processes of water movement, mixing and stabilisation of the water column, which largely control the availability of inorganic nutrient levels and light energy necessary for plankton cell growth or division. The spectacular summer blooms of 1975, 1976, 1978, 2000, 2002, 2003, 2004 and 2006 that occurred in the South West Marine Ecosystem region, with chlorophyll *a* values sometimes in excess of 100 mg chl *a* m⁻³ and cell counts reaching 10,000,000 individual cells in a litre of sea water, are described. Seven shelf environments are defined for the waters of the Shelf Seas around the British Isles. Seasonal cycles are defined. The results are shown to be applicable to other continental shelf regions of the North Atlantic Ocean. Interannual variability of summer blooms is explained. Results are given for climate change and shelf circulation.



2. Satellite remote sensing of southwest waters in 2009

Peter I. Miller

Remote Sensing Group, Plymouth Marine Laboratory,
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This talk aims to provide the wider spatial and temporal context of southwest ecosystem surveys through analysis of satellite Earth Observation (EO) data on ocean colour and temperature throughout the year. In particular, sea-surface temperature (SST) maps indicate the large-scale physical forcing resulting from another unsettled summer and stormy autumn. Chlorophyll-*a* estimates represent the distribution of phytoplankton at the base of the marine food chain. Thermal ocean fronts are automatically derived from SST data, to indicate the boundaries between water masses (Miller, 2009), and widely accepted to be key structures influencing the distribution of fish eggs and larvae, and certain pelagic fish and cetaceans. PML front analysis is contributing to the designation of UK Marine Protected Areas within a Defra project. These EO parameters and their anomalies may help to explain aspects of the higher trophic levels of the southwest marine ecosystem.

Miller, P.I. (2009) Composite front maps for improved visibility of dynamic sea-surface features on cloudy SeaWiFS and AVHRR data. *Journal of Marine Systems*, 78(3), 327-336.
[doi:10.1016/j.jmarsys.2008.11.019](https://doi.org/10.1016/j.jmarsys.2008.11.019)

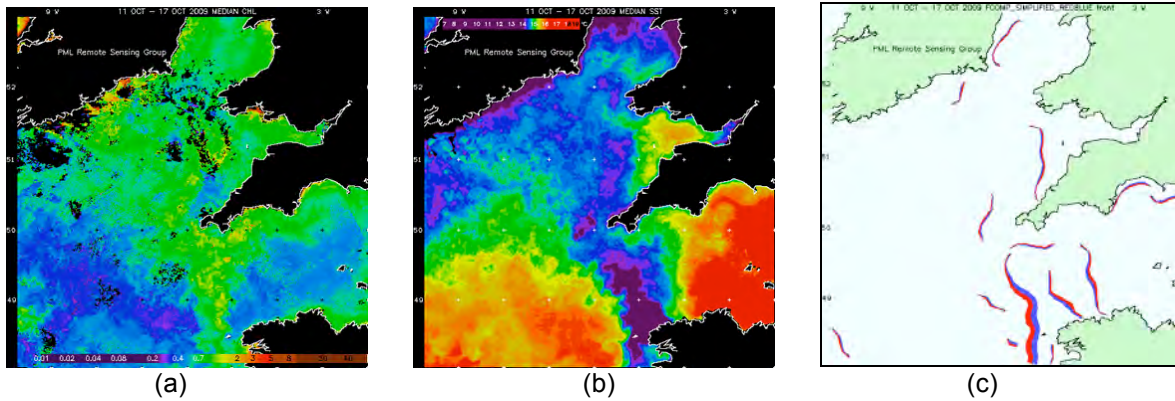


Figure 1. Satellite EO data for 11-17 Oct. 2009, showing a late autumn phytoplankton bloom at the western end of the English Channel: (a) Chlorophyll-a concentration; (b) Sea-surface temperature; (c) Thermal front maps, coloured showing the warm/cold sides as red/blue.

3. Zooplankton monitoring off southwest UK

Claudia Halsband-Lenk, *Plymouth Marine Laboratory*, clau1@pml.ac.uk

David Johns, *Sir Alister Hardy Foundation for Ocean Science*, djoh@sahfos.ac.uk

Damien Eloire, *Plymouth Marine Laboratory*, dmelo@pml.ac.uk

Dave V.P. Conway, *Marine Biological Association*, dvpc@mba.ac.uk

Zooplankton abundance and composition have been analysed from 1988 to 2007 in weekly samples from the coastal station L4 off Plymouth in the Western English Channel. The seasonal cycle of the total zooplankton was characterised by two peaks in spring and autumn, respectively. The seasonal cycle did not show significant changes to what has been described at L4 in the past, but we observed variability and potential changes in the intensity of peaks during the spring and the autumn periods. Total zooplankton abundance did not show any long-term trend, but this might change in the future if the decreasing tendency observed for the last years of the time series continues. There is evidence of long-term changes in *Oncaea* spp., Cirripede larvae, *Calanus helgolandicus* and Chaetognaths, all of which have increased, whereas numbers of *Temora longicornis*, *Acartia clausi*, *Evadne nordmanni*, Appendicularians, *Podon* spp. and *Ctenocalanus vanus* have decreased. Community structure remained stable without radical changes in the composition of the dominant taxa, but long-term trends were highlighted over the twenty year period as well as changes in diversity related to changes in environmental conditions.

Plankton indicator species will be key factors in monitoring future changes in the plankton ecosystem of the Western Channel in relation to environmental and climate variations. From early 2007 we started analysing medusae species, as recent reports suggest that medusae numbers have increased globally over the last 5 years. If this is the case at L4 and in the western channel requires further investigation, but samples from 2008 and 2009, which have not yet been included in the long-term analysis, contained medusae species that used to be rare off Plymouth: we found the oceanic narcomedusa *Solmaris corona*, which does not have a bottom hydroid stage, from September to November in maximum numbers up to 480 a haul ($\sim 40 \text{ m}^{-3}$), although usually in lower numbers. This species was rarely collected in our waters prior to 1957, according to the Plymouth Marine Fauna (1957) and Russell's Medusae (1953). This year we sampled it a month earlier, from August, and in October we had a haul with 8500 specimens ($\sim 700 \text{ m}^{-3}$). Another oceanic species without a bottom stage, the trachymedusae *Aglantha digitale* has also been very abundant this year and sampled over an extended period. A further new arrival at L4 in autumn 2008 was the cladoceran *Penilia avirostris*. This conspicuous zooplankton is regularly found in CPR samples in the southern North Sea and in lower numbers along the French Atlantic coast, but had been absent from the Channel until autumn 2008. It has appeared again in late October 2009 in low numbers.

These recent developments highlight the importance of long-term zooplankton monitoring and the need to continue the time series to validate the trends observed and understand the drivers of zooplankton community change.

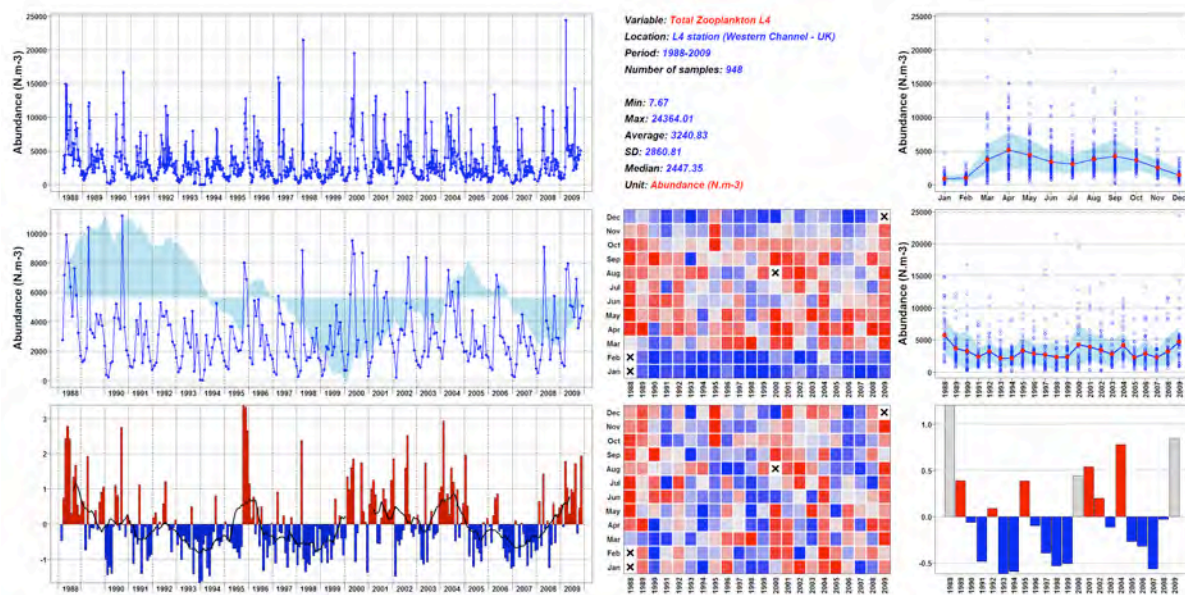


Figure 1. Total abundance of zooplankton at station L4 from 1988 to 2009. A) raw data (weekly), B) monthly averages (curve) and standardised cumulative sums (shaded), C) monthly anomalies (bars) and 12-month moving average (black curve), D) ranking of monthly averages, E) ranking of monthly anomalies, F) monthly seasonal cycle, G) annual averages, H) annual anomalies (grey bars represent years with missing data).

4. Seahorse Tagging Project

Steve Trehwella

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Studland in Dorset is a popular anchorage for boaters and concerns have been raised about the impact on the population of seahorses and their seagrass meadow habitat. In 2008 seahorses and their place of shelter were given legal protection under the Wildlife & Countryside Act 1981. In 2009 the Seahorse Trust began a seahorse tagging project at Studland to investigate the pairing habits, territorial behaviour, seasonality and distribution of the seahorses in order to learn more about how high levels of boating activity may impact upon them. Currently, despite legal protection, nothing is being done to conserve the site or offer protection for these animals. It is hoped that findings from the project will result in the enforcement of the legal protection these animals have being afforded.

Studland is the only known site in the UK where seahorses appear in sufficient numbers to be found and studied in this way. However boat numbers can top 300 on a busy summer day, causing damage to the seagrass meadow by ripping it up by the roots and leaving bare holes in the bed. There are also a number of illegal moorings causing extensive damage to the seagrass meadow, with no restriction on new ones being put in.

Five spiny seahorses, *Hippocampus guttulatus*, were tagged, including two breeding pairs, using numbered floy tags. During the summer, 30 repeat sightings were recorded and these showed that seahorses pair for at least the duration of the breeding season and that pairs are highly territorial. The courtship dance of one pair was filmed for the first time in the UK.



5. Temporal and spatial distributions of jellyfish strandings in South West Cornwall: interactions between biology and physical forcing

Dirk Wilyman* and Cathy Lucas

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On a global scale the incidence of unusual influxes of jellyfish appears to be increasing. Examples include the sinking of fishing trawlers in Japan, the influx of *Mnemiopsis leidyi* (The Sea Walnut) in Italy, and mass stranding events of *Pelagia noctiluca* (mauve stinger) in Northern Ireland in 2007, wiping out over 100,000 salmon in a fish farm. This has highlighted the importance of investigating the biology and spatial-temporal distribution patterns of jellyfish. Few studies have investigated the sudden appearance and disappearance of jellyfish aggregations in southwest UK waters, especially strandings. The magnitude and extent of these aggregations are not only influenced by the biology and behaviour of the organisms themselves, but also by local and regional scale environmental controls, e.g. wind and tide.

This investigation aims to explore interactions between environmental controls and the biology of jellyfish using strandings. The focus is on strandings of jellyfish species on four beaches in southwest Cornwall. The selected beaches are Sennen Cove, Gwenver, Porthcurno and Penzance; these were all sampled on a weekly basis between June and September 2009. This regular monitoring, coupled with opportunistic surveys and ongoing lifeguard surveillance, has provided useful insights into the summer/autumn fluctuations in stranding events.

An unusual finding was the mid-summer influx of Portuguese Man-O-War (*Physalia physalis*) and other long-distance migratory species (e.g. By-The-Wind-Sailor *Velella velella*), along with a later bloom of Moon jellyfish (*Aurelia aurita*). Initial results suggest that 1) environmental forcing, e.g. wind vector and velocity, and 2) individual species biological cycles, are the dominant controls on mass stranding events.

6. Seabirds and climate change

Helen Booker
RSPB SW England Region (helen.booker@rspb.org.uk)

UK breeding seabird populations have experienced widespread declines over the last decade. Several years of poor breeding productivity is likely to have driven the declines, with climate change one of the factors which can effect productivity.

Changing sea temperatures caused by climate change can affect the species upon which seabirds feed – changes in food availability at crucial stages in the breeding cycle can therefore impact on breeding success. The RSPB is investigating climate change impacts on breeding storm petrels, a species that feeds directly on zooplankton.

Changes in oceanographic fronts also have an effect as the fronts concentrate prey species, e.g. zooplankton/fish, and are therefore key foraging hotspots. Weak fronts in recent summers have meant that fewer zooplankton and fish are brought to the surface, making it more difficult for surface feeders such as kittiwake.

Identifying important seabird foraging areas, the stability of those areas over time, and seeking protection for important sites, could help buffer seabirds and other marine life from climatic and other pressures.

7. SeaWatch SW Marine Wildlife and Basking Shark survey 2009: preliminary results.

Alice Jones, Russell Wynn (NOCS) and David Johns (SAHFOS)
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The SeaWatch SW project aims to improve our understanding of the impacts of biotic and abiotic controls on the spatio-temporal distribution of migratory marine megafauna at a biodiversity hotspot off southwest UK. Intensive effort-based monitoring is undertaken annually from 15 July to 15 October at Gwennap Head, a strategic watchpoint located on the southwest tip of the UK mainland. The Gwennap Head watchpoint overlooks Runnelstone Reef (Fig. 1), an important foraging area for resident and migratory apex predators.

We report the preliminary analysis of the 2009 SeaWatch SW effort-based survey for Basking Sharks, Ocean Sunfish and marine mammals. The data from the 2009 season cover a total of 1003 hours. Time series for the appearance of all target marine mammals and fish are presented, with comparisons to previous year's survey results.

The most striking result from the 2009 survey is a dramatic decrease in the sightings of Basking Sharks. The cumulative total of peak daily sightings for the full survey period was just 71, compared to 297 in 2008 and 656 in 2007 (Fig.2). It is hypothesised that the influence of consistently unsettled weather and strong westerly winds during July and August may have affected frontal development, thus reducing favourable foraging habitat for the sharks.

In addition to the visual survey, a programme of zooplankton sampling was undertaken during September 2009 and further sampling is planned for 2010. The coarse analysis of the 2009 samples is reported in terms of influence of sample site topography and tidal state on the total zooplankton density. The zooplankton sample results are discussed in relation to Basking Shark surface sightings and foraging behaviour.

8. Grey Seals in Cornwall 2009

Sue Sayer

Cornwall Seal Group (CSG): sue@cornwallsealgroup.co.uk, www.cornwallsealgroup.co.uk

2009 has been a very busy and active year for CSG members. Annual Seal Census of Cornish Coast completed for third year. Similar patterns of site usage by seals. Surveys have been carried out regularly at: Godrevy (by CSG members – 737 in Photo ID catalogue (PID)), Newquay (by Atlantic Diver et al – 8 in PID), Looe (by Looe Marine Conservation Volunteers with Cornwall Wildlife Trust and CSG – 18 in PID) and Isles of Scilly (by CSG & IoS AONB Sustainable Development Fund – 125 in PID). Seawatch SW independently collected seal data from Gwennap, as part of their surveys. Monitoring begun at other sites, e.g. Boscastle (BDMLR), Falmouth (Orca Sea Safaris), Portreath (Public). New Seal Watching Guidelines and lots of other advice can be found on the 'Downloads' page of the CSG website.

Godrevy Seals 2009: Sue's data

Two peaks (Max 214: Average 51), both earlier than usual – Spring one month and Autumn two months early. 68% adults, of which 51% are males, so a male 'chill out zone' & currently a Beachmaster 'power vacuum'! Average percentages per visit: Identified = 27%; Net entangled = 3%. Disturbance occurred on 53% of visits. Of 737 seals in PID, 53 have been seen at 20 other different sites around Cornwall and Devon.

Gwennap Seals 2009: Seawatch SW data (Analysed by B Allen & S Sayer)

Max number of seals was 19, seen 4 times and 10 or more seals seen 19 times. Rising to early/mid September with possible plateau or decline thereafter. Seal numbers don't appear to be linked to wind direction, cloud cover or glare. Seal numbers appear to be linked to sea state (less seen over sea state 4) and tide (more over low tide). Fortnightly seal number pulses create a 'heartbeat' that is possibly linked to neap/spring tide cycles. Significantly less seals observed in July. Significantly more seals hauled out in October (data filtered for sea state and tide).

9. Seabird and cetacean surveys in the western English Channel in 2009

Tom Brereton, Kate Lewis and Clive Martin

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Contact: tom.brereton@marine-life.org.uk

The charity *Marinelife* undertook an extensive programme of survey work for cetaceans and seabirds in the western English Channel in 2009, including (1) monthly dedicated surveys on the Portsmouth-Bilbao, Plymouth-Roscoff and Poole-Santander ferries (2) daily casual recording on the Portsmouth-Bilbao ferry (3) occasional dedicated surveys on the Poole-Cherbourg, Weymouth-Channel Islands and Portsmouth-Caen ferries (4) a systematic late summer/autumn survey of the whole western Channel sampling SCANS II tracklines (n=17 transects, totalling~800 nautical miles) (5) a systematic winter survey of Lyme Bay (8 transects totalling ~200 nautical miles) (6) opportunistic surveys (n=~30) made by volunteers on dive, angling and fishing boats (7) collation of casual records through a postcard survey targeted at local skippers of fishing, dive, angling boats and yachts and (8) access to data collected on the Plymouth-Santander, Penzance-Isles of Scilly and Cherbourg-Rosslare ferries from *Orca*, *the Isles of Scilly Wildlife Trust* and *Plymouth-Santander Marine Survey* research groups, by working in partnership through the Atlantic Research Coalition (ARC).

This work programme is funded by *Marinelife*, *Natural England* and the *European Union* (Charm III project) and supported by *P&O Ferries* and *Brittany Ferries*. The key objectives of the survey programme include (1) to monitor spatial and temporal trends in the status of seabirds and cetaceans (2) to supply data that will enable the offshore distribution of seabirds and cetaceans to be mapped for an EU-funded digital atlas of the Channel (3) to assess the importance of Lyme Bay and surrounding waters for Balearic Shearwater and White-beaked Dolphin (4) to provide data to

inform regional conservation action, including the identification of Marine Conservation Zones (MCZs) and (5) to assess climate change impacts on marine biodiversity.

This survey effort is bringing in a wealth of effort-related and casual sightings data from the western English Channel. Highlights in 2009 included (1) more than 1000 Balearic Shearwaters summering in the Baie de Saint-Brieuc, Brittany (2) the regular summer occurrence of up to 50 White-beaked Dolphins (including juveniles and calves) in central Lyme Bay, with more occasional sightings between Start Point and the Lizard. Sightings were made in January, April and from July to October. Site fidelity has been proved with a photo-recapture in October 2009, of an individual first photographed in September 2007 less than 10 nautical miles away (3) the winter occurrence of an estimated 16,000 Guillemots and 4000 Razorbills in Lyme Bay (4) a mobile pod of ~50 Bottlenose Dolphins (including at least a dozen calves) commuting between Dorset and Cornwall. Photo-recaptures have been made between Hengistbury Head (May) and Berry Head, Devon (September), though there are no matches between the Marinelife catalogue (n=22 individuals) and the GECC Normandy catalogue (n=~300 individuals) and (5) moderate numbers of Harbour Porpoise widely distributed west of Portland Bill on both sides of the Channel

There were occasional sightings of Risso's Dolphin and Long-finned Pilot Whale on both sides of the Channel west of Start Point. Plankton fronts were largely absent from eastern areas, consequently there were relatively few sightings of Basking Shark and European Storm-petrel compared to previous years. No large concentrations of Balearic Shearwater were seen offshore on the English side of the Channel, the most reliable area being within a few miles of Portland Bill, particularly the Shambles Bank where up to 20 were seen in July/August self-foraging and scavenging around angling boats.

A number of sightings of rare species were made including Striped Dolphin, Northern Bottlenose Whale, Black-browed Albatross, Little Shearwater, Fea's Petrel, Great Shearwater (including a winter record) and Wilson's Storm-petrel. For regular sightings updates see – <http://www.marinelife.org.uk/sightings/coastallatest.html>.

A press release of the White-beaked Dolphin and Balearic Shearwater work part-funded by Natural England was covered by local newspapers and regional ITV news. The work of Marinelife was filmed by the BBC Coast Team and the One Show in the summer months.

10. Cornwall Wildlife Trusts Seaquest Netsafe Project

Tom Hardy, Marine Conservation Officer
Cornwall Wildlife Trust
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The Seaquest Netsafe project is the amalgamation and extension of Cornwall Wildlife Trusts continued work on cetacean research and conservation. The work comprises two major projects: 1) The Pinger Trial, and 2) The static acoustic monitoring project, as well as funding our continued strandings research.

The Pinger trial has been underway since March 2009 and is aimed at testing the effectiveness and the practical issues of using pingers on inshore tangle nets. The project aims to prove the effectiveness of pingers by using acoustic monitoring devices (CPODs) to measure levels of cetacean activity around nets with pingers and those without. There are currently four vessels taking part in the trial with an additional vessel from Boscastle joining the trial soon. Initial results seem to suggest that the pingers have few problems from the practical perspective of hauling and shooting away the fishing gear. In addition to this, the fishermen involved in the trial have few reservations about using them. Acoustic monitoring of the nets has proved extremely effective and has given us very promising results, which will in turn enable us to test this mitigation method in a fishery with a relatively low by catch rate.

The static acoustic monitoring work, using the CPOD devices, aims to test the validity of using static acoustic monitoring to measure activity of cetaceans in a given area. We have seven sites where

CPODs are currently deployed, and each site will be supported by a group of volunteers conducting effort-based surveys throughout the year to validate the data collected. In the future we aim to work jointly with Exeter University to create a more encompassing array of CPODs around the Cornish coastline. Due to the infancy of the project there are no results available to date.

11. Towards sustainable marine tourism – developments within the WiSe Scheme

Colin Speedie

Wave Action and WiSe co-ordinator (colin@wave-action.com)

The WiSe Scheme has been operating since 2003, and since its inception has achieved a significant level of coverage around the U.K. Training courses in low impact marine wildlife watching have been run from Jersey in the South, to Harris and the Shetland Isles in the far North, and over 1200 people have now attended a course.

Local instructors have been trained in most areas, to enable them to deliver the core WiSe elements, with specific regard to local issues and sensitivities, whether they be legal, species related or site specific.

Working in conjunction with the RYA's Green Blue initiative, educational materials have been developed to embed the WiSe ethos into the leisure boat world, through website and video based products, and direct targeting of key players such as harbourmasters and marina operators.

WiSe is currently engaged in development in the following areas:

- Accompanied days afloat. During 2009 we ran a pilot project in Northern Ireland where a local instructor spent a day on the water with two accredited WiSe operators. The aim was to evaluate (with the use of a specially developed checklist) the sustainability of the operation, and to offer advice on ways in which the operator might improve or otherwise add value to their activities.
- Masterclasses. For some time WiSe has been looking into the possibility of running a course that would encourage accredited operators to enhance their skills and integrate their activities with researchers and Conservation groups. Training will cover such areas as data gathering and handling, photographic and video recording for identification purposes (techniques, equipment and licensing) and enhanced educational and informational commentary. Updates on the latest moves in terms of legal protection will also be presented, as well as reflections on the most up to date information on species behaviour and sensitivity. 3 Masterclasses are pencilled in for spring 2010 in England, Scotland and the Isle of Man.
- New markets. WiSe aims to increase its penetration of the leisure boat market in the coming years, with particular regard to the sailing community, such as sail training organisations, marina operators and dive clubs and other marine activity societies.

Much has been learned during the initial phase of WiSe, and many weaknesses have been identified and acted upon. Operating within its new locally devolved regime, we believe that WiSe is well placed to develop in new ways that will enhance its role and deliver greater benefits for the marine environment. WiSe remains a simple, practical tool to provide key training for boat users concerning the sensitivities of marine wildlife, that may prove even more important as more and more people take to the water, and we move towards enactment of the Marine Bill, and in particular Marine Protected Zones.