

Marine Mammal Strandings Co-ordination and Investigation (Scotland)

Annual Report

1 January to 31 December 2010

for Marine Scotland, Scottish Government

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1 Executive Summary

In 2010, 307 marine animals were reported to the Scottish Strandings Investigation Programme; 183 seals, 122 cetaceans and 2 basking sharks. Of these, 117 cases (55%), comprising 55 cetaceans, and 62 seals were necropsied. The total number of strandings was higher than both the previous year and the annual average for the project since 1992. The large (250%) increase in seal carcasses is attributable to increased reporting effort rather than mortality. Verminous pneumonia remains the single most common cause of death for seals, for cetaceans the picture is more complex as it is species dependent. Live strandings, pneumonia and generalised bacterial infections are commonly diagnosed however. This year a website with interactive stranding maps was launched (www.strandings.org) and an online database is due to go live in spring 2011. The number of seals submitted with spiral 'corkscrew' lesions has continued to increase and represents an increasing cause of concern as to the impact on a population level.

2 Project overview

The principal requirement of this project is to provide a co-ordinated approach to surveillance of marine species (e.g. cetaceans & seal) strandings and to investigate major causes of death of stranded marine mammals in Scotland.

This work builds on the work undertaken in Scotland by the UK Cetacean Strandings Investigation Programme (CSIP). Detailed information about the CSIP, including access to stranding records, can be found at ukstrandings.org.

2.1 History of project

In 1988 a large number of dead or moribund harbour seals were found around the coast of the UK. The Sea Mammal Research Unit (SMRU), then part of the British Antarctic Survey, based at The University of Cambridge led studies into this for the UK. At that time the SAC Veterinary Centre in Inverness was managed by a veterinary surgeon, Harry Ross, with an interest in marine mammals, and Harry became involved in the seal investigation in collaboration with SMRU and the Scottish SPCA.

It became evident that this was the first recorded outbreak of morbillivirus in seals, a virus of similar type to that causing distemper in dogs and rinderpest in cattle, and subsequently named as Phocine Distemper Virus (PDV).

Around the same time The Aberdeen University Department of Zoology was establishing a field centre in Cromarty to study the ecology of common seals in the Moray Firth. There were also studies conducted by Aberdeen University on the resident population of bottlenose dolphins in the same area. This increase in interest in

marine mammals in the Moray Firth area led to stranded pinnipeds and cetaceans being reported and taken to SAC for necropsy.

In 1990 The Institute of Zoology in London was awarded a research contract to investigate stranded marine mammals for the UK . It soon became apparent that there needed to be local input to this project in Scotland. On 1 January 1992 the SAC were awarded a three-year research contract by the then Department of Environment (DoE) to “Co-ordinate and investigate marine mammal strandings in Scotland”

Contiguous contracts have been awarded ever since by the Government department responsible, funded by Defra, Scottish Government and Welsh Assembly Government.

2.2 Details of work

- a) To continue to collate, analyse and report data for all cetacean, seal, basking shark and marine turtle strandings across the Scottish coast. This will include determination of cause of death and surveillance of the incidence of disease.
- b) To undertake approximately 70 post mortems on cetaceans and seals stranded around the Scottish coast (approx 20-30 cetaceans and 40-50 seals). A wide geographical spread of post mortems should be achieved unless specified otherwise.
- c) To provide an overall Scottish sample of both species of seal, including areas of common seal decline ,to determine cause of death and any potential contributing factors.
- d) To investigate specific cases of strandings/causes of death as requested by the SG
- e) Continue to contribute to existing SG funded projects including the minke whale entanglement and the bottlenose dolphin projects
- f) To provide scientific advice to the Scottish Government as necessary about major causes of death in stranded marine mammals, including any trends or unusual trends.
- g) To develop a database which brings together data on both strandings and post mortems for seals. All cetacean data should be fed into the database for the “UK Cetacean Strandings Investigation Programme”.
- h) Contribute to the production of strandings training material and workshop events and raise awareness through publicity.
- i) Standardise the current protocols for necropsies where appropriate
- j) Review options for specimen storage facility, with a focus on reducing storage demand and consider publicising tissue bank facility.
- k) Review any papers compiled using SAC free samples as a means of quality control.

3 Strandings

3.1 Main species found stranded around the coast

The most commonly stranded cetacean in Scotland, and indeed the whole of the UK is the harbour porpoise (*Phocoena phocoena*). A 1994 study (SCANS) estimated a population of approximately 280,000 harbour porpoises in the North Sea, making it the most numerous cetacean species. Porpoises are largely coastal animals and most will float if they die at sea so it is of little surprise that this is the species recorded stranded most often.

Other species commonly found include the minke whale (*Balaenoptera acutorostrata*), Atlantic white-sided dolphin (*Lagenorhynchus acutus*), white-beaked dolphin (*Lagenorhynchus albirostris*), long-finned pilot whale (*Globicephala melas*) and the short-beaked common dolphin (*Delphinus delphis*)

The minke whale was extensively hunted in the Antarctic until 1986 but it now appears the population is recovering. Since the beginning of the Scottish strandings scheme in 1992 there is an upward trend in the number of minke whales recorded, which is probably in part due to the population increase. A significant percentage of minke whales examined show some evidence of entanglement, usually in some type of mooring rope.

The Atlantic white-sided dolphin is the species recorded most often as live-stranded in Scotland. Most live stranded animals either die or are euthanased. Bacteriological analysis of tissue taken from necropsied animals shows a high proportion to have *Brucella* infection in the brain, and it is thought that infection causes disorientation, impaired feeding ability and ultimately live stranding. The white-beaked dolphin is another species reported stranded regularly, mostly in the North of Scotland. This is another species that often strands alive.

Long-finned pilot whales live in tight social groups and are a species commonly associated with mass-strandings in Scotland and in many other countries around the world. In the 1980s there was a spate of mass strandings around the UK with hundreds of animals being involved. Recently a group of around 30 long-finned pilot whales were seen in a sea loch in South Uist and a description of this case is outlined in section 3.7 below

3.2 Stranding process

Clearly, every cetacean will die somewhere at some time and several things can happen then. By far the majority of these deaths will occur at sea and most of these carcasses will never reach the shore. They may float for a time and then sink to the seabed to become food for other organisms or they may be predated upon as they float on the surface.



Figure 1: Graphic showing what happens when an animal dies at sea

Many of the stranded cetaceans that we examine either died very close to the coast and were taken ashore by tidal and/or weather influences or actually came ashore alive and died there.

Both the striped and common dolphin are found stranded regularly with the most common cause of death recorded as live-stranded. It is interesting to note that some species of cetacean are more likely than others to float after death. For example, despite the presence of a local population of bottlenose dolphins in the Moray Firth, the only carcasses to be found stranded are either animals that have stranded alive and died or very decomposed carcasses. It appears that fresh bottlenose dolphin carcasses seldom float but sink to the seabed. After a period of weeks the carcasses become buoyant due to the gas released during autolysis, and will then float on the surface, where tidal and weather may act to wash ashore to be found.

3.3 Strandings overview

In 2010, 307 marine strandings were reported to the Scottish Strandings Investigation Programme; comprising 183 seals, 122 cetaceans and 2 basking sharks. No marine turtles were reported.

3.4 Species found stranded 2010

Table 1 & Figure 2 show the marine species found stranded around Scottish coasts in 2010. Species classes are also shown. 122 cetaceans comprising 11 identifiable species were reported, and as in previous years the majority (51%) were harbour porpoise (*Phocoena phocoena*, n=61). 183 seals comprising the two native species of common, or harbour, seal (*Phoca vitulina*), and grey seal (*Halichoerus grypus*) and a single hooded seal (*Cystophora cristata*) were reported. It is likely the 67 unidentifiable seals are native species.

Species Class	Species (common)	Necropsied	Not necropsied	Grand Total
Basking Shark	Basking shark	0	2	2
Harbour porpoise	Harbour porpoise	36	25	61
Whale	Sowerby's beaked whale	0	1	1
	Long-finned pilot whale	1	2	3
	Sperm whale	0	3	3
	Minke whale	4	8	12
Dolphin	Risso's dolphin	3	0	3
	Bottlenose dolphin	3	1	4
	Short-beaked common dolphin	2	2	4
	Short-beaked common dolphin/striped dolphin (indeterminate species)	0	4	4
	Striped dolphin	2	2	4
	Atlantic white-sided dolphin	2	3	5
	White-beaked dolphin	2	5	7
Seal	Hooded Seal	1		1
	Grey Seal	19	34	53
	Common seal	38	20	58
	Seal (indeterminate species)	4	67	71
Cetacean	Cetacean (indeterminate species)	0	11	11
Total		117	190	307

Table 1: Total number of marine strandings, Scottish waters, 2010

3.5 Spatial maps of strandings

Figure 3 & show the spatial distribution of strandings during 2010 for seals and cetaceans respectively. Figure 5 is a density map showing 'hot spot' areas where most strandings were reported. It can be seen there was an equal spread around the Scottish coastline with notable clusters around Fife, the Forth, Tay and Moray firths, Loch Linnhe and the Clyde. This correlates well with areas of active reporting and beach surveys, for example the hotspot in Fife is probably attributable to seal reporters local to SMRU in St Andrews. The foci around the on the east coast firths is likely to also represent the populations resident around these sites, but may be biased due to increased probability of reporting in areas of higher population density.

Number of strandings Jan-Dec 2010

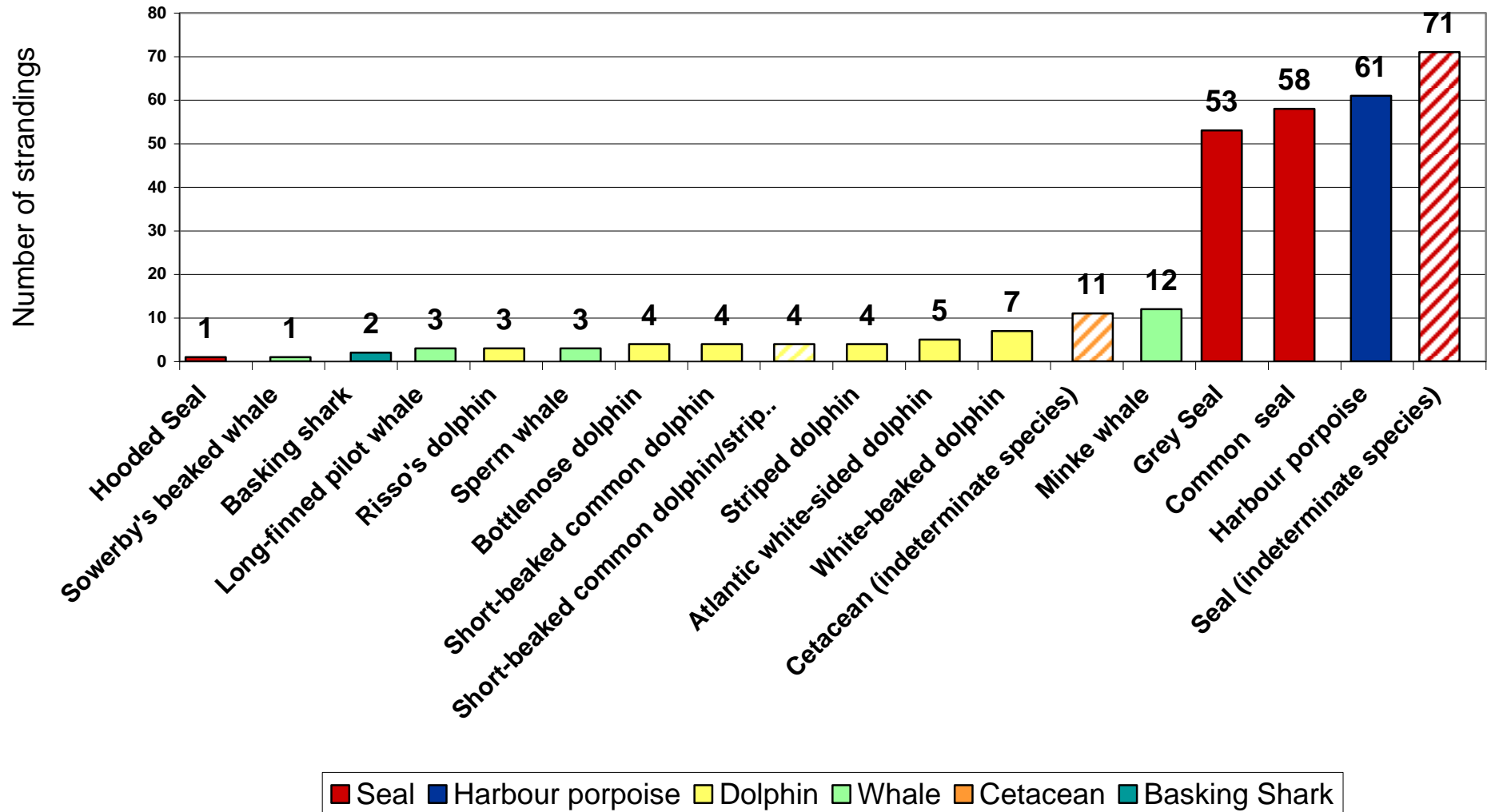


Figure 2: Plot of total number of marine strandings, Scottish waters, 2010

Strandings Jan1st- Dec 31st 2010

Legend

- ◻ Basking shark
- ▲ Common seal
- ▲ Grey seal
- ▲ Hooded seal

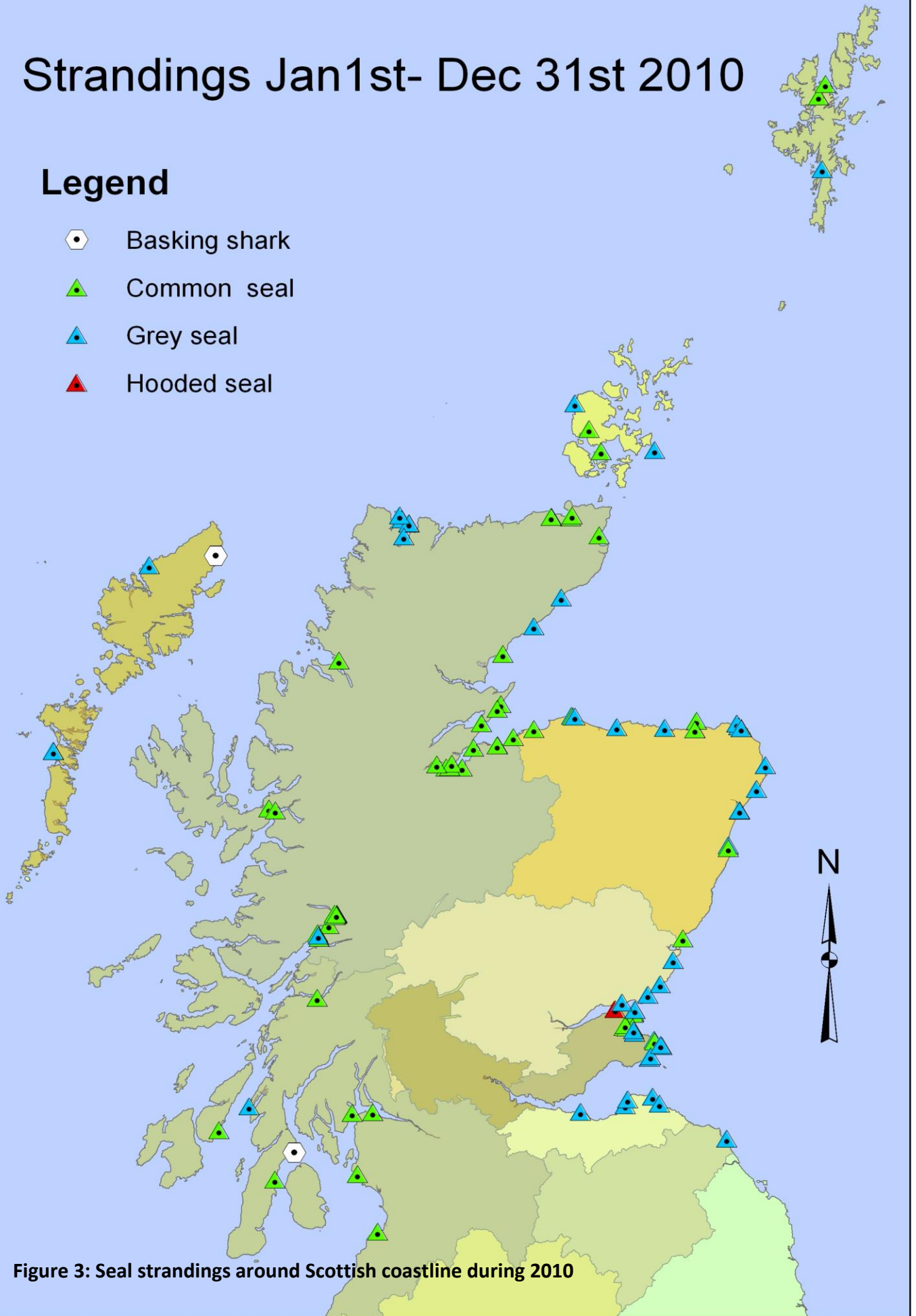


Figure 3: Seal strandings around Scottish coastline during 2010

Cetacean strandings Jan 1st- Dec 31st 2010

Legend

- Harbour porpoise
- Atlantic white-sided dolphin
- Bottlenose dolphin
- Long-finned pilot whale
- Minke whale
- Risso's dolphin
- Short-beaked common dolphin
- Sowerby's beaked whale
- Sperm whale
- Striped dolphin
- White-beaked dolphin
- Short-beaked common dolphin/striped dolphin (indeterminate species)
- Cetacean (indeterminate species)

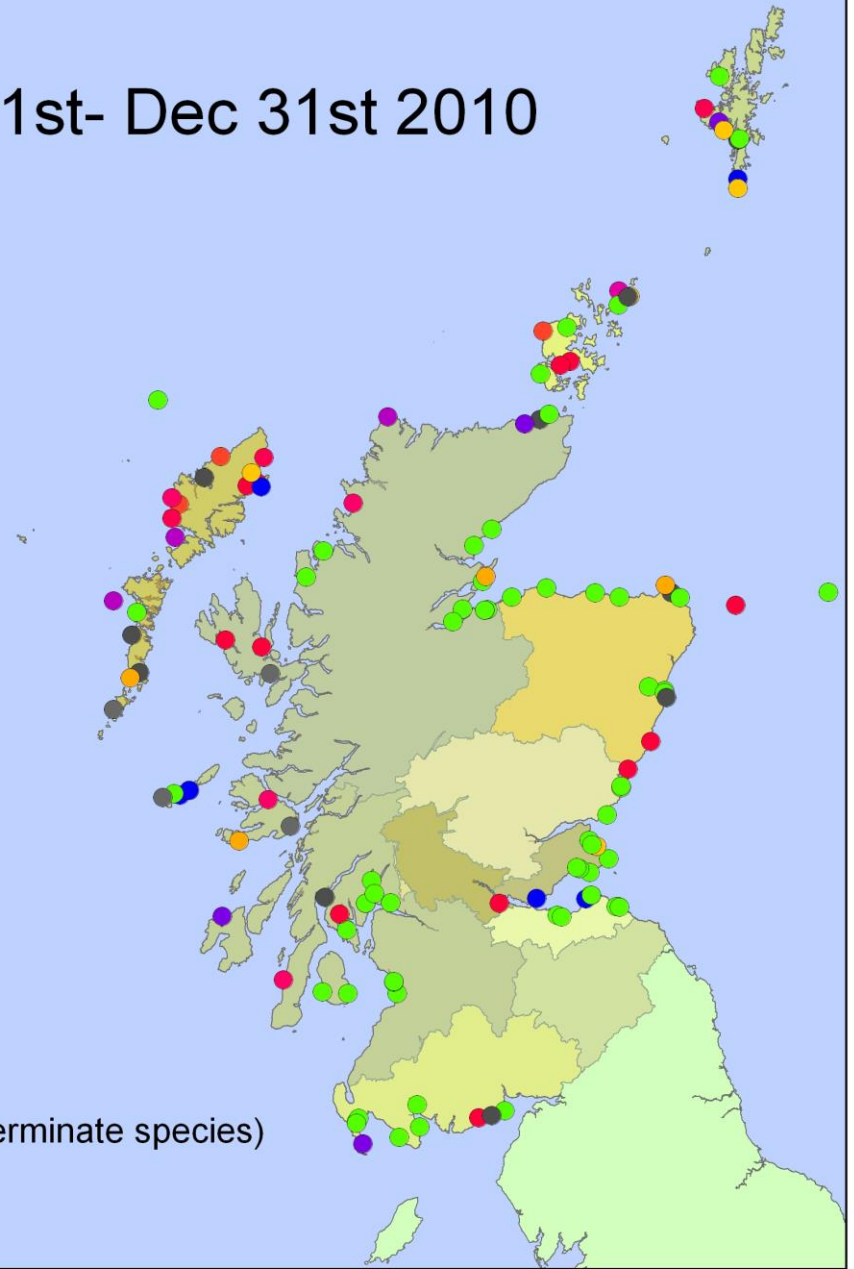


Figure 4: Cetacean strandings 2010

Kernel smoothed map of strandings Jan-Dec 2010

Stranding clustering

- No clustering
- Low clustering
- High clustering

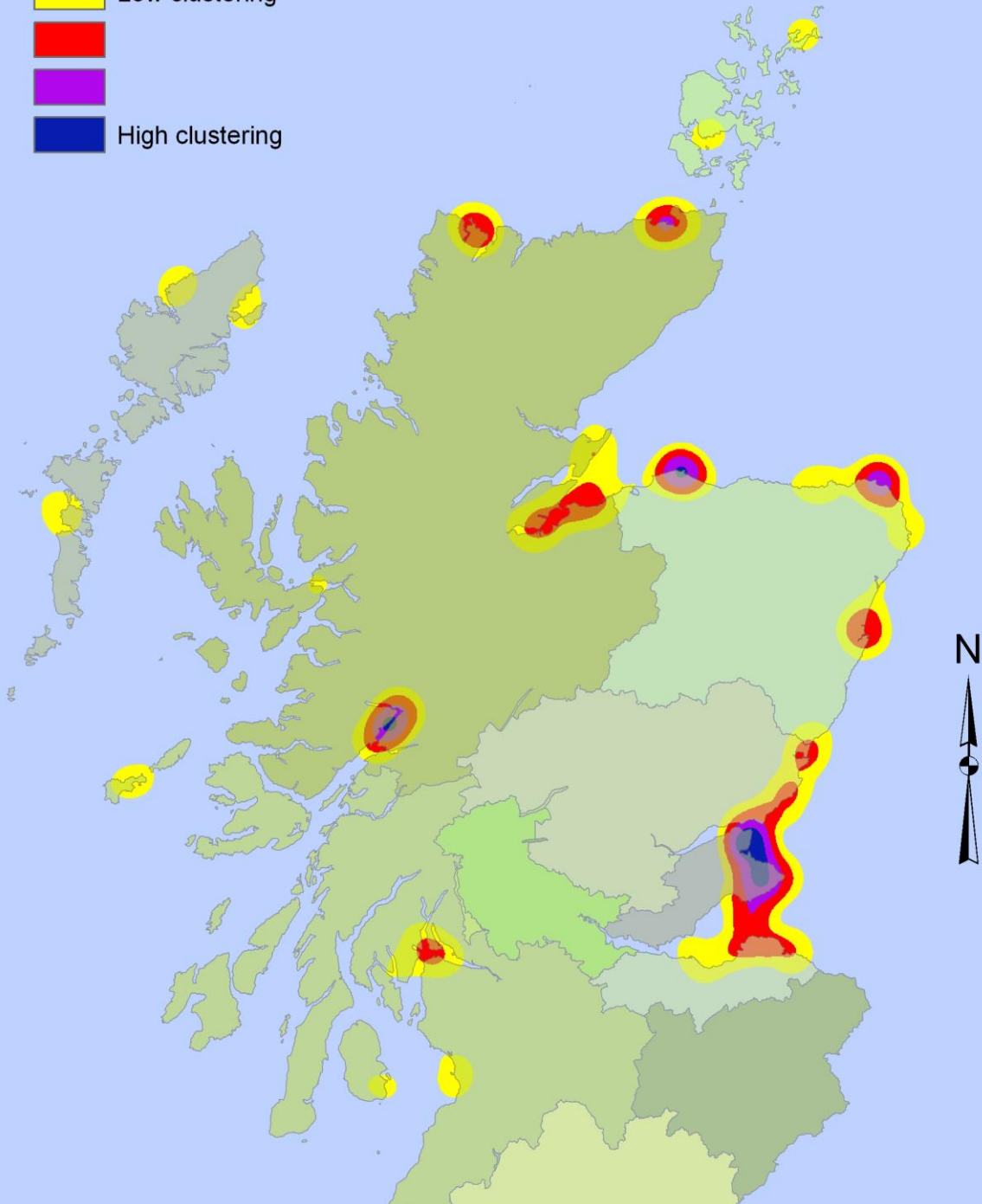


Figure 5: Density map of all species of marine strandings around Scotland during 2010.

Marine strandings Jan-Dec 2010



Pie charts show marine strandings by administrative region. Size of pie chart is proportional to the number of strandings

- Harbour porpoise
- Common seal
- Grey Seal
- Atlantic white-sided dolphin
- Basking shark
- Bottlenose dolphin
- Hooded Seal
- Long-finned pilot whale
- Minke whale
- Risso's dolphin
- Short-beaked common dolphin
- Short-beaked/striped common dolphin (indeterminate)
- Sowerby's beaked whale
- Sperm whale
- Striped dolphin
- White-beaked dolphin
- Cetacean (indeterminate species)
- Seal (indeterminate species)

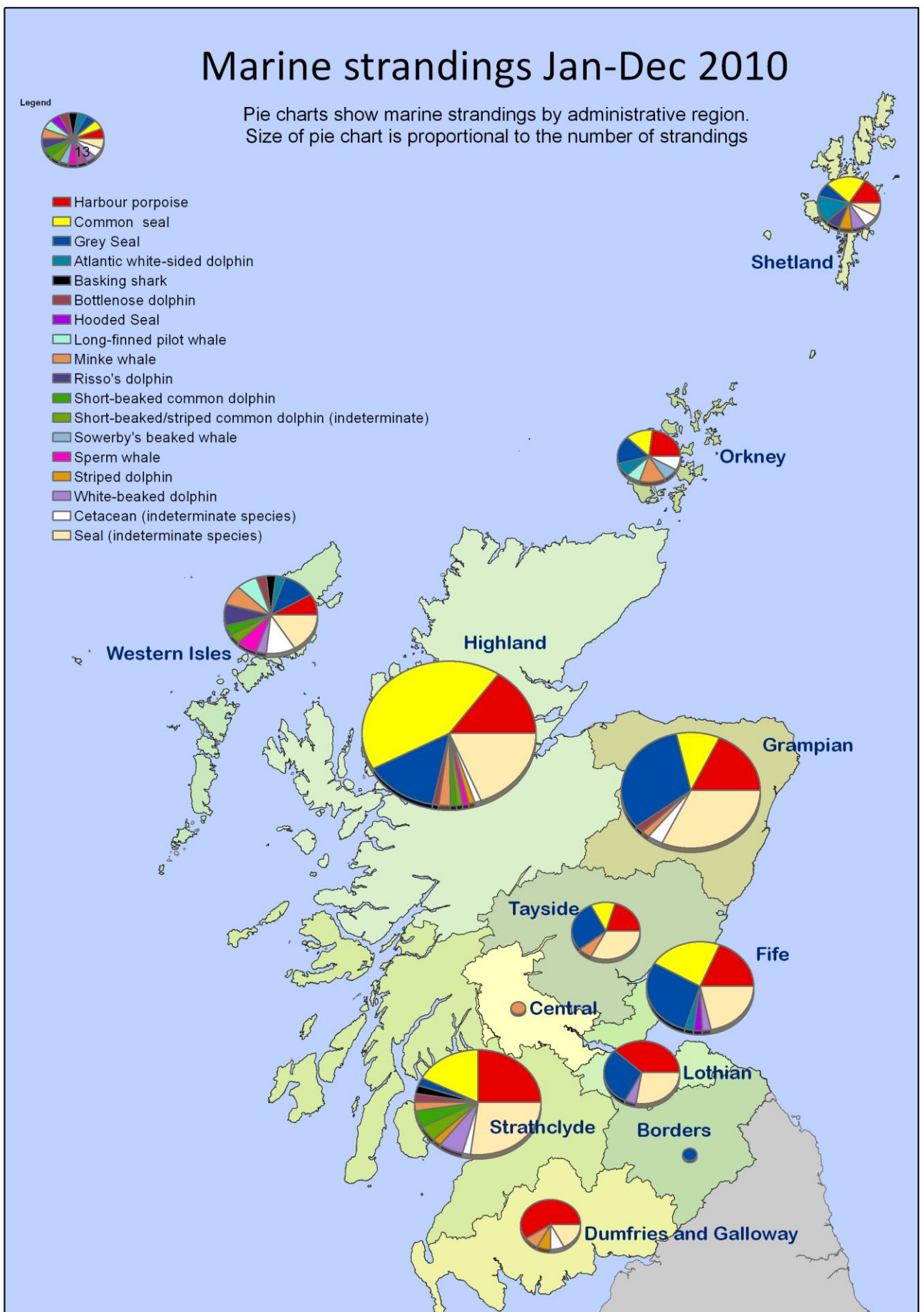


Figure 6: Proportion of species stranded by region, 2010

3.6 Trends in marine strandings 1992-2010

Figure 7 shows the total number of Scottish strandings reported since 1989. Figure 8 shows the same data but as a proportion of all strandings. The number of seals reported in 2010 was considerably higher (257%) than the previous year and is attributable to increased public awareness to report seal carcasses rather than increased mortality. (The large peak of seals reported in 2002 represents the increased reporting effort and mortality during the Phocine distemper virus outbreak) Cetacean stranding numbers are not significantly different from previous years although there appears to be a decreasing number of whale and dolphin species reported, both in absolute numbers and as a proportion of total strandings. The specific reason for this is uncertain.

3.7 Mass strandings incidents

No notable mass stranding events occurred in Scotland in 2010, however on 26th October there a pod of pilot whales sighted in Loch Carnan, Uist. (57.3'N,7.2'W) On the 31st October, they left the area however a week later, on the 6th November, there was a mass stranding of pilot whales in Rutland Island, Donegal in the Republic of Ireland. (55.0'N,8.4'W) 33 animals initially stranded and a further two carcasses subsequently washed in. Detailed carcass examination was not possible as there is no scheme in the Irish Republic to fund cetacean necropsies, however minimal sampling and morphometric data was collected by volunteers from the Irish Whale and Dolphin Group. Photo-identification made a positive link between the group seen in Uist and those stranding in Ireland, however further information about the cause of stranding is unknown.



Photo 1: Pilot whales mass stranded on a Donegal beach. Photo courtesy of IWDG

Scottish strandings 1992-2010, all species

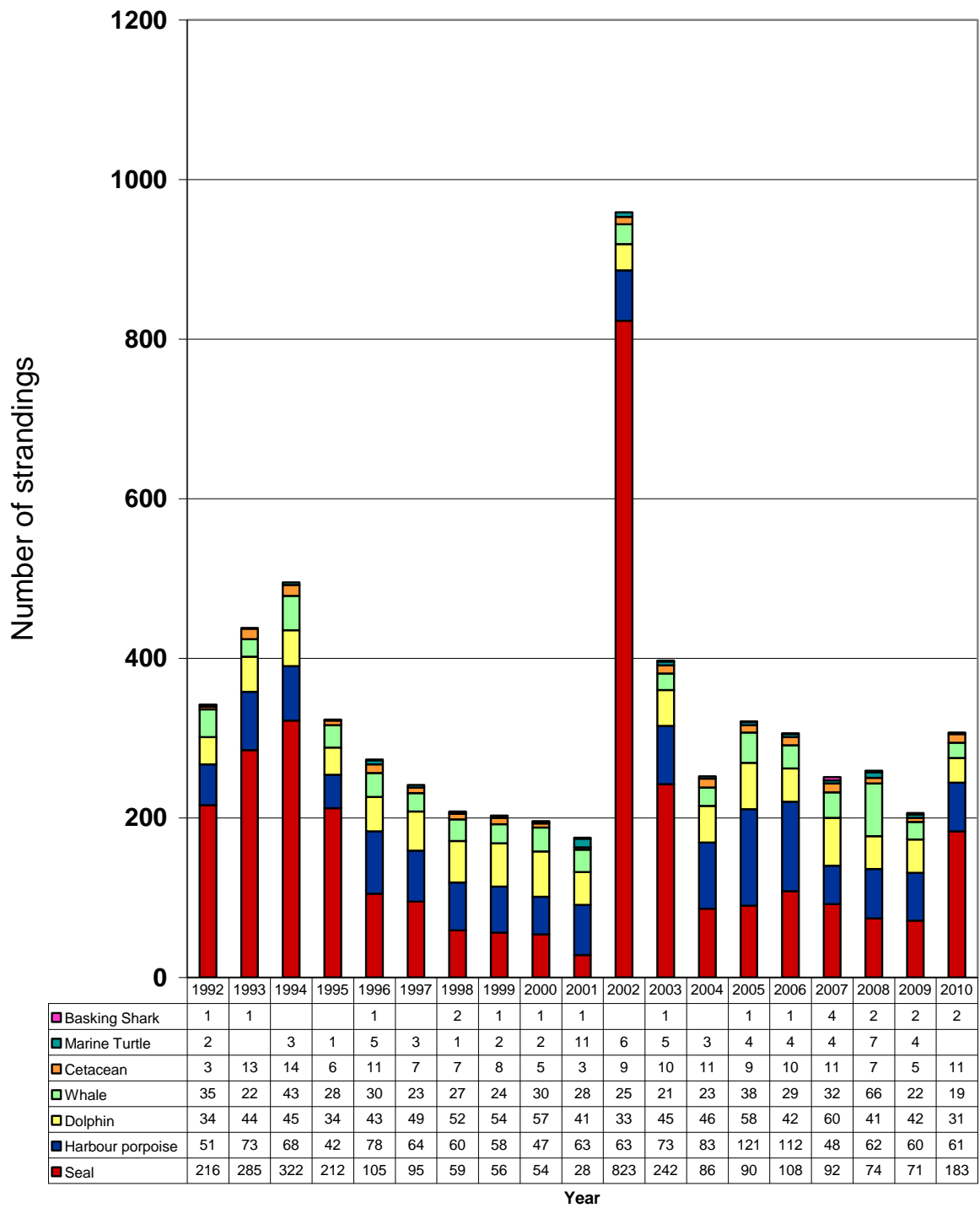


Figure 7: Scottish strandings 1992-2010, all species (Cetacean' refers to indeterminate species)

Scottish strandings 2003-2010, all species

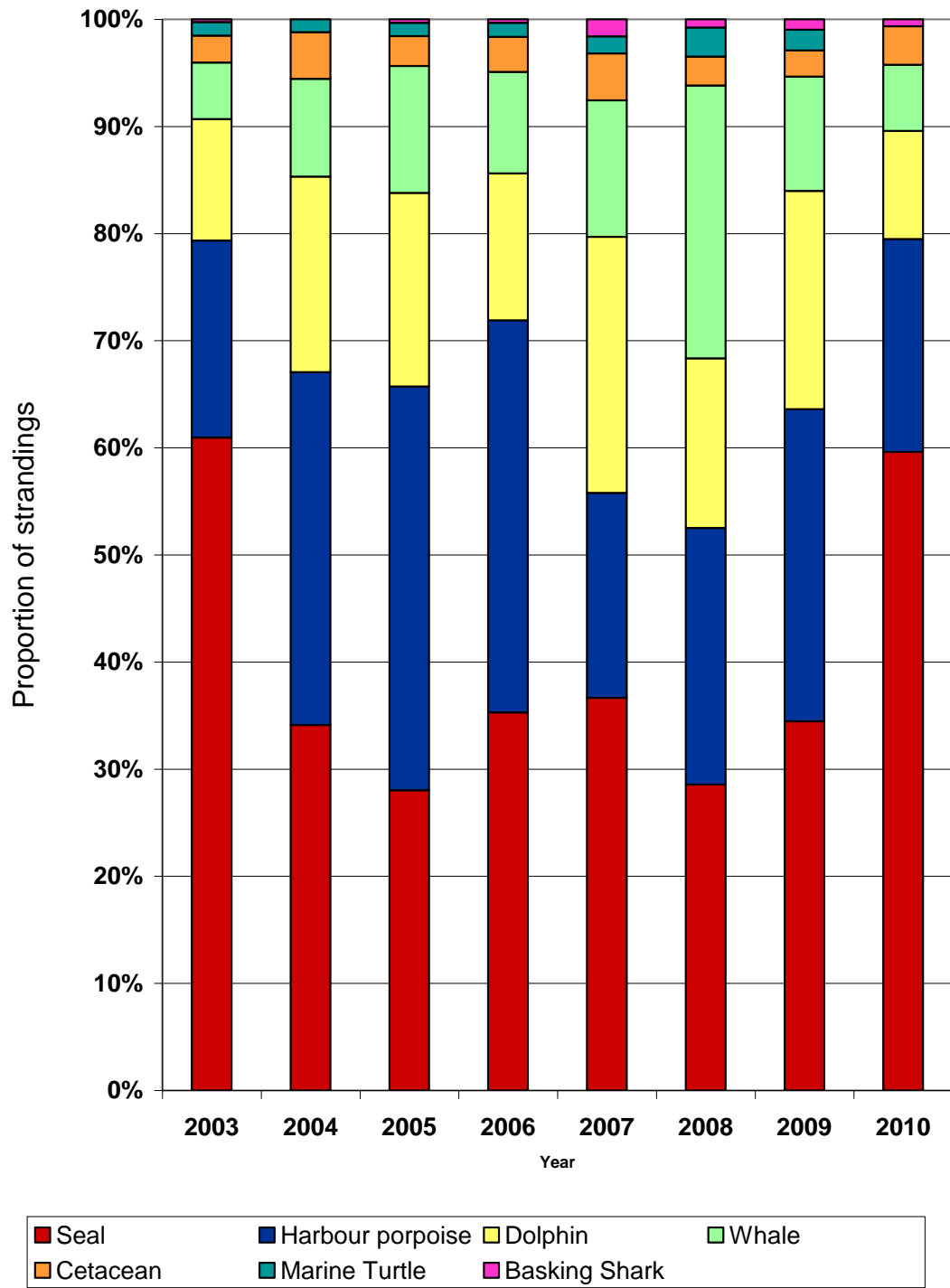


Figure 8: Proportion of Scottish strandings 2003-2010, all species (Cetacean' refers to indeterminate species)

4 Necropsies

4.1 Necropsy protocol

Examination of all cetacean or seal carcasses was conducted to a standardized protocol and the results can be seen in Table 2 and Figure 10. The necropsy provides the gross pathology data used to establish a cause of death and quantify burden of disease and various additional samples are collected as part of the protocol. In addition to tissues taken for bacteriology and histopathology, a standardised array of tissue samples are archived at -20°C . Gonadal tissues, teeth (for age determination) and stomach contents are collected and used by other Defra-funded research projects, for example investigating the ecological impacts of cetacean by-catch in UK and European waters. Skeletal material from all marine carcasses necropsied in Scotland is donated to National Museums of Scotland for inclusion in the research collection. This all supports a broad range of multidisciplinary scientific research activities and collaborations, maximising the information gained from each stranding incident.

4.2 Necropsy overview 2010

In 2010, 117 cases underwent necropsy to establish a cause of death. This comprised 55 cetacean strandings (9 species) and 62 seals (38 common seals, 19 grey seals and 1 hooded seal). In addition, 4 severely autolysed carcasses were examined for signs of trauma but were too decomposed to allow accurate speciation on morphology alone. Figure 9 shows the number of strandings necropsied by species class. Harbour porpoise were again over-represented in this regard, with 36/61 (59%) of porpoise strandings undergoing necropsy, compared to 55/122 (45%) of all cetaceans. This is attributable to the longer time window available for meaningful necropsy of small cetaceans, compared to larger species which decompose very rapidly.

4.3 Cause of death results

Table 2 and Figure 10 show the cause of death established by necropsy, arranged by species class, and show the categorisation of causes of death

Infectious diseases accounted for the primary cause of death in 21/55 (38%) of cetaceans and 26/62 (41%) of seals. Trauma cases accounted for 8/55 (15%) and 16/62 (26%) of cetacean and seal deaths respectively. Other causes of death, including live strandings, metabolic, physiological or behavioural causes, accounted for 19/55 (35%) and 7/62 (11%) of cetacean and seal deaths respectively.

Figures 12 and 13 show the spatial distribution of causes of death. There are geographic differences in cause of death due to both species and disease variation over space. For example, the most common diagnosis for animals reported from the Western Isles is live stranding, whereas infectious disease is the most common cause of death throughout the rest of mainland Scotland. This in part can be explained by the species distribution of strandings, with the Western Isles having a larger proportion of non-coastal species where live stranding is a likely diagnosis. Of the 21 cetacean cases diagnosed with an infectious disease, pneumonia (47%) meningio-encephalitis (29%) and generalised bacterial infection (19%) are the most prevalent. Of pneumonias, parasitic pneumonia are the most prevalent. In comparison to terrestrial species, marine mammals have a high tolerance for parasite

burdens, especially lung nematodes, with most adult animals presenting with some evidence of infection. It is hypothesised the main infection challenge occurs as the animal is weaned and begins to ingest nematode eggs vectored by their prey. There is usually some degree of infection and subsequent mounting of an immune response in the host, with disease severity peaking in juvenile animals and decreasing with age. The greatest pathology is associated with migrating larvae, rather than adult parasites, and consequently is more severe in juvenile animals. Pathology will be exacerbated in cases with immunosuppression or debilitation from other causes, e.g. starvation, concurrent bacterial infection or pregnancy.

Number of strandings suitable for necropsy Jan-Dec 2010

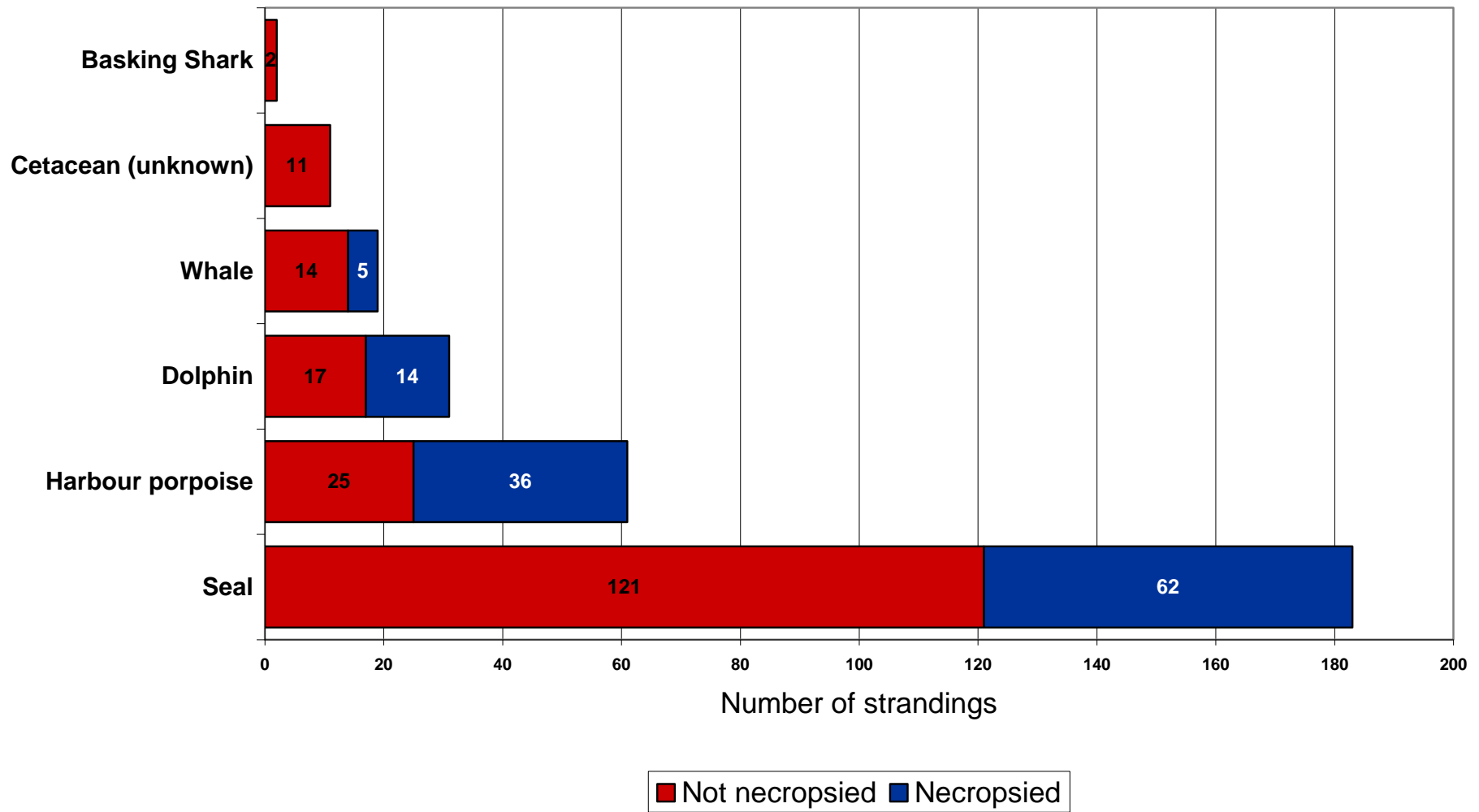


Figure 9: Number of strandings suitable for necropsy Jan-Dec 201

Cause of Death Class	Cause of Death Category	Dolphin	Harbour porpoise	Seal	Whale	Grand Total
Bycatch	Bycatch	4	1			5
Entanglement	Entanglement				1	1
Infectious Disease	Generalised Bacterial Infection /Septicaemia	4	6			10
	Generalised Parasite Burden	1	2			3
	Meningoencephalitis	5	1	1		7
	Peritonitis			2		2
	Pneumonia, parasitic			1		1
	Pneumonia: Bacterial	1	1	1		3
	Pneumonia: Parasitic		2	9		11
	Pneumonia: Parasitic and Bacterial		5	3		8
	Pneumonia: Parasitic and Fungal		1			1
	Pneumonia: Unknown origin			1		1
Live Stranding	Live Stranding	3	1		4	8
Other	Developmental abnormality	1		2		3
	Dystocia & Stillborn	1	3			4
	Rehabilitation failure			1		1
	Senility	1				1
Physical Trauma: Bottlenose Dolphin Attack	Physical Trauma: Bottlenose Dolphin Attack		2			2
Physical Trauma: Other	Physical Trauma: Bite wounds			5		5
	Physical Trauma: RTA			1		1
Physical Trauma: Shot	Physical Trauma: Shot			3		3
Physical Trauma: Spiral "Corkscrew" lesions	Physical Trauma: Spiral "Corkscrew" lesions		1	6		7
Starvation	Maternal separation/starvation		4	1		5
	Starvation		2	3		5
Not Established	Not Established: Autolysis	1		5		6
	Not Established: Predated			1		1
Pending	Awaiting histopathology	1	2	3		6
	Awaiting necropsy		2	4		7
Grand Total		14	36	62	5	117

Table 2: Cause of death of species necropsied Jan-Dec 2010

Cause of death of strandings Jan-Dec 2010 by species class

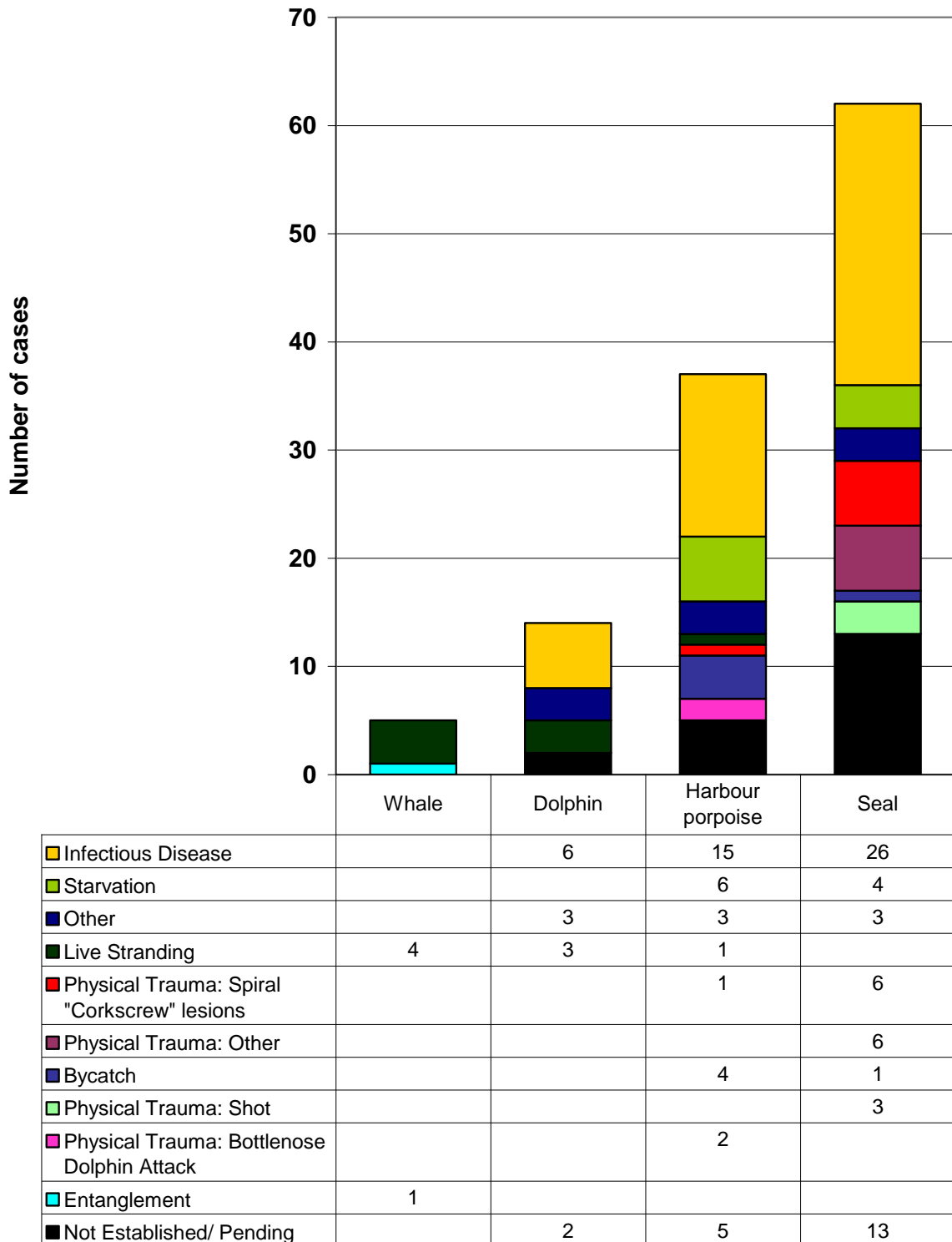


Figure 10: Chart of cause of death of species necropsied Jan-Dec 2010

4.4 Spatial maps of cause of death by region

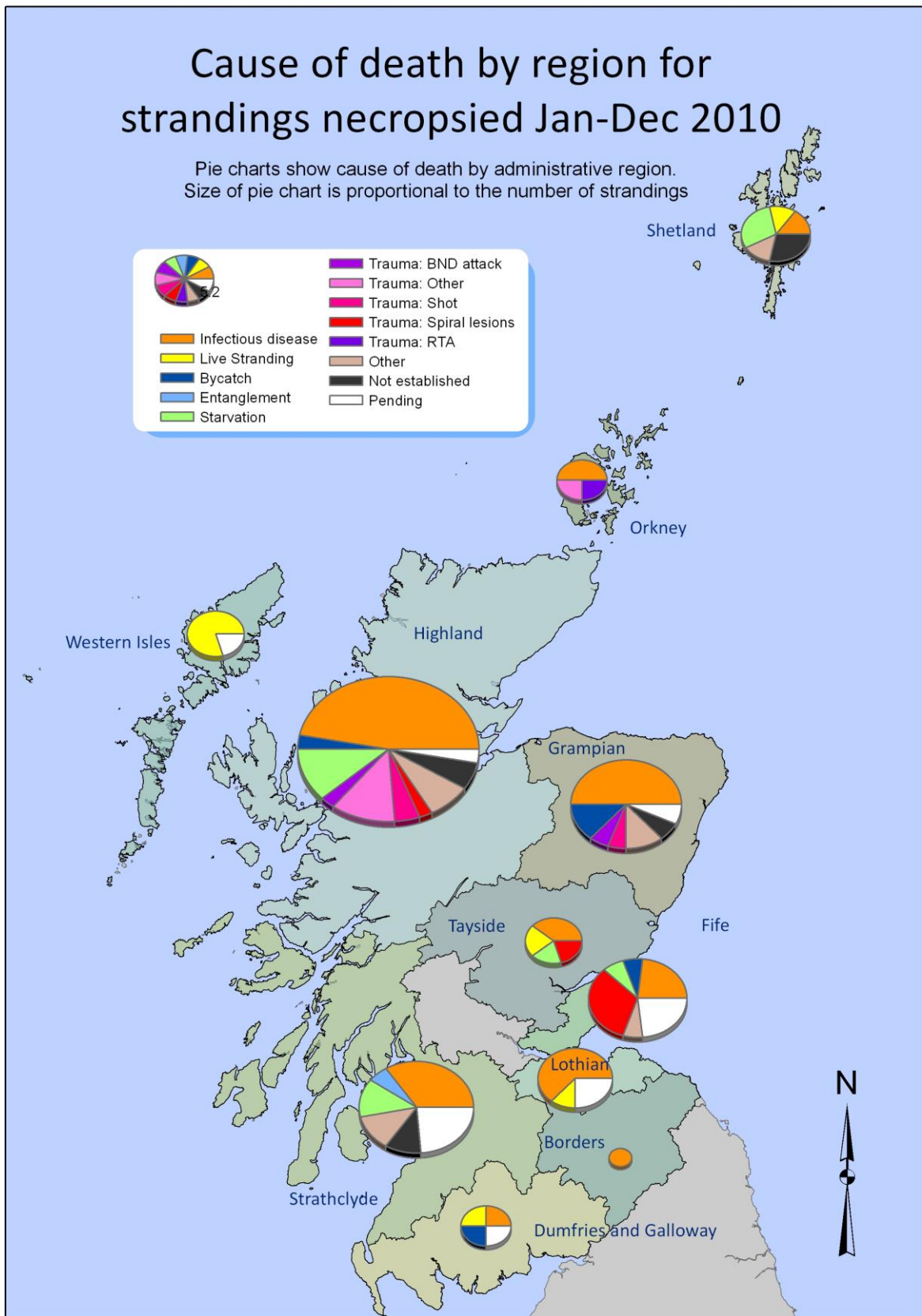


Figure 11: Cause of death for all marine strandings necropsied, by region

Cause of death by region for cetaceans necropsied Jan-Dec 2010

Pie charts show cause of death by administrative region. Size of pie chart is proportional to the number of strandings

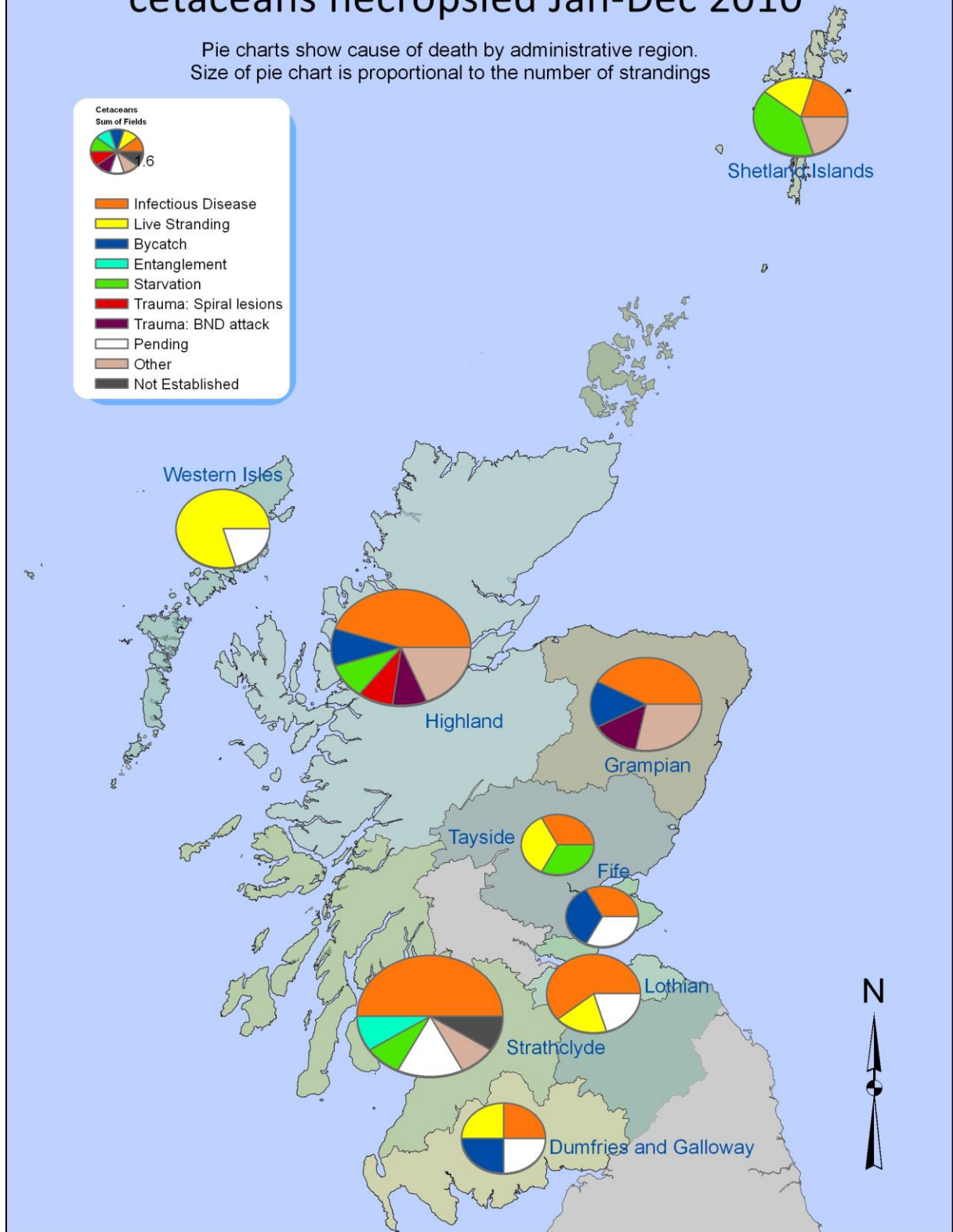


Figure 12: Cause of death for all cetacean strandings necropsied, by region

Cause of death by region for seals necropsied Jan-Dec 2010

Pie charts show cause of death by administrative region.
Size of pie chart is proportional to the number of strandings

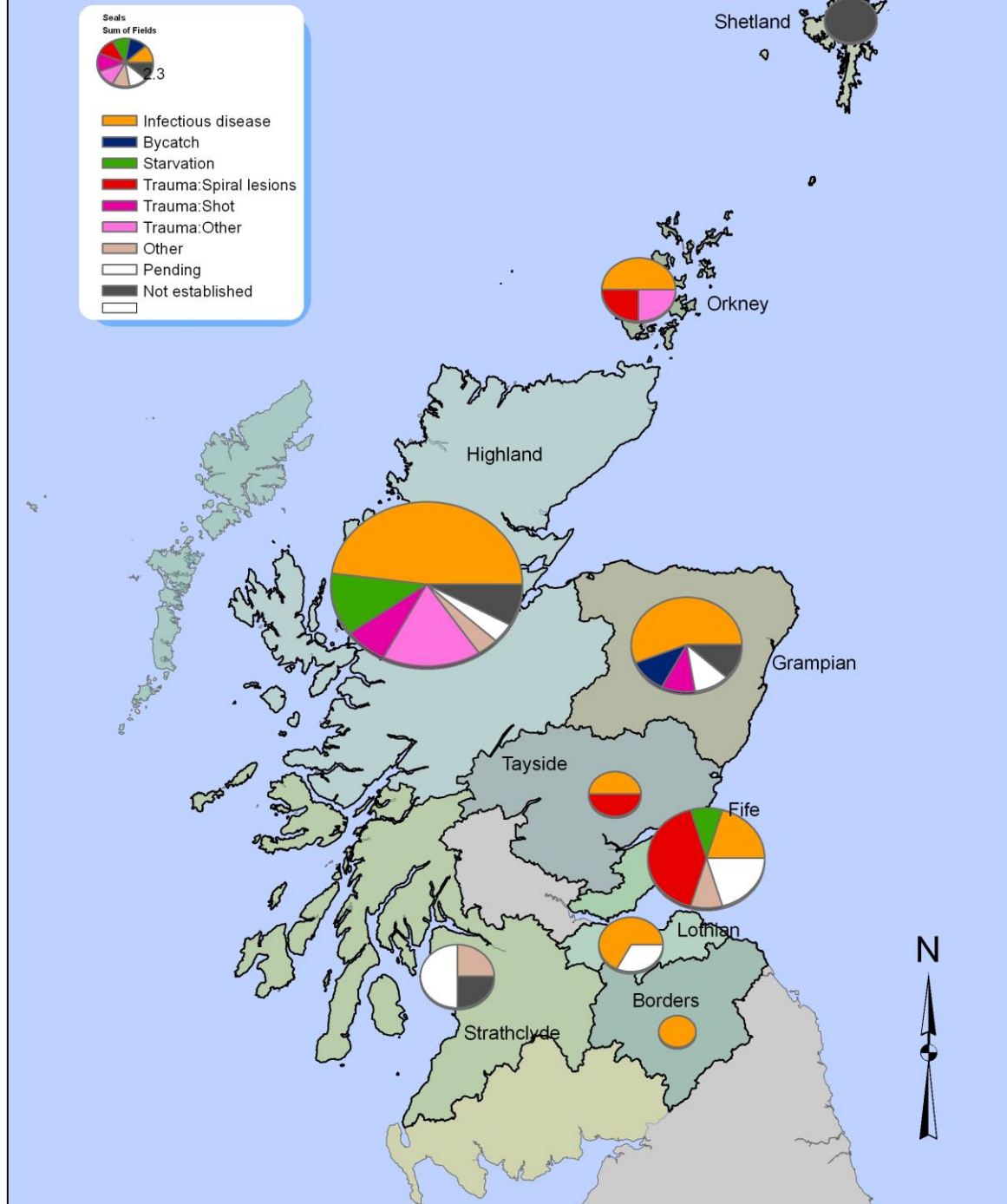


Figure 13: Cause of death for all seal strandings necropsied, by region

5 Notable strandings

The following cases are of notable strandings. Note, this data is also shown in the 2010 quarterly reports.

- **M036/10: 20/02/2010.** Harbour porpoise – Fraserburgh, Grampian – found with vaginal prolapse and euthanized on site. Necropsy findings: severe generalised parasitism and debilitation. Degree of parasitism was large for an adult and it is possible increased stress and reduced feeding ability during pregnancy may have immunologically compromised the animal, allowing parasitism to develop to such severity.
- **M045/10: 07/03/2010.** Striped dolphin, Drummore, Stranraer – refloated but found dead later. Necropsy findings: Meningioencephalitis, attributed to *Brucella ceti* and subsequent live stranding.
- **M082/10: 27/04/2010.** Minke whale, Grangemouth – refloated but found dead later. Carcase not examined as disposed of by council. The reluctance of the landfill site to permit access to our team to undertake a necropsy highlighted several issues with communicating the importance of post mortem analysis to council agencies.
- **M106/10: 10/06/2010.** Minke whale, Tighnabruich, Argyll. Died on site. Necropsy findings showed that animal had most likely died as a result of previous entanglement. The lesions are shown in photos 2 & 3 below. It can be seen that the wounds are resolving but sufficient damage had been done by the duration and severity of the entanglement process that subsequent infection and mandibular fracture led to the death of this animal.



Photo 2: Lateral view of entangled minke whale M106-10



Photo 3: M106-10 mouth lesions.

- **M157/10: 30/07/2010 Young minke whale, Horse Isles Bay, Nr Dalbeattie. Seen alive at several locations in the estuary, extensive bruising to blubber and subcuticular muscle from multiple live strandings in estuarine region.**



Photo 4: Ventral view of case M157-10 showing bruising associated with successive strandings and tidal refloat in estuary.

- **M206/10: 08/09/2010 Risso's dolphin, Tolsta beach, Lewis. Euthanased. Necropsy findings:** Juvenile male Risso's dolphin. No evidence of any traumatic or disease process. The cardiac stomach contained evidence of very recent feeding, It is likely that this animal became socially separated and subsequently live stranded. This illustrates that Risso dolphins are successfully feeding off the Western Isles, supporting findings made by recent survey work.



Photo 5a & b: Food remains found in stomach of M206-10

- **Case M210/10: Harbour porpoise, Hillswick, Shetland. Refloated but found dead next day. 11/09/2010 Necropsy findings:** The sub-adult male porpoise found live stranded, the liver showed profound jaundice and fatty change and the kidneys were also jaundiced. Samples were sent for agrochemical analysis to investigate if the pathology could have been a result of off-licence use of organophosphates in the marine environment around Shetland. These all tested negative, and the cause of stranding remains unknown.
- **Case M209-10, Hooded seal (*Cystophora cristata*) found Newport, Tayside:** This hooded seal pup was seen alive but died before it could be taken to rehab. 10/09/2010: **Necropsy findings:** Large (3.3kg) mass of rocks and gravel of various sizes ranging from 1-2mm to 5cm diameter in the stomach, alongside some leaf matter and some small plastic debris. It is probable, given this pup was well south of its normal foraging range, that the pica (deranged appetite) was a response to hypoglycaemia following a period of inadequate feeding.

6 Investigation into ‘corkscrew’ lesions

Seal carcasses, with similar distinctive injuries, have been recovered around the UK in 2009 and 2010. The main finding has been a continuous laceration that spiralled down and around the body in a “corkscrew” spiral. Six cases have been necropsied at SAC and additional 5 more at SMRU. Photo 6 and Photo 7 show the similarity between geographically distinct clusters of cases in Norfolk and Fife.



Photo 6: Typical appearance of a corkscrew Injury in Norfolk cases. Photo courtesy of Steve Bexton, RSPCA Wildlife Hospital Norfolk.



Photo 7: Typical appearance of a corkscrew Injury in a case from eastern Scotland

In collaboration with SMRU, Steve Bexton at the RSPCA wildlife hospital in Norfolk and Tony Patterson at AFBI Stormont Veterinary Laboratory we are continuing to investigate the cause of characteristic spiral cuts seen on seals found dead along the east coast of Scotland, Norfolk and in Strangford Lough, Northern Ireland. Additionally, a adult male harbour porpoise was recovered from Gairloch beach, Highland (NG799770, Case M216-10) which was found freshly dead on the beach in good body condition. There were a series of two sets of inclined spiralling cuts, clockwise and anticlockwise, beginning at the head with avulsion of the blubber layer from the musculature. The cuts were not as continuous as seen in some of the 'corkscrew' seal cases, but shared the oblique angle of incision and lack of underlying tissue damage seen in the seal cases. This is the first case we have seen this year reported in cetaceans or from west coast of Scotland. There were also multiple punctate rip marks around the head and jaw. The lungs and liver showed evidence of chronic parasitism with fibrosis and there was stable foam in the airways. The lungs were symmetrical and did not show hyperinflation or congestion. There was little nematode burden in the lung parenchyma. It is difficult to be certain, but a lack of congestion or blood clots seen in the arteries could indicate exsanguination, Food remains in the stomach and a good blubber thickness also suggested this animal was healthy prior to death and propeller trauma is most likely.



Photo 8: 'Spiral' lesions in case M216-10. The cut was not the same as those seen in the seals, and comprises two cuts perpendicular to each other from, it is assumed, two cutting surfaces.

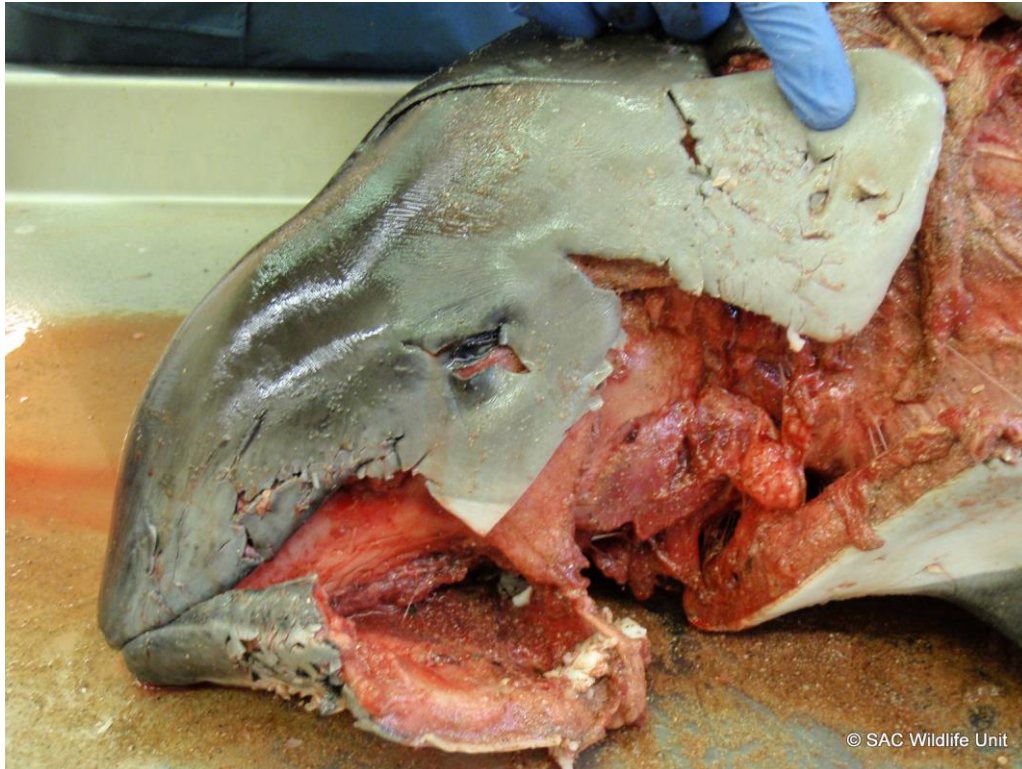


Photo 9:- close up of head trauma to case M216-10

Current theories point to the animals becoming drawn into a ducted or cowled propeller, possibly similar to the type used by vessels employing dynamic positioning systems. Further work is needed to confirm if such mechanical devices are capable of causing these spiral lesions, and also to quantify the impact at a population level. It is possible that the cases seen represent only a small fraction of the total. In particular, the number of animals involved in these trauma incidents, and the mechanism of trauma, has to be understood in order to quantify the severity of this problem and develop measures to mitigate the effect.

7 Outputs

7.1 Conferences and meetings:

Andrew Brownlow gave a oral presentation at the European Wildlife Disease Association conference 'Healthy wildlife, healthy people', 13-16 September 2010 on the island of Vlieland, the Netherlands. Abstract follows:

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The purpose of surveillance: 20 years of monitoring disease in Scottish cetaceans.

Since 1990 a dedicated scheme for the monitoring and sampling of stranded cetaceans has been in operation in Scotland. In close collaboration with similar programmes running in England and Wales, the scheme has collated, analysed and reported data for all marine mammal strandings around the UK coast. The purpose of the scheme is to monitor the level of disease and contaminant burden in stranded marine animals, collect life history parameters and identify any substantial new threats to conservation status. The scheme relies on opportunistic sampling of stranded cetaceans. Species, morphometric data, size, location and body condition of the stranded animal is collected and, if feasible, the animal is collected for a post-mortem examination. Gross pathology, bacteriology, histopathology, and neurohistopathology are undertaken on most specimens collected for necropsy.

Harbour porpoise (*Phocoena phocoena*) account for the greatest number of strandings each year and comprise 52% of the total number of strandings. Between 1992 and 2008 the Scottish strandings scheme received reports of 1166 harbour porpoise. Of these, 632 animals were in suitable condition for necropsy. Excluding by-caught and live-stranded animals, the most common causes of mortality were starvation, infectious diseases (mainly pneumonias due to combinations of parasitic, bacterial and/or mycotic infections) and physical trauma. The objective of this work is to present these data and show the spatial and temporal variations in cause of death. Robust assessment of disease burden in this species potentially allows for indication of disease in sympatric cetacean populations, where data are more scarce and analysis complicated by factors such as reporting bias, over-dispersion or small sample size.

7.2 Marine strandings poster:

The new strandings poster continues to be distributed to relevant stakeholders, e.g. marine welfare charities, coastal communities, countryside wardens. A copy of the poster has been included in the appendix.

7.3 Website and database:

Work has continued on the web-based database to hold Scottish seal necropsy data and any data not held in the UK CSIP database and is due for completion in spring 2011

Additionally, the website outlining the Scottish Marine Stranding scheme was completed and work begun on designing an interface for mapping and displaying the Scottish strandings data. This site went live in June 2010 and can be seen here:

www.strandings.org

The site enables members of the public to access parts of the marine stranding database using an interactive map to find the location, species and cause of death of all strandings since 1992. It also produces user-specified dynamically generated charts showing the trend in stranding numbers over time by both year and species.

7.4 Radio and Media

A BBC film crew filmed a bottlenose dolphin necropsy in August 2010 for inclusion in a forthcoming BBC2 documentary 'Britain's Secret Seas'. Expected broadcast date is April 2011.

8 Discussion

In 2010, 307 marine animals were reported to the Scottish Strandings Investigation Programme. It was possible to necropsy 117 of these, 55 cetaceans, and 62 seals. As in previous years, there was an overrepresentation of harbour porpoise in the stranding population compared to other species. This is for a number of reasons; porpoise are a numerous, coastal species that tend to float when dead and, due to the small size, are slow to autolyse. The harbour porpoise dataset is unique amongst stranding species as it is large enough to enable valid inference about the traumatic, toxic, metabolic and infectious processes at work on both porpoise and, potentially, coastal marine species in general. In this regard the use of porpoise as disease sentinels is potentially possible. Initial data inspection shows a clear spatial heterogeneity of cause of death, although much less of a temporal trend over time. This is being analysed in more detail and the findings will be published in 2011.

An attempt was made in 2010 to increase the public awareness of the stranding project through the design and distribution of a new poster and the launch of the website www.strandings.org. This provides users with the opportunity to view strandings data in a graphical or tabulated format, or spatially using Google Maps. The website also provides users with a method for reporting strandings online, in specific an upload function to send digital images which has proved very useful. Use of new media such as Twitter and Facebook has also been explored, and the project profile has been helped by recent radio and television programmes featuring our work.

Despite improved coverage and a much higher reporting rate for seals in 2010, it is still likely that strandings are underreported in many areas; often for simple reasons of population, geography and logistics. The length of the Scottish coastline is of the order of about 12,000 km; this is about 8% of the total coastline of Europe, and in many areas strandings are just unlikely to be spotted, let alone reported. In addition, the probability a stranded animal is reported is influenced by more socio-cultural reasons. Areas with a local, proactive person or group enable strandings to be reported efficiently; regions without this network tend to have poorer reporting rates. Orkney, for example, has a large seal population yet we receive very few reports of seal carcasses from these islands (Figure 3, Figure 8) Improved awareness and coordination in areas such as this may significantly improve the reporting level, and strategies to achieve this are currently being explored. This is of particular importance when taking into account surveillance for potential new threats to marine species, such as the corkscrew lesions seen on seals during the last couple of years, or acquiring baseline data for assessing the impact of installations by the marine renewable industry.

9 Appendix

9.1 Publications 2010

- LAW, R.J., BERSUDER, P., BARRY, J., DEAVILLE, R., REID, R.J., JEPSON, P.D., 2010. Chlorobiphenyls in the blubber of harbour porpoises (*Phocoena phocoena*) from the UK: levels and trends 1991-2005. **Marine Pollution Bulletin** **60**, 470-473.
- SARAH J. DOLMAN, EUNICE PINN, ROBERT J. REID, JASON P. BARLEY, ROB DEAVILLE, PAUL D. JEPSON, MICK O'CONNELL, SIMON BERROW, ROD S. PENROSE, PETER T. STEVICK, SUSANNAH CALDERAN, KEVIN P. ROBINSON, ROBERT L. BROWNELL, AND MARK P. SIMMONDS A note on the unprecedented strandings of 56 deep-diving whales along the UK and Irish coast: **Marine Biodiversity Records, page 1 of 8. # Marine Biological Association of the United Kingdom, 2010 doi:10.1017/S175526720999114X; Vol. 3; e16; 2010**
- LAW, ROBIN J.; JON BARRY; PHILIPPE BERSUDER; JONATHAN L. BARBER; ROB DEAVILLE; ROBERT J. REID and PAUL D. JEPSON. Levels and trends of brominated diphenyl ethers in blubber of harbor porpoises (*Phocoena phocoena*) from the UK, 1992-2008: **ENVIRONMENTAL SCIENCE & TECHNOLOGY 44(12):4447-4451. 2010.**
- M. P. DAGLEISH, J. L. BAILEY, G. FOSTER AND J. BARLEY The First Report of Disease in a Basking Shark (*Cetorhinus maximus*): **Journal of Comparative Pathology. 2010, Vol. 143, 284-288**

9.2 Strandings poster 2010

Scottish Marine Animal Stranding Hotline




whales



dolphins



seals



turtles



basking
sharks

If you find a
dead, stranded marine animal,
please report it at

www.strandings.org

or call

07979 245893 / 01463 243030

Rescue for **LIVE** strandings can be called 24 hours a day through
Scottish SPCA Animal Helpline (03000 999 999)
or **British Divers Marine Life Rescue (01825 765546).**

The Scottish Marine Animal Stranding Scheme collates, investigates and reports information on stranded marine animals for Scotland. We use the information gathered from strandings to improve our understanding of the number, distribution and health of marine animals in Scottish waters. The scheme is managed by the SAC Disease Surveillance Centre, Inverness in collaboration with the organisations listed below.

It is useful to provide the following information when reporting a stranded animal:

- 1 What is it?** What type/species of animal? If you are not sure, you can send us pictures from your phone or camera
- 2 Where is it?** As precise a location as you can give, how far to the nearest road access and is it above the high tide mark?
- 3 What size is it?** Approximate length, can it be moved or secured against removal by the tide?
- 4 How fresh is it?** Is it in a good state or a smelly heap of bones?

WARNING: Marine animals are wild animals. They may carry diseases which are transferable to humans. Do not put yourself at risk of injury. Do not attempt to move heavy animals without adequate assistance. Wash hands thoroughly after any contact.

