

# **Report on the Production of a Catalogue of Risso's Dolphins that Utilize the Irish Sea and Surrounding Waters**

## **Introduction**

Risso's dolphins (*Grampus griseus*) have a worldwide distribution, found throughout temperate and tropical waters. However they show a marked preference for deep, offshore waters, typically between 400 and 1000m. (Baird, 2002). This has made in-depth study of their behaviour, population structure and life history traits difficult.

It has long been recognised that, for many cetacean species, individuals can be recognised, over a long period of time, through natural markings and this can be used to understand ranging patterns, site fidelity and social associations within a population (Wells, 2002). Natural markings that can be used for identification vary with species and for Risso's dolphins are primarily nicks out of the dorsal fin and scars on both the fin and the body. It is believed that the extensive scarring patterns seen on Risso's dolphins are more permanent than in some other cetacean species and can therefore be reliably used as an identification tool (MacLeod, 1998).

The Isle of Man, with its relatively deep surrounding waters, has recently been shown to support a number of Risso's dolphins, which are regularly present in spring and summer and are consistently seen within a few hundred metres of shore. Since 2007, the Manx Whale and Dolphin Watch (MWDW) has conducted photo ID of the animals seen around the island and, together with images taken by other observers, has created a catalogue of individuals.

This project uses the MWDW catalogue as a basis for comparison with images from other organisations working along the west coast of Britain, to create a more widely ranging catalogue. It has been created in such a way that as more images become available, they can be easily incorporated to provide an increasing depth of knowledge into this population of Risso's dolphins.

## **Methodology**

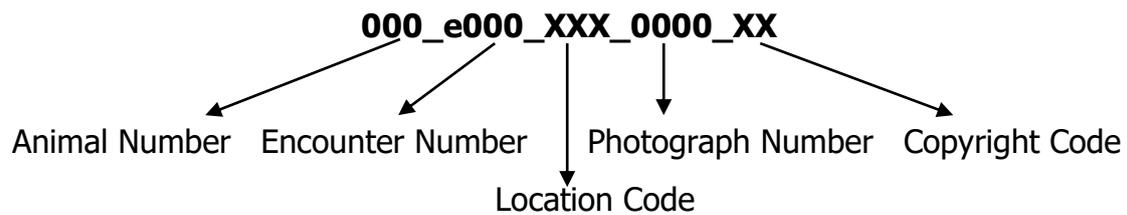
Images have so far been provided from MWDW and the Hebridean Whale and Dolphin Trust (HWDT), with whom a data sharing agreement has been signed. The Whale and Dolphin Conservation Society (WDCS) are also planning to provide a large set of images, which they are still assembling, and these will be incorporated in the same way once we have received them. This will then provide good coverage from the Hebrides, Isle of Man and North Wales, encompassing the main extent of this population's known range.

Each group of images, from a particular sighting, are grouped under the same 'Encounter Number'. These are then sorted, with low quality images being disregarded. Images are deemed to be of too low quality if the animal is at a poor angle, is not in focus, has poor light quality or is too far away to be able to distinguish markings. It should be noted however, that a less good quality image of a very well marked animal may still be retained, if it is felt that the animal is still distinguishable.

Animals with distinctive markings are then identified and given a unique number. Individuals can fall into three categories; 'well marked', 'left' and 'right'. Well marked individuals have nicks or notches out of the dorsal fin, usually on the trailing edge (see Fig. 1). Additionally, it may have distinctive scars. This means the animal can be identified from a photo of either side of its fin. 'Left' and 'Right' individuals can only be distinguished by scarring patterns and can therefore only be identified from a photo of the left or right side of the fin respectively (see Fig. 2 & 3).



All photographs of an animal are labelled as follows:



**Animal Number:** the unique number of that individual, a 3 digit sequential number. 'Left' and 'Right' animals are labelled with an 'L' or 'R' accordingly.

**Encounter Number:** a 3 digit number referring to the encounter that photo was taken in.

**Location Code:** a 3 letter code referring to the general location that photo was taken in (see Appendix 1)

**Photograph Number:** the original number given to the photograph by the camera (to distinguish multiple photos of the same individual from the same encounter) (see Appendix 1)

**Copyright Code:** Initials of the photographer or group who has copyright over the photograph (see Appendix 1).

Folders are then made for each individual, containing all available images of that animal. This is called the 'Master catalogue' and is divided into 3 sections; well marked, left and right. From the master catalogue, the best photo of each animal (left and right side, where available, for well marked animals) is then put into an 'ID catalogue'. Again this is in 3 sections, well marked, left and right. (See accompanying Data CD). This catalogue is then an easy reference guide for comparing new individuals to. For ease of reference, the label on the ID photos is limited to just the animal number, photograph number and copyright code.

The data relating to each encounter e.g. date and location, is entered into an Excel spreadsheet. Linked to this are spreadsheets listing each individual and which encounters it has been seen in. (See accompanying Data CD). From this it can be calculated how many times each individual has been seen and a discovery curve for the population can be drawn. The discovery curve plots the number of total identifications made against the size of the catalogue and can help determine whether all the individuals within a population have been discovered.

## **Results**

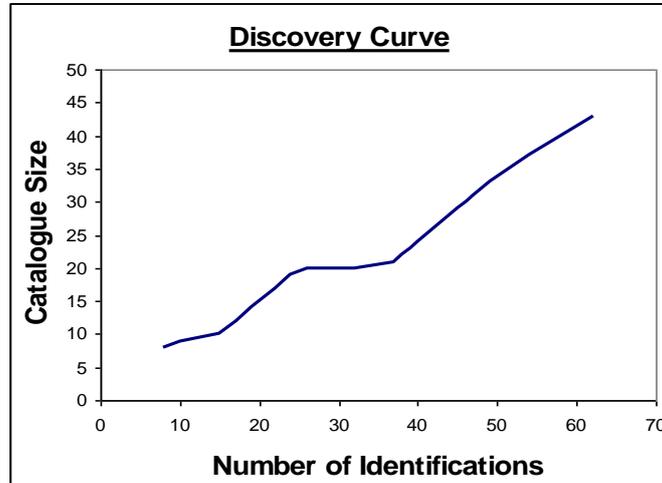
The number of individuals in each catalogue is currently as follows:

Well Marked = 43                  Left = 12                  Right = 16

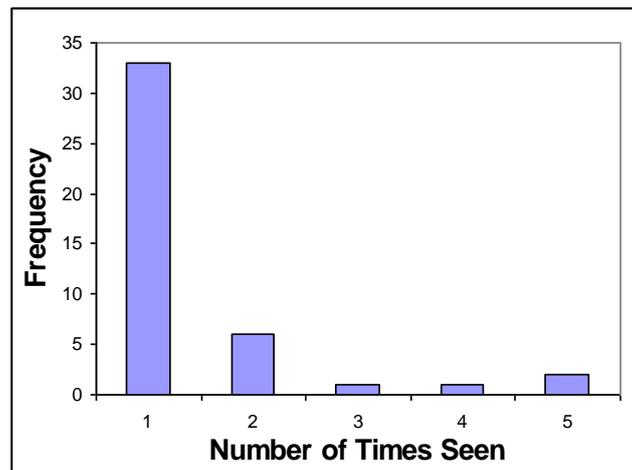
The 3 ID catalogues can be seen in the following pages.

The minimum number of different individuals in total is therefore 59. This is the number of well marked plus either the number of lefts or rights, whichever is higher. Both are not used as some of the left individuals may have been identified on the right hand side too and vice versa. For this reason, the majority of further analysis is done using the well marked catalogue only.

The discovery curve for the well marked catalogue is shown below. It can be seen that the curve is still systematically increasing, indicating that new individuals are being discovered and it is not likely that all members of the population have been identified.



This can also be seen from the bar graph below. This shows that the majority of animals have only been seen once, indicating that new animals are still being identified and it's not just the same group being repeatedly identified.



Nevertheless, some animals have been re-sighted, with 2 individuals having been seen 5 times. From the tables displayed for each individual in the catalogues following, it can be seen that 7 well marked individuals have been seen in 2 different years. Furthermore, 1 individual first identified in 2005 was subsequently re-sighted 3 years later in 2008.

The position of each encounter has also been plotted on a map, as can be seen below. Taken in collaboration with the catalogue, it can thus be seen where each animal has been observed. Currently there are no animals which have been identified in both Manx and Hebridean waters.

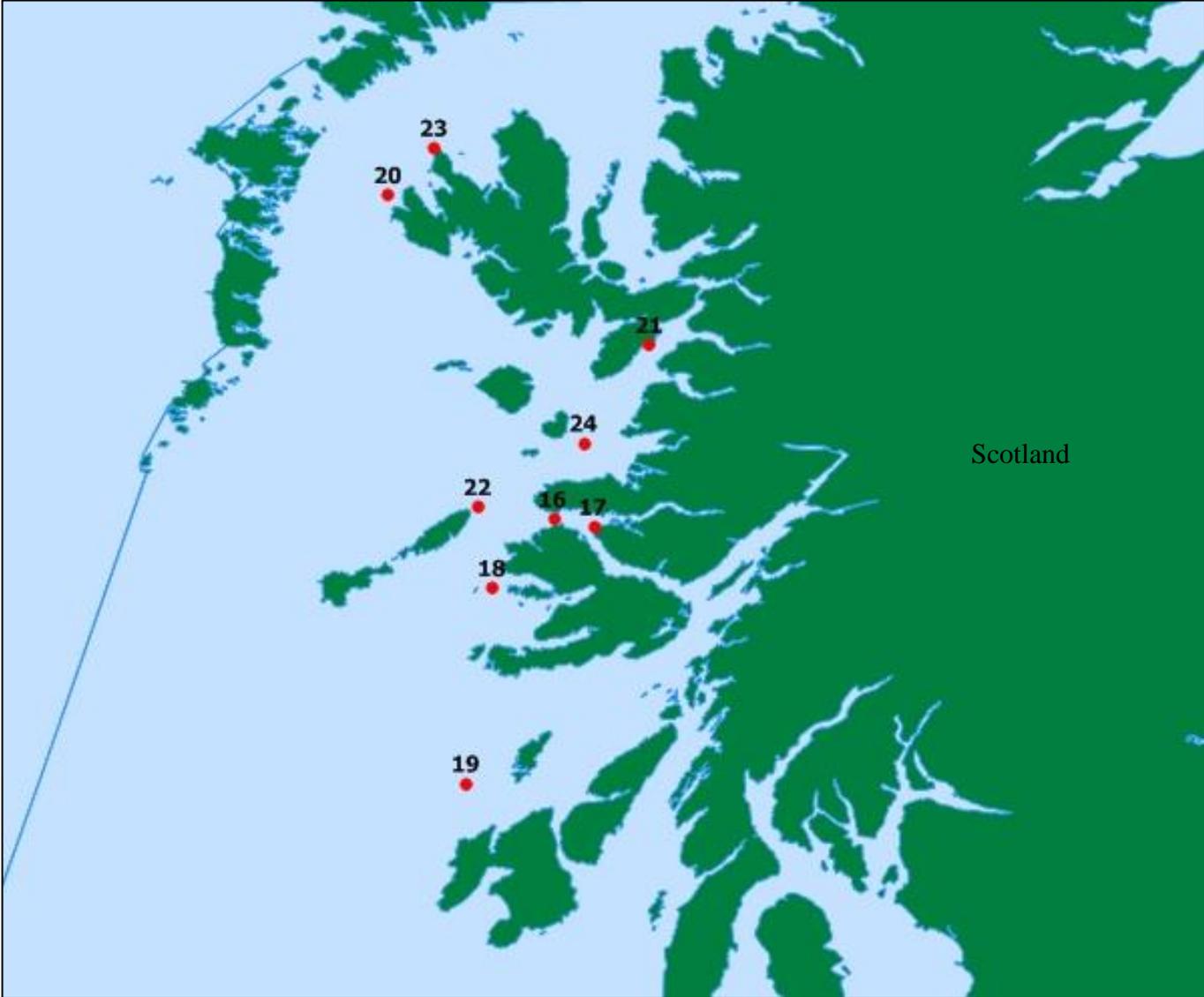
**Map 1:** Overview showing distribution of all encounters. Each red dot represents one encounter.



**Map 2:** Numbered encounters from around the Isle of Man.



**Map 3:** Numbered encounters from the Hebrides.



## **Discussion**

From the images collected so far, a catalogue of 43 well marked animals has been created. Additionally, catalogues of individuals which can only be recognised from an image of the left or right hand side have also been created, numbering 12 and 16 respectively. Images have so far only come from the Isle of Man and Hebrides and there are currently no matches between the two areas. This could be due to a variety of reasons, which are not mutually exclusive.

As the discovery curve and 'times seen' graph show, animals within the population are still being discovered. It could be that animals in either or both areas are yet to be identified and matched to an individual in the other area. The catalogue is also only based on 25 encounters. With future work and identification of more animals, matches between the two areas may come to light.

The social structure of the Risso's dolphin is poorly understood, as, until recently, no long-term, large scale photo ID projects have been carried out. However, from a study in the Azores, it has emerged that Risso's dolphins seem to have a unique social structure (Hartman, 2008). This appears to include elements of an unstable, fission-fusion society (as shown by other delphinid species such as bottlenose dolphins) and elements of a stable, matrilineal society (as shown by species such as pilot whales). Thus, in the population in the Azores, there are several small, stable groups of 3-12 individuals which occasionally form loose associations with other groups.

Presently, there is nothing known about the social associations of Risso's dolphins in Britain. However, if these are similar to the Azorean population, it could be that there are separate groups in Manx and Hebridean waters, which may occasionally come together to exchange genes. Again, only continued work will be able to elucidate the social structure of the population within the

Irish Sea. It is hoped that with future re-sights, not only will the potential for matches be increased, but that social association patterns will be revealed.

It should also be remembered that photo ID is not an exact science. Not only is it challenging at sea to try and get good quality images of all animals within a group, but also there is a degree of subjectivity in the analysis of photos. Whilst it is unlikely that any matches within the well marked section have been overlooked, it is nevertheless possible within the left and right sections or with photos of borderline quality.

The continuation of photo identification by research groups around the Irish Sea will continue to provide essential information about this poorly understood cetacean, both in terms of the Irish Sea population and for the species as a whole. It is hoped that the Isle of Man can remain in the centre of this project to create a long-term, photo-identification based data set on this little understood dolphin.

## **References**

Baird, R., 2002. Risso's Dolphins. Encyclopedia of Marine Mammals. pp1037-1039

Wells, R.S. 2002. Identification Methods. Encyclopedia of Marine Mammals. pp601-608

MacLeod, C.D., 1998. Intraspecific scarring in odontocete cetaceans: an indicator of male 'quality' in aggressive social interactions. J. Zool. Lon. **244: 71-77**

Hartman, K.L., Visser, F. & Hendriks, A.J.E., 2008. *Social Structure of Risso's Dolphins (Grampus griseus) at the Azores: a stratified community based on highly associated social units.* Can. J. Zool. **86: 294-306**

## **Appendix 1**

### **Location Codes**

IOM = Isle of Man waters

HEB = Hebridean Sea waters

### **Photograph Number**

This number is automatically assigned to each photograph by the camera. Different cameras label images in different ways, hence why some of these numbers have letters also associated with the number and numbers are not sequential in any way.

### **Copyright Codes**

<b>Name of Photographer</b>	<b>Code</b>
Eleanor Stone	ES
John Galpin	JG
Simon Mitchell	SM
Sharon Bond	SB
Graham Hall	GH
Richard Cope	RC
Nina Shimmin	NS
Pete Hadfield	PH
Hebridean Whale and Dolphin Trust	HWDT
Genevieve Leaper	GL
Marcus Walters	MW
Colin Speedie	CS
Tom Jackson	TJ