SEABIRD AND MARINE MAMMAL MONITORING OF THE ARKLOW BANK: interim report for the period July 2005 to June 2006

Herring Gull breeding on Wicklow Head

July 2006

For: Airtricity

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1 SUMMARY

This interim report covers the monitoring period from July 2005 to June 2006 inclusively. Survey trips were undertaken to routinely monitor the Arklow Bank and its environs for seabirds, marine mammals and zooplankton. Cover was achieved in the majority of months but in some months weather conditions were not favourable to the accomplishment of the survey targets.

Standardised seabird and harbour porpoise counts are presented on a month-by-month basis. Also results are compared with data from previous years. Additionally the data is, for the first time, compiled into two time periods: Years 1 – 3, data accrued before the turbines were installed and Years 4 – 6, data accrued after the turbines were installed.

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3 INTRODUCTION

The long term monitoring of the Arklow Bank for populations of seabirds and marine mammals was designed and undertaken by Coveney Wildlife Consulting. Regular monitoring of the bank started in 2001 and continued on an ongoing basis (Coveney and Phalan 2001, CWC 2003, CWC 2004). However Coveney Wildlife Consulting's participation in the monitoring of the Bank ceased in July 2005. As an interim measure the regular monthly surveys have been carried out by Fulmar Ecological Services until the tendering procedures to contract another organisation to carry out the monitoring work has been completed (FES 2005, 2006).

4 METHODS

To ensure compatibility of the data set with previous sets, the day-to-day survey methodology designed and used by CWC Ltd has not been altered. Full descriptions of these methods are outlined in the CWC 2004 report. In brief, seabirds and marine mammals are recorded using an adaptation of JNCC standard techniques. The survey route is predetermined and consists of three sections: (1) the cable, (2) the box and (3) the bank. Cable and box routes are surveyed by one operative while the bank route requires two surveyors (one surveying each side of the boat). The recommended monthly survey coverage is outlined as follows: 15km of the cable route; 50 or 47km (route alternates on a bimonthly basis) of box route; and two 35km runs along the Arklow Bank proper with two surveyors to be undertaken twice a month.

Data for most species are presented as birds per km travelled but for certain species density values are presented instead. This is for compatibility issues with previous CWC reports. One change has been adopted for this report: previously the 5km ends of the bank routes were considered as 'box data' these areas are now treated as 'bank data' due to their proximity to the Arklow Bank and also they are surveyed with the same intensity as the bank area. Historical data used in this report has come from CWC Ltd. and are treated at face value. Note that standard deviations for the various mean species abundances/densities were not available for Years 1 – 3 data.

5 RESULTS

Coverage

Table 1 presents the summary information of the amount of survey kilometres covered and also relates these amounts as a percentage of the target. For each section (i.e. Cable, Box and Bank) the target was reached for the majority of months.

Table 1 Summary information of monthly survey coverage

	Cable Survey kilometres	% target achieved	Box Survey kilometres	% target achieved	Bank Survey kilometres	% of target
July	15	100	47	100	280	100
August	15	100	50	100	280	100
September	6	40	37	79	280	100
October	15	100	25	50	220	79
November	15	100	37	79	280	100
December	15	100	50	100	140	50
January	15	100	47	100	280	100
February	15	100	50	100	280	100
March	6	40	12	25	140	50
April	9	60	50	100	140	50
May	15	100	47	100	280	100
June	15	100	50	100	280	100

Due to a prolonged period of bad weather the planned plankton sampling trip for September could not be achieved and a similar situation was repeated in March (Table 2). However the requisite ten stations were sampled for every other month.

Table 2 Summary information of zooplankton sampling

Month	Number of stations sampled
July	10
August	10
September	0
October	10
November	10
December	10
January	10
February	10
March	0
April	10
May	10
June	10

During the December monitoring only, the plankton sampling had to be spread over two days. This was due to the fact that the first days sampling had to be abandoned due to worsening weather conditions.

March was a particularly poor month as regards survey targets because persistently poor weather hampered the work. Nonetheless some valuable data for that month was gathered. April weather also produced a challenge for the surveyors and boat. Complete coverage was achieved for both May and June.

Seabird monitoring

Leech's petrel, Storm Petrel, Swallow, Starling, Pomarine Skua, Great Skua, Arctic Skua, Red-necked Phalarope, Common Scoter among others were all recorded in or around the Arklow Bank during the period July 2005 to June 2006 inclusively. In this section abundances (or where appropriate density values) for the more regularly occurring species are presented with previous year's data. Additionally the data are combined into two categories: Year 1-3, an average generated from the first 3 years of surveying (Data from CWC); and Year 4-6, an average with associated standard deviations. This is then presented for a preliminary focus on the 'before' and 'after' situation of the installation and operation of the seven turbines.

Year 6 data for the Red-throated Diver varies in line with the abundances recorded for the previous years both on the bank and on the box (Figure 1, Figure 2). Figure 3 and Figure 4 presents the before and after turbine installation data for this species: The high February peak that was calculated for this species in the early years of monitoring has not been repeated in the last three (Years 4, 5 and 6). With this exception for the bank data both time periods seem to be quite similar. Red-throated Diver are much less abundant on the box part of the study area.

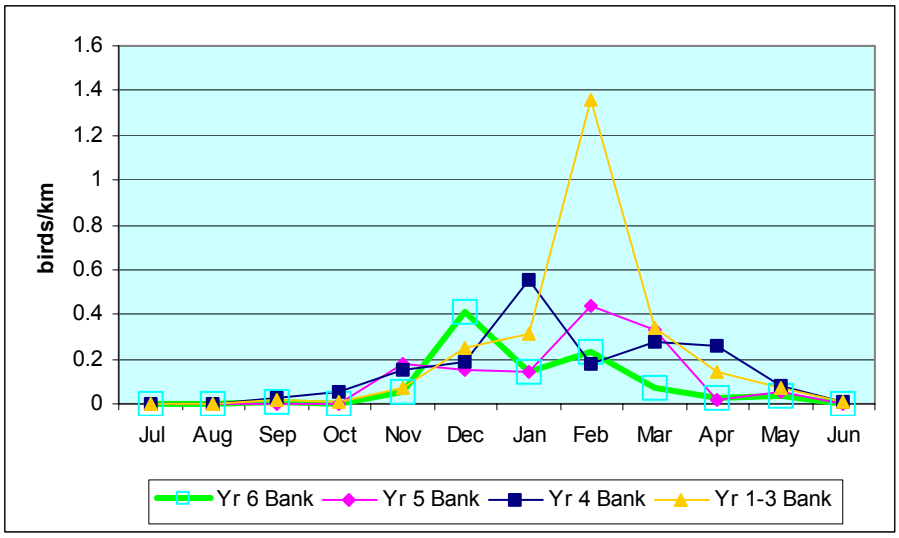

Figure 1 Red-throated Diver abundance on the Bank

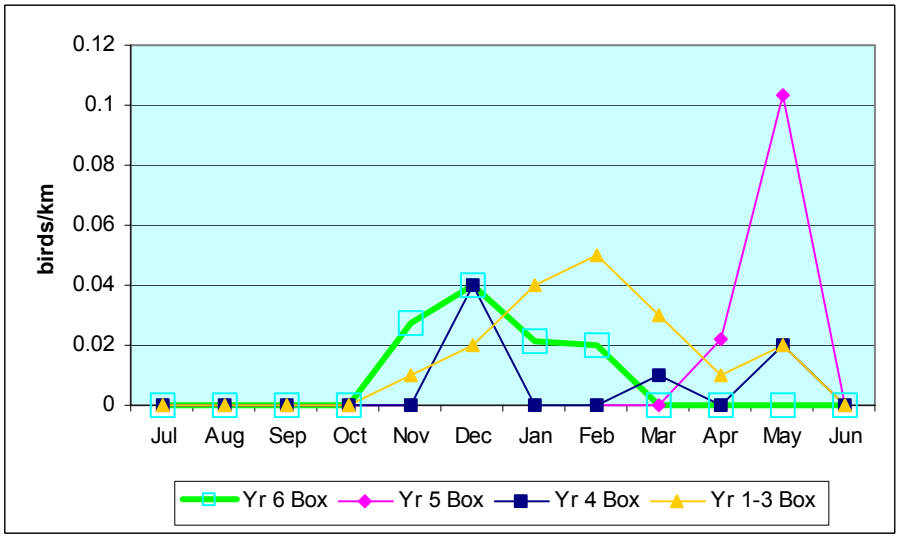

Figure 2 Red-throated Diver abundance on the Box

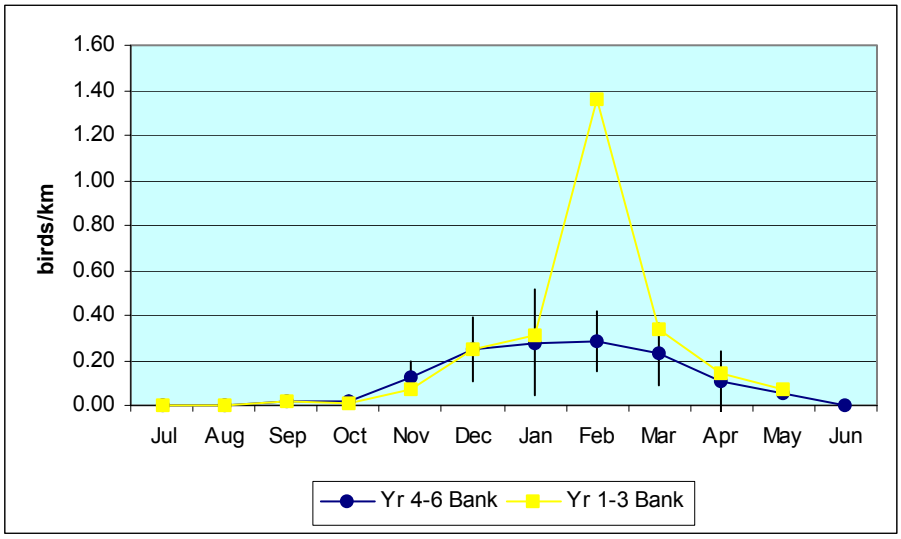

Figure 3 Red-throated Diver abundance on the Bank – compiled

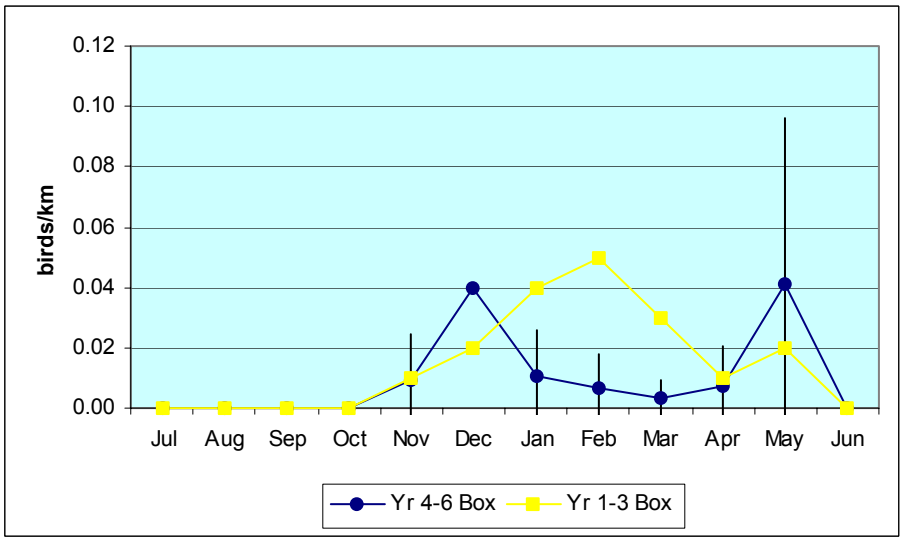

Figure 4 Red-throated Diver abundance - compiled

Fulmar abundance varied, on the bank and on the box as well as on a yearly basis (Figure 5, Figure 6). This year's recorded abundance on the bank was quite low but on the box during the July and August surveys exceptional numbers were recorded. Both these factors influenced the complied data (Figure 7, Figure 8) with this species on the bank occurring in lower numbers in more recent years.

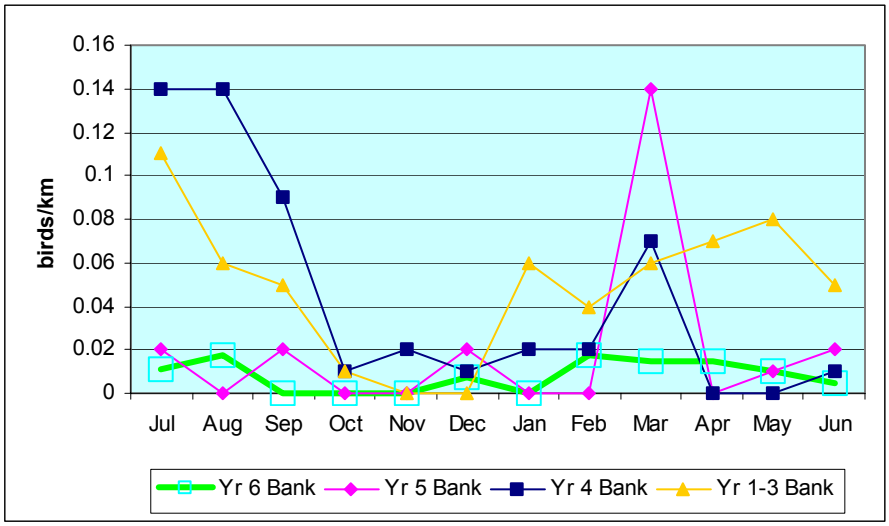

Figure 5 Fulmar abundance on the Bank

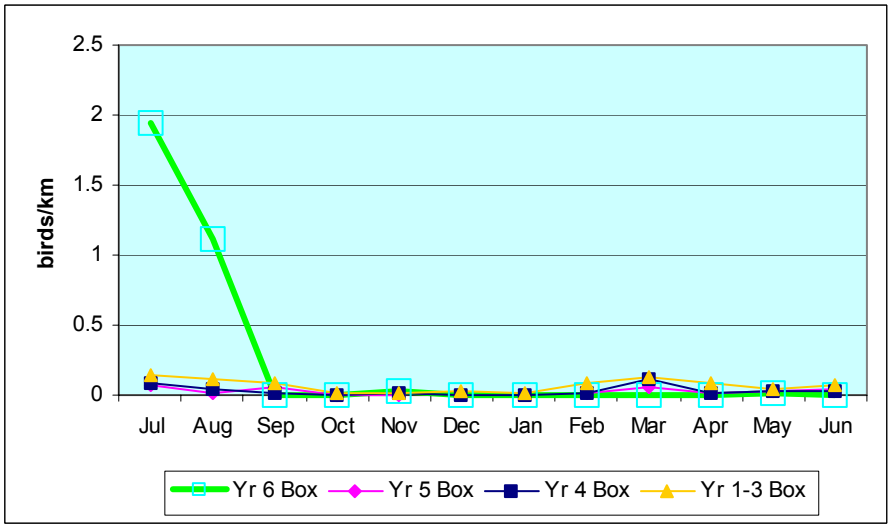

Figure 6 Fulmar abundance on the Box

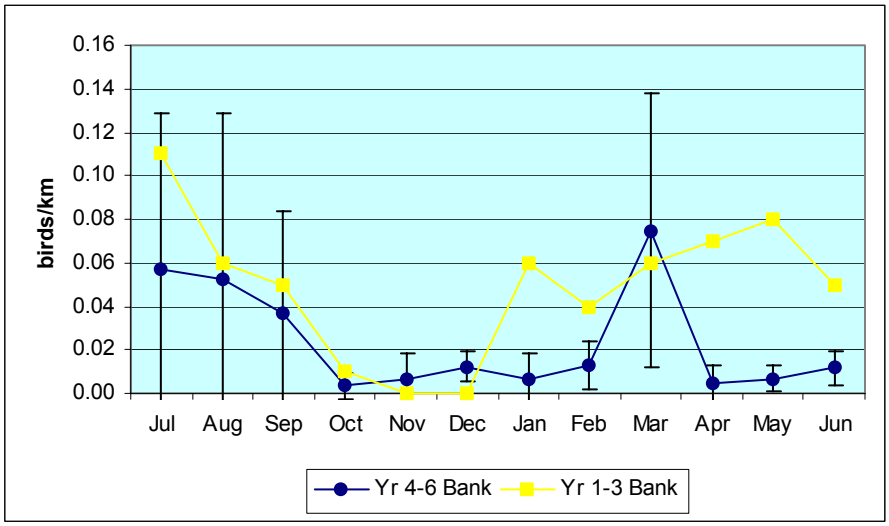

Figure 7 Fulmar abundance on the Bank – compiled

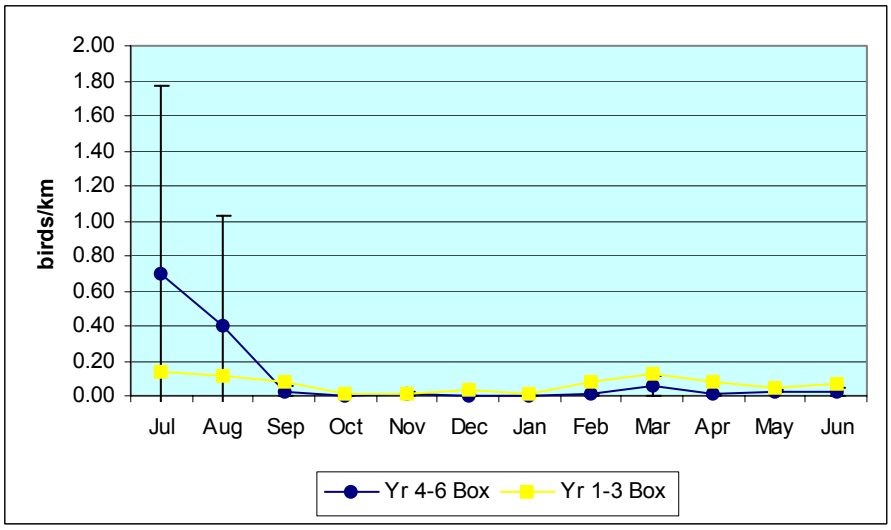

Figure 8 Fulmar abundance on the Box - compiled

In a similar fashion to the Fulmar data Gannet abundance on the bank was quite low this year (Figure 9) with peaks recorded on the box in the autumn (Figure 10). When the data is compiled it is evident that Gannet abundance on the bank during Years 4 – 6 is lower than previous survey years (Figure 11). The situation is less clear for Gannet numbers on the box part of the study area (Figure 12).

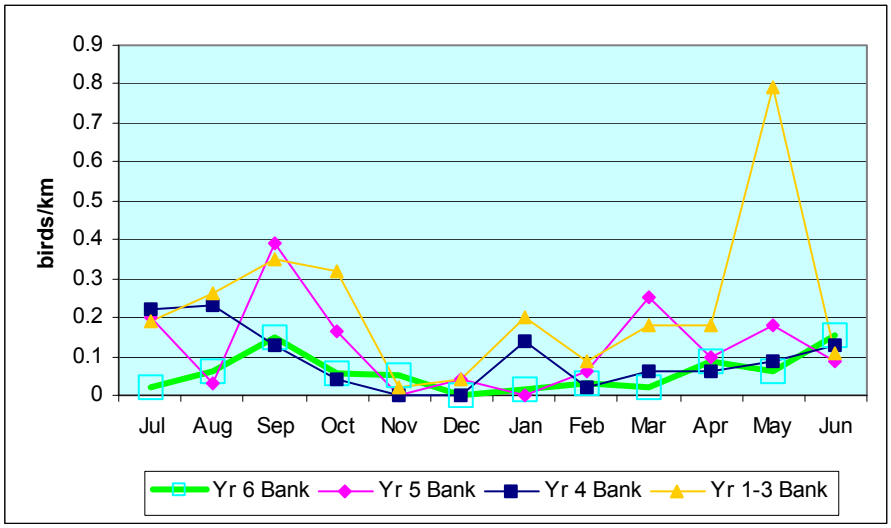

Figure 9 Gannet abundance on the Bank

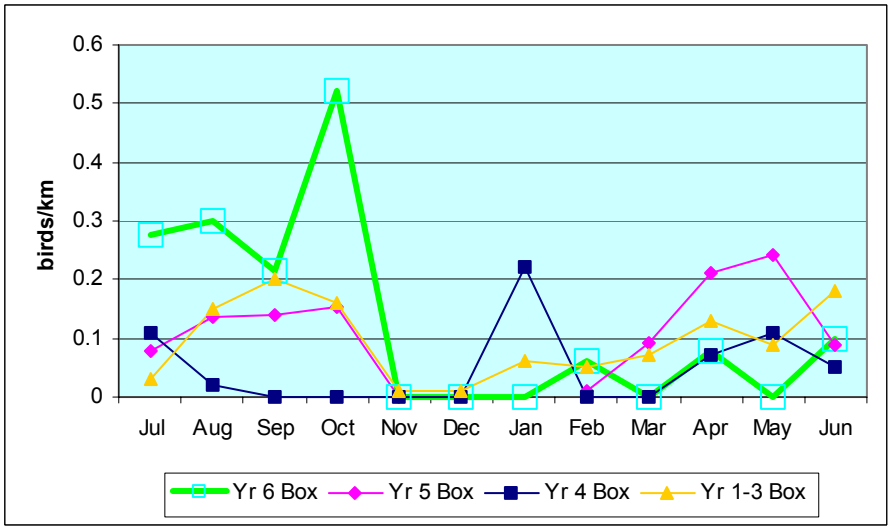

Figure 10 Gannet abundance on the Box

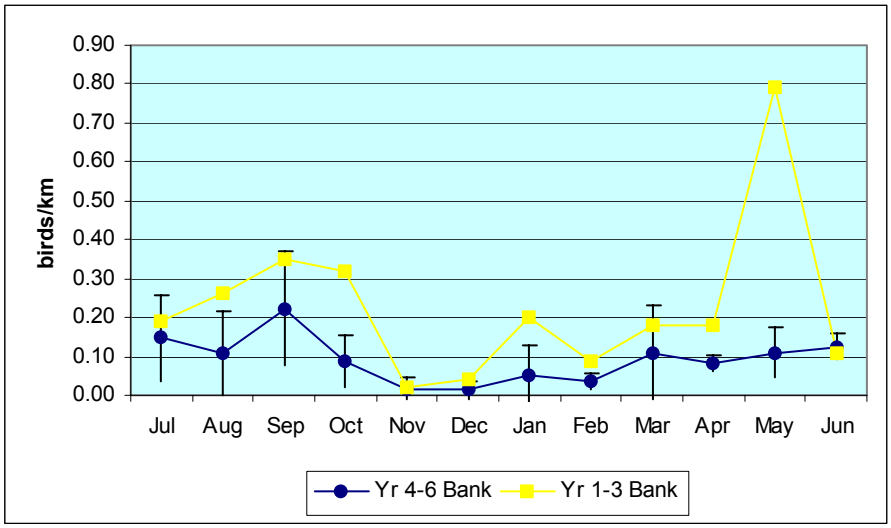

Figure 11 Gannet abundance on the Bank – compiled

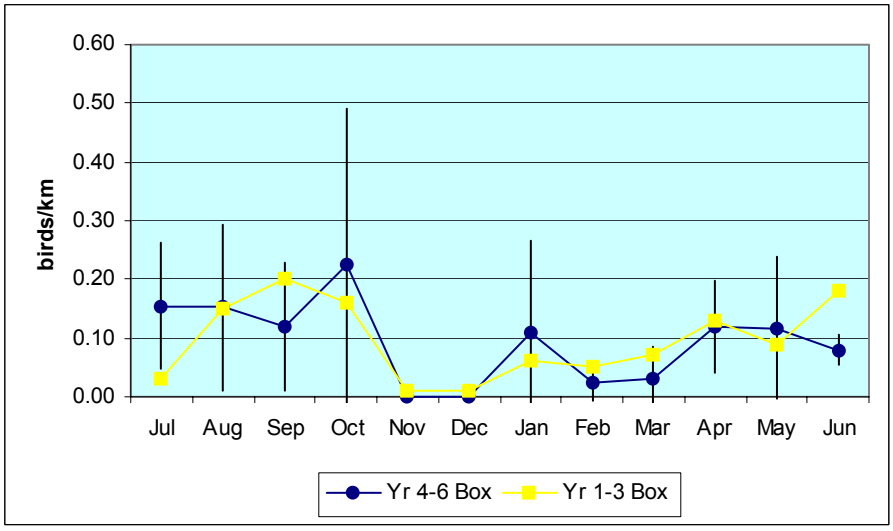

Figure 12 Gannet abundance on the Box – compiled

Guillemot densities on the bank this year were well above average (Figure 13) with three large peaks recorded (September, January and April). The peak recorded on the bank in September was paralleled on the box (Figure 14). When the data for this species is compiled into years 1 –3 and years 4 – 6, it can be seen that Guillemot were

recorded in higher numbers in years 4 –6, this is even more pronounced for the box data (Figure 15, Figure 16)

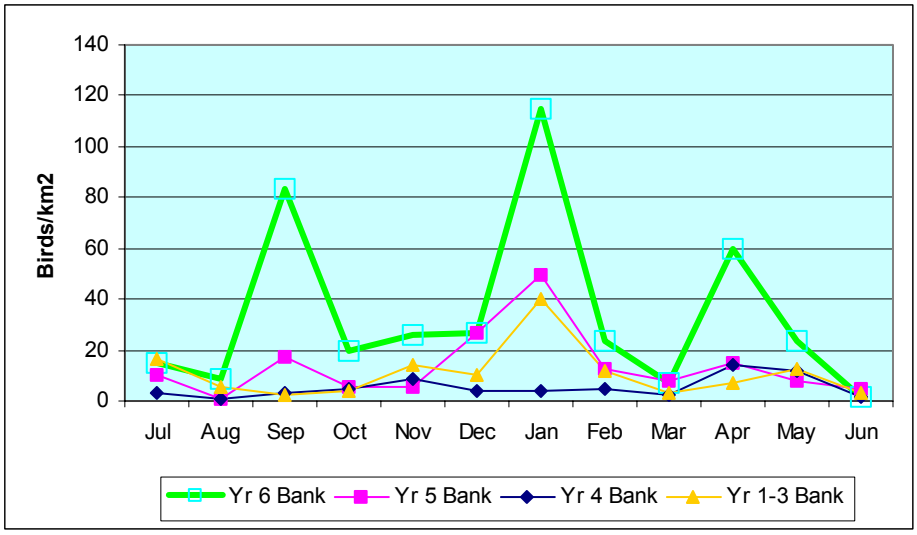

Figure 13 Guillemot density on the Bank

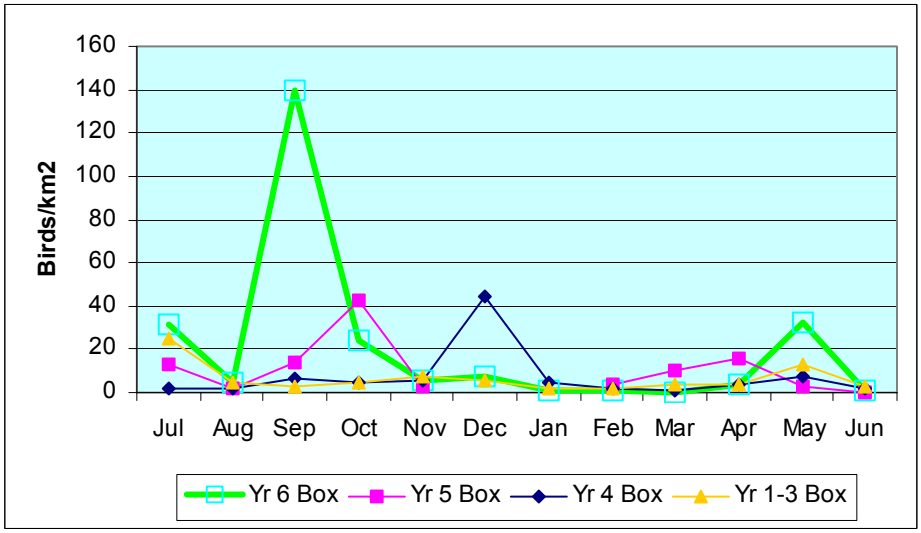

Figure 14 Guillemot density on the Box

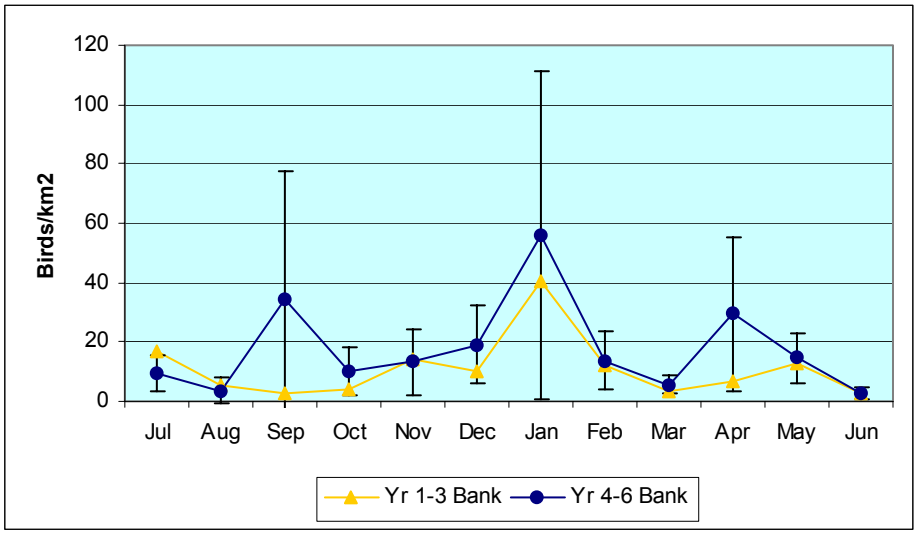

Figure 15 Guillemot density on the Bank – compiled

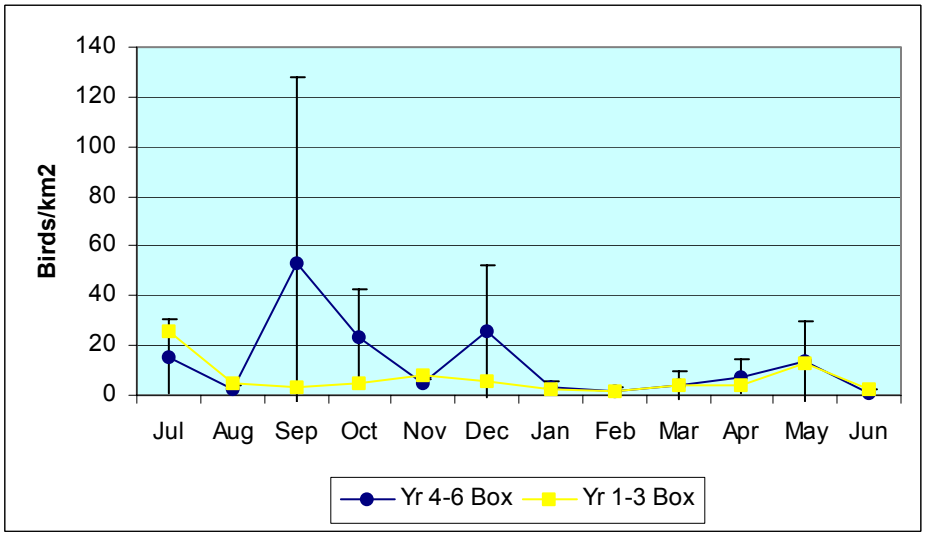

Figure 16 Guillemot density on the Box – compiled

Razorbill, the second Auk species, was found in above average densities this year on the bank (Figure 17). A pronounced September peak was recorded on the box (Figure 18), which pre-empted the large increase that was recorded on the bank a month later.

Densities of Razorbill were higher for the more recent compilation (Years 4 –6) than at the start of the monitoring programme for both the box and the bank. These values have been influenced to a large degree by this year's records (Figure 19, Figure 20).

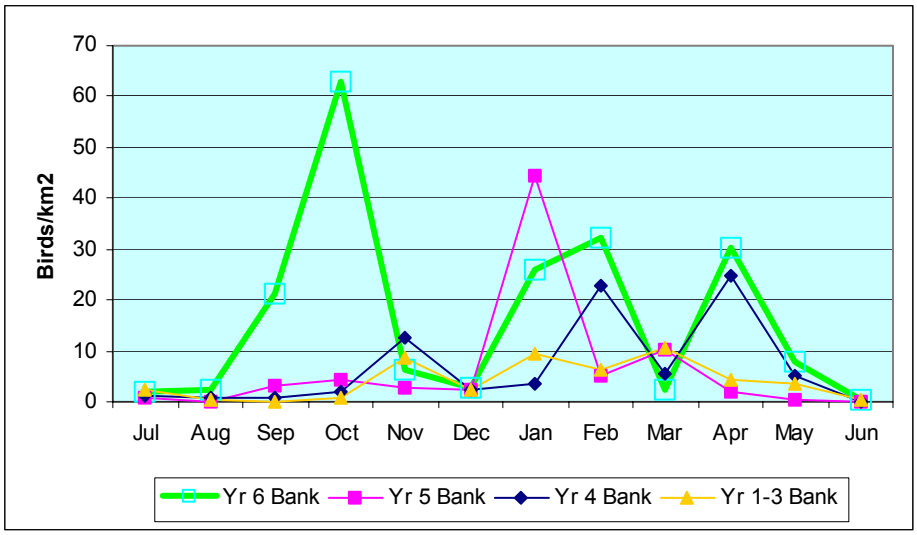

Figure 17 Razorbill density on the Bank

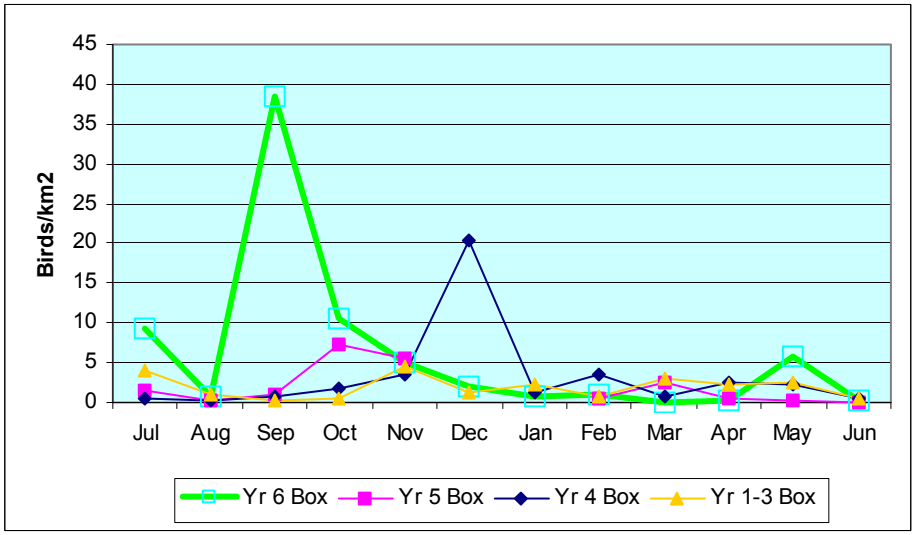

Figure 18 Razorbill density on the Box

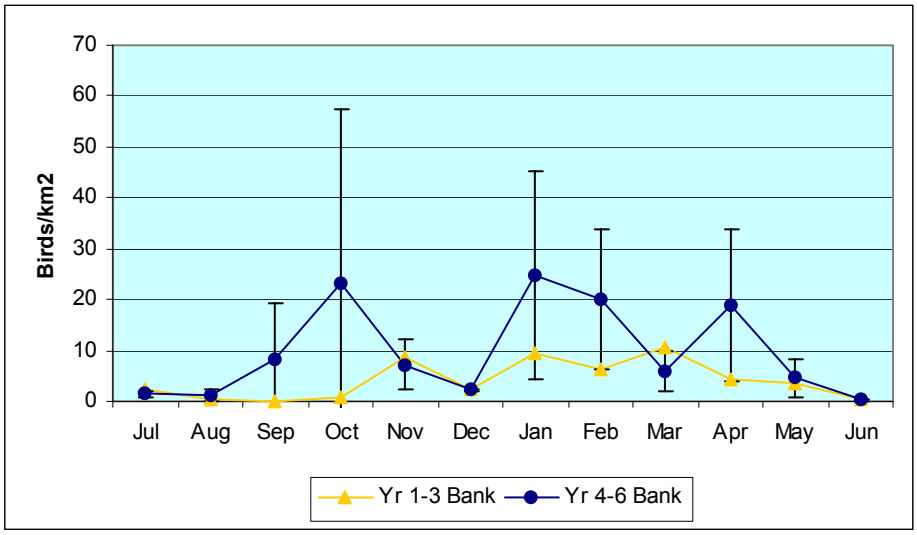

Figure 19 Razorbill density on the Bank – compiled

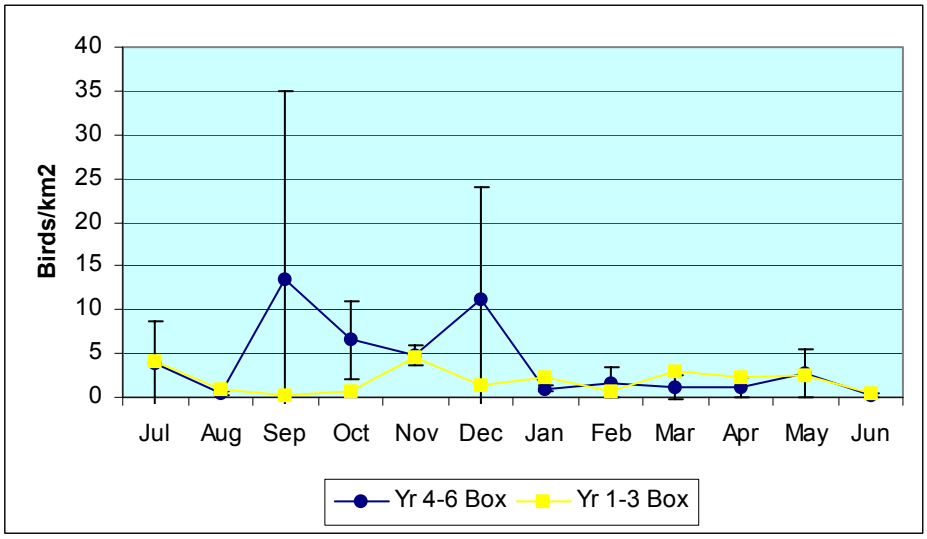

Figure 20 Razorbill density on the Box – compiled

Manx Shearwater is a seasonal species that is not encountered on the study area during the winter months. On the bank during Year 6 this species was recorded at densities within the parameters as recorded in previous years (Figure 21). However on the box part of the study area two peaks were recorded (Figure 22). When this year's

data is combined with previous years no apparent differences between the two compilations of data are evident in either the bank data or the box data (Figure 23, Figure 24).

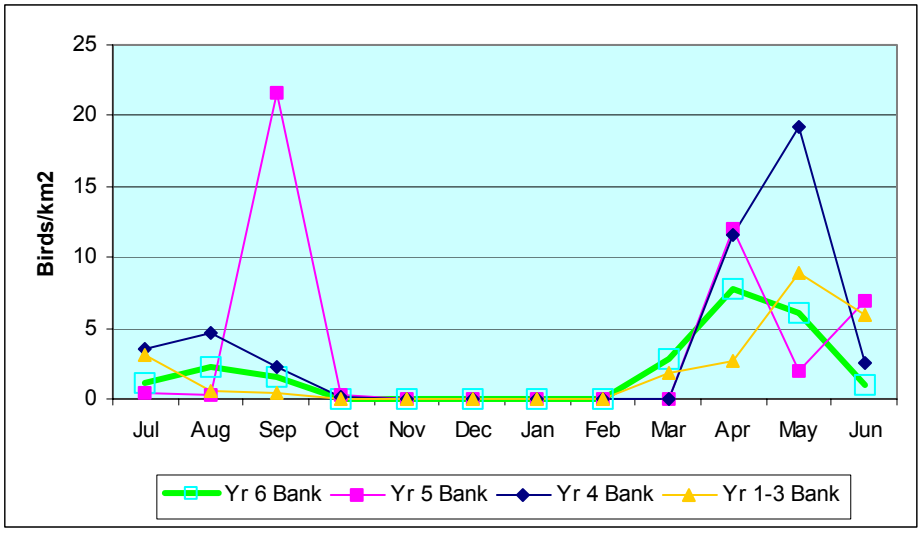

Figure 21 Manx Shearwater density on the Bank

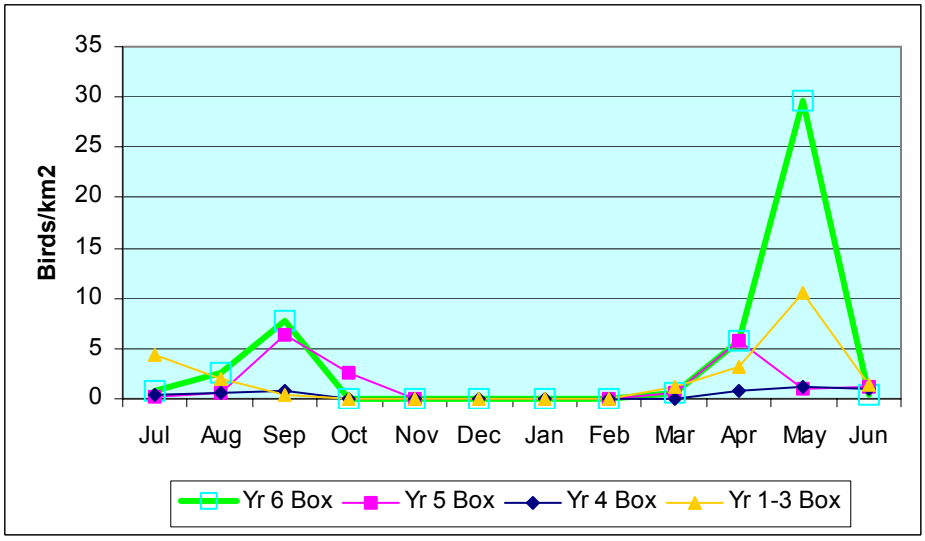

Figure 22 Manx Shearwater density on the Box

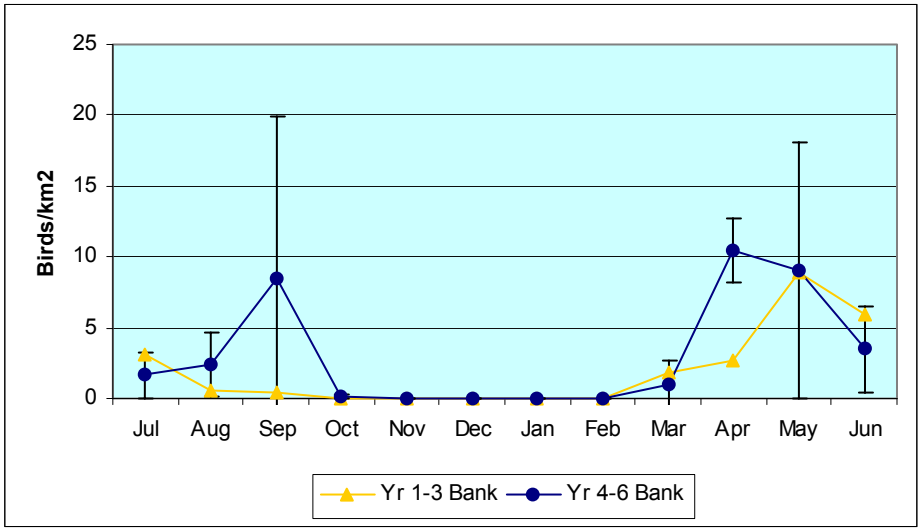

Figure 23 Manx Shearwater density on the Bank – compiled

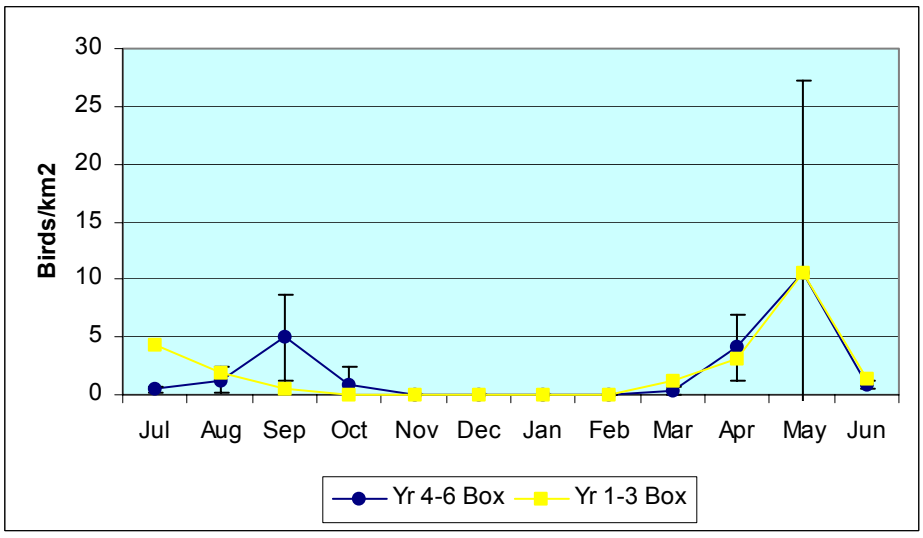

Figure 24 Manx Shearwater on the Box - complied

When compared to the previous two years Little Gull numbers seem to have returned to numbers that were recorded during the start of the surveying of seabirds on the Arklow Bank study area (Figure 25, Figure 26). On account of the strong numbers recorded during survey year's four and five, Little Gull on average is higher in the compiled category of Years 4 – 6 (Figure 27, Figure 28).

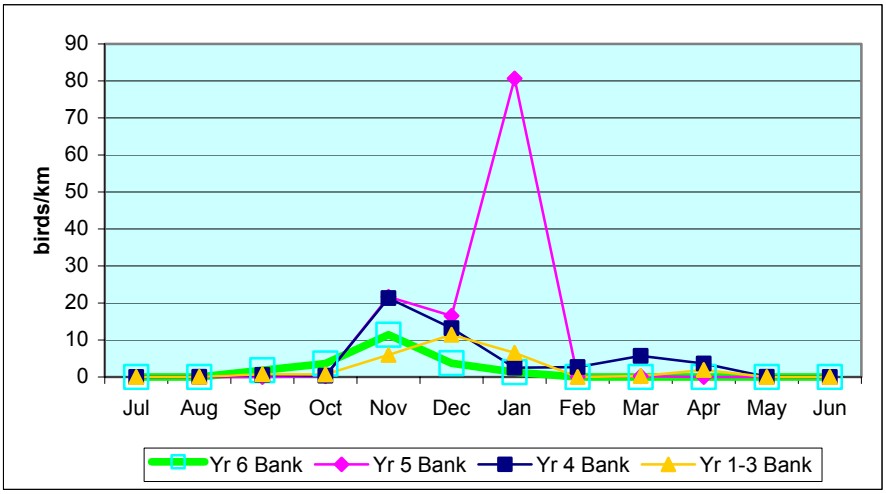

Figure 25 Little Gull abundance on the Bank

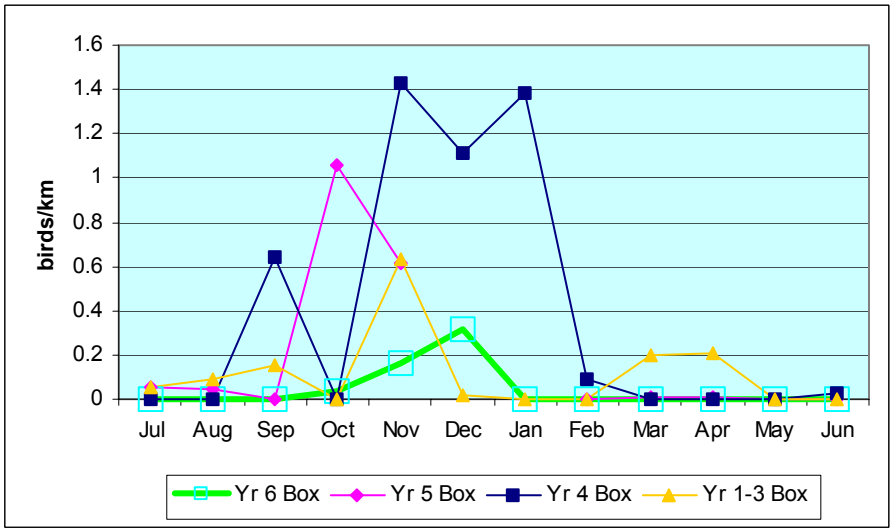

Figure 26 Little Gull abundance on the Box

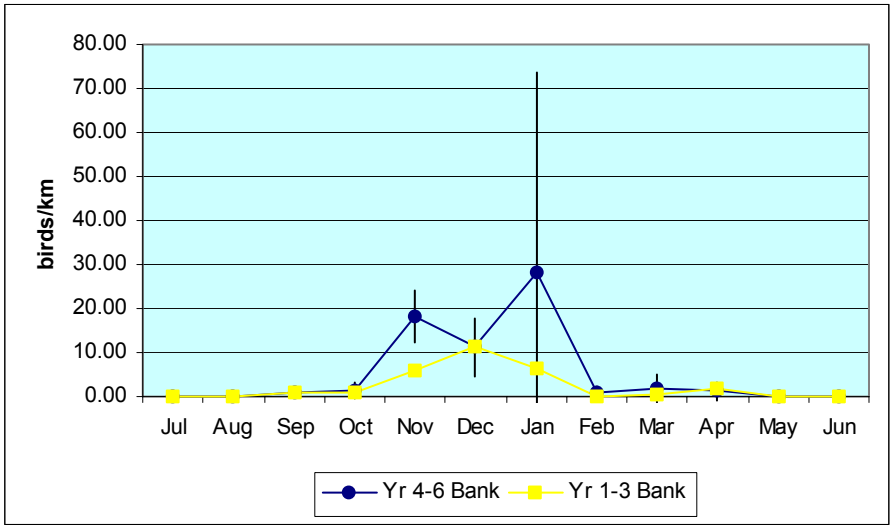

Figure 27 Little Gull abundance on the Bank – compiled

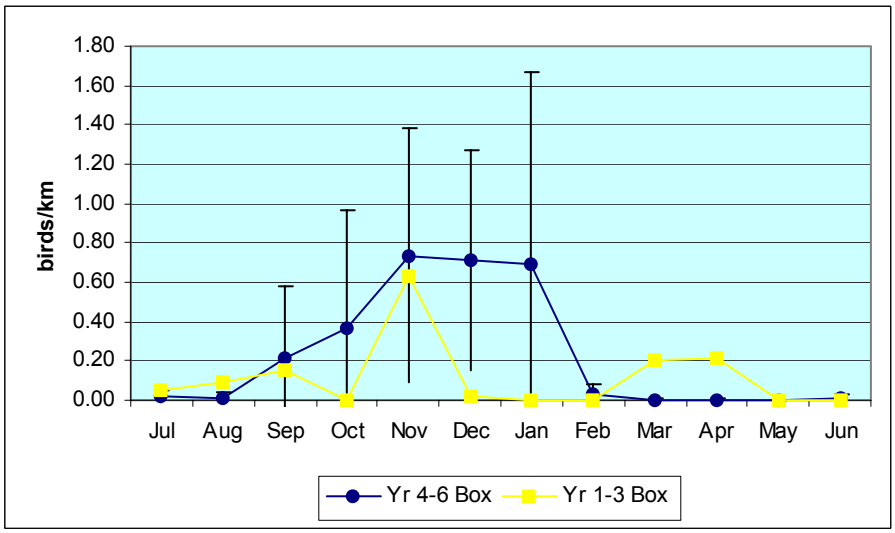

Figure 28 Little Gull abundance on the Box – compiled

On the whole year 6 recorded relatively high numbers of Kittiwake during the non-breeding season on the bank even though numbers were under-recorded during the single December survey (Figure 29). Kittiwake numbers over the box area were relatively low except for the September survey (Figure 30). When Kittiwake numbers

recorded during Years 1 – 3 are compared with Years 4 – 6 it is evident that more Kittiwake aggregated over the bank in higher numbers more recently (Figure 31). Kittiwake favour the bank over the box area. The compilation of the six years of data do not produce any clear picture for the box area (Figure 32).

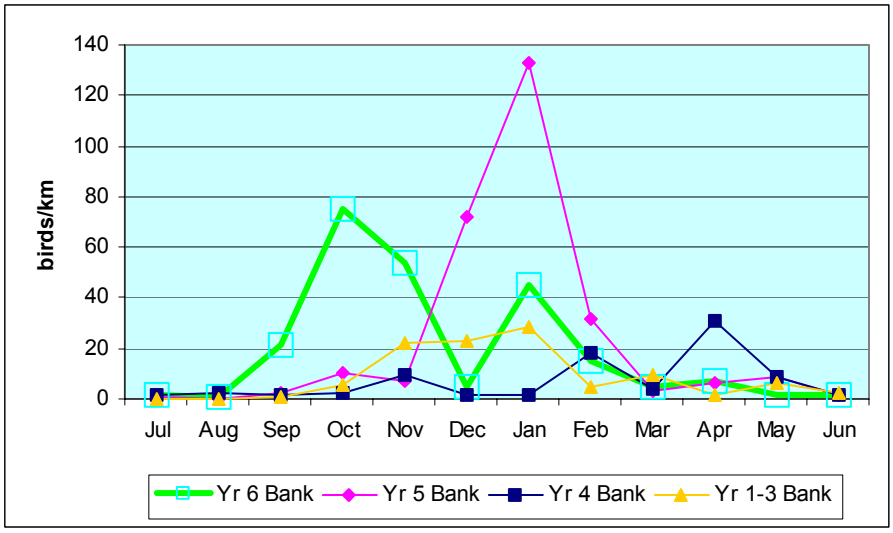

Figure 29 Kittiwake abundance on the Bank

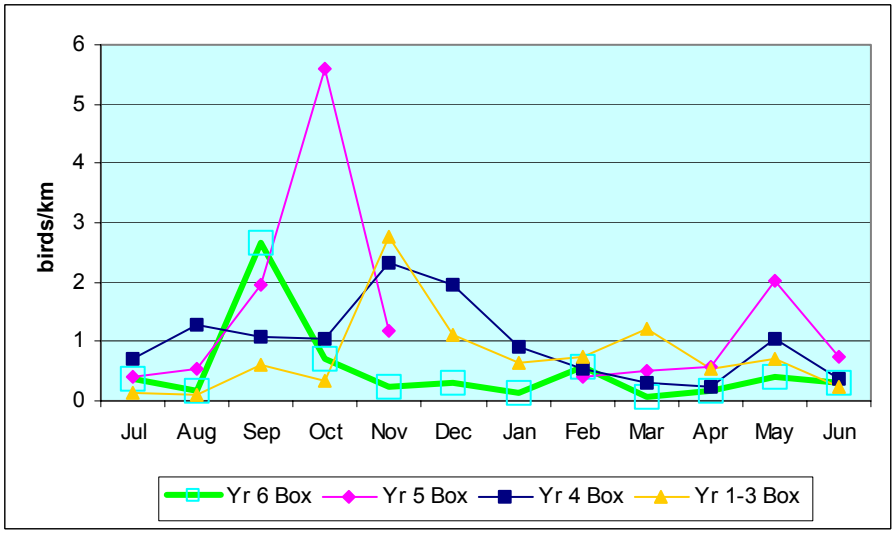

Figure 30 Kittiwake abundance on the Box

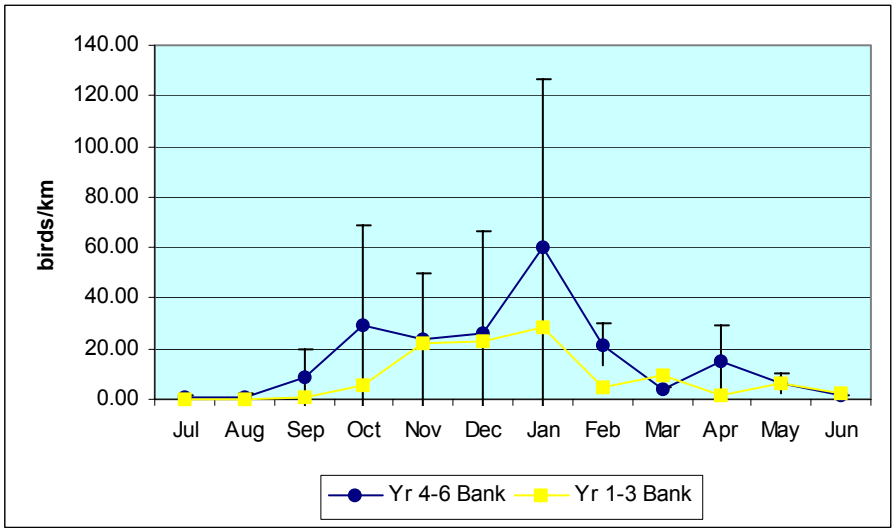

Figure 31 Kittiwake abundance on the Bank – compiled

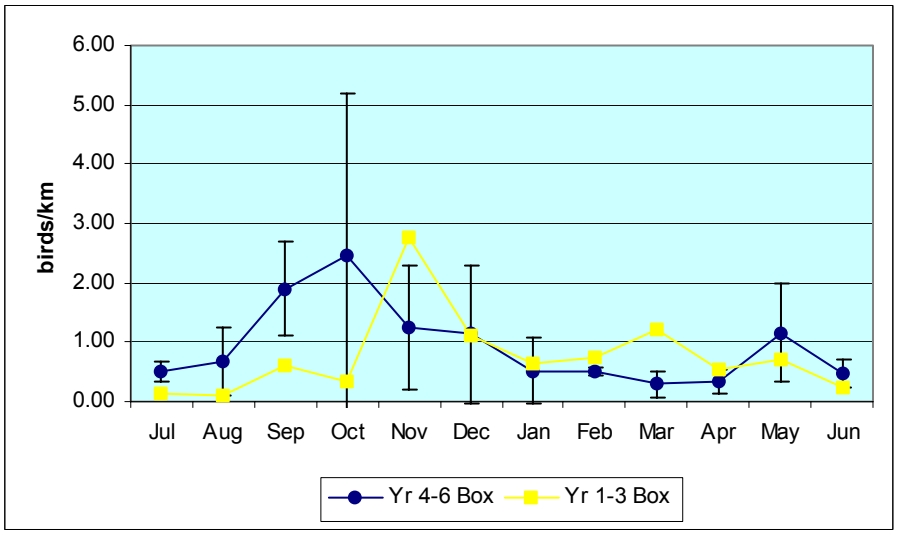

Figure 32 Kittiwake abundance on the Box – compiled

Common Gull occurred this winter on the bank at densities that was of an intermediate value when compared with the densities of Year 4 and Year 5 (Figure 33). Common Gull densities recorded on the box were more erratic with a peak recorded during the month of March (Figure 34). On both the bank and the box this

gull species has only occurred in the study area in significant numbers during the last three winters (Figure 35and Figure 36).

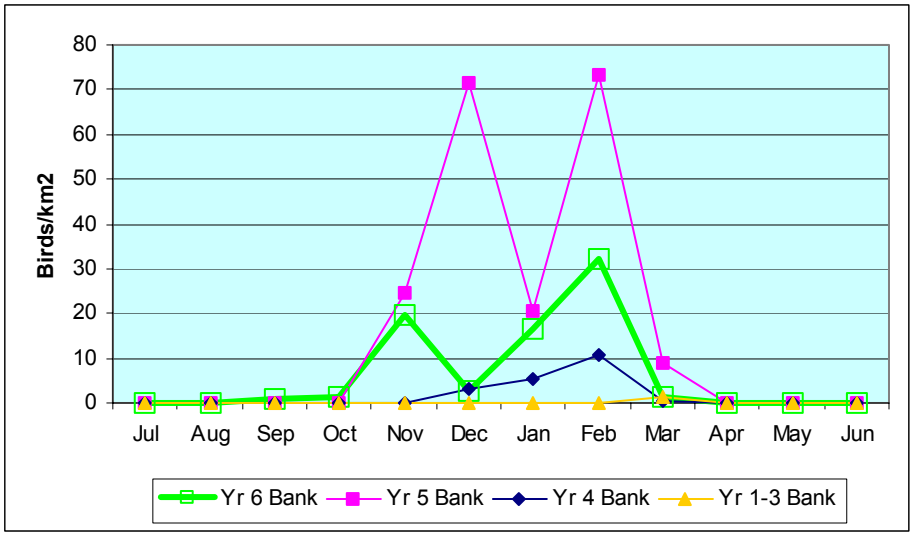

Figure 33 Common Gull density on the Bank

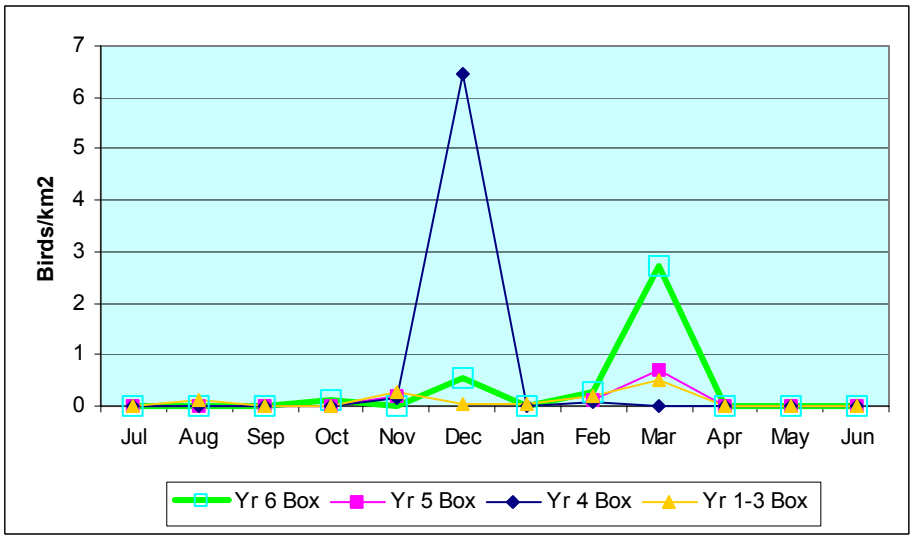

Figure 34 Common Gull density on the Box

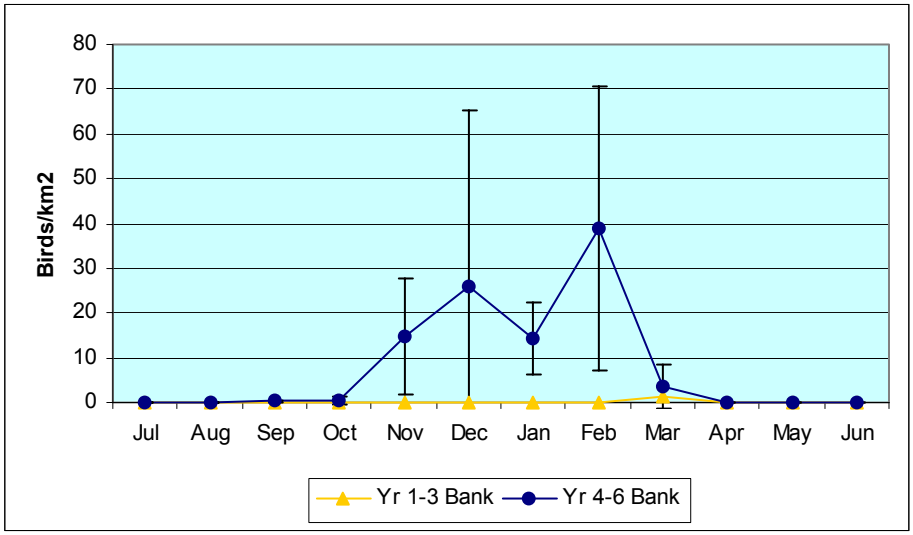

Figure 35 Common Gull density on the Bank – compiled

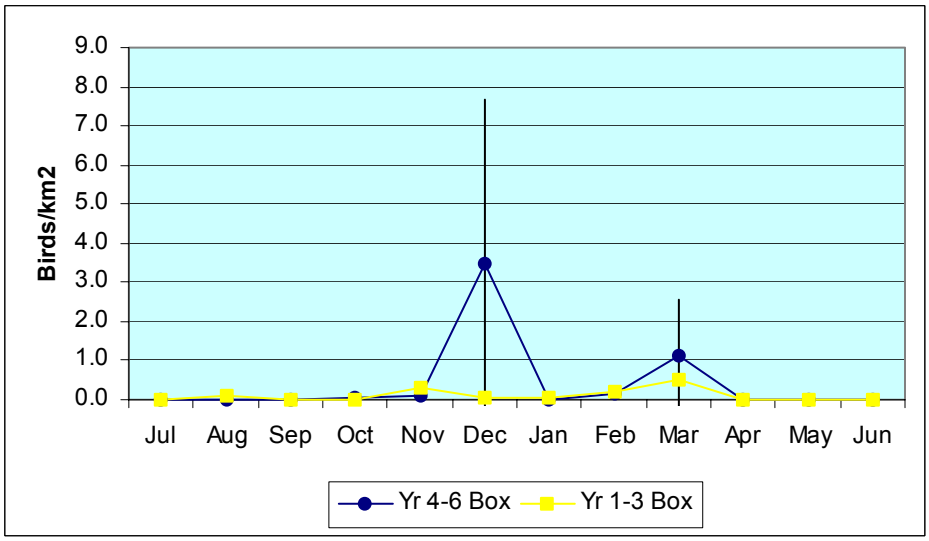

Figure 36 Common Gull density on the Box - compiled

As with most bird species recorded during the monitoring Shag is mainly concentrated on the Bank area over the winter period (Figure 37, Figure 38). Year 6 data for this species is generally in line with most recorded winters with the exception of Year 5, which was an exceptional year for many species.

In comparing the compiled data only a marginal overall increase was noted for the Years 4 – 6 for the bank with no clear pattern emerging for the box data (Figure 39, Figure 40).

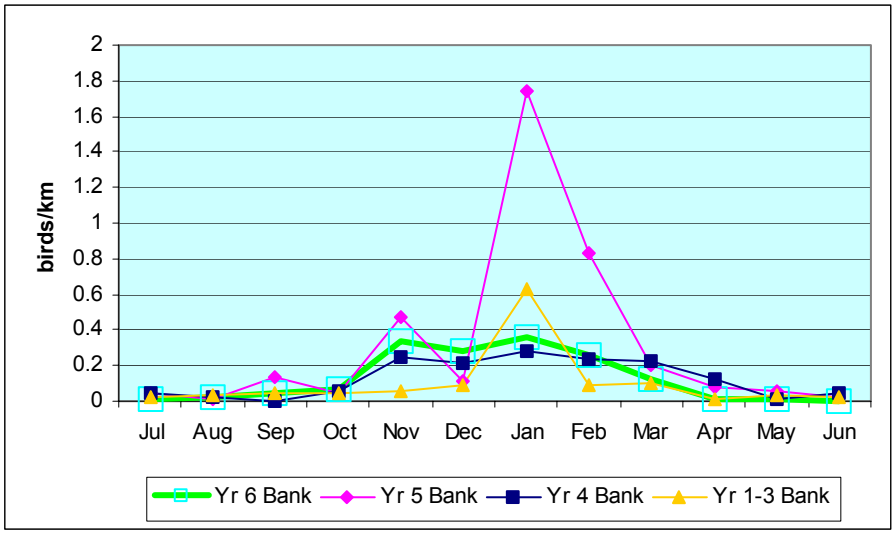

Figure 37 Shag abundance on the Bank

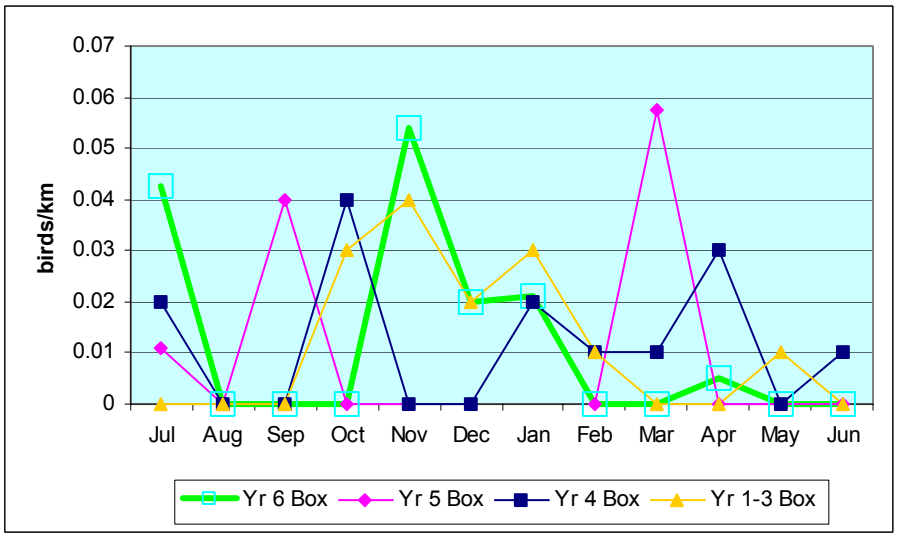

Figure 38 Shag abundance on the Box

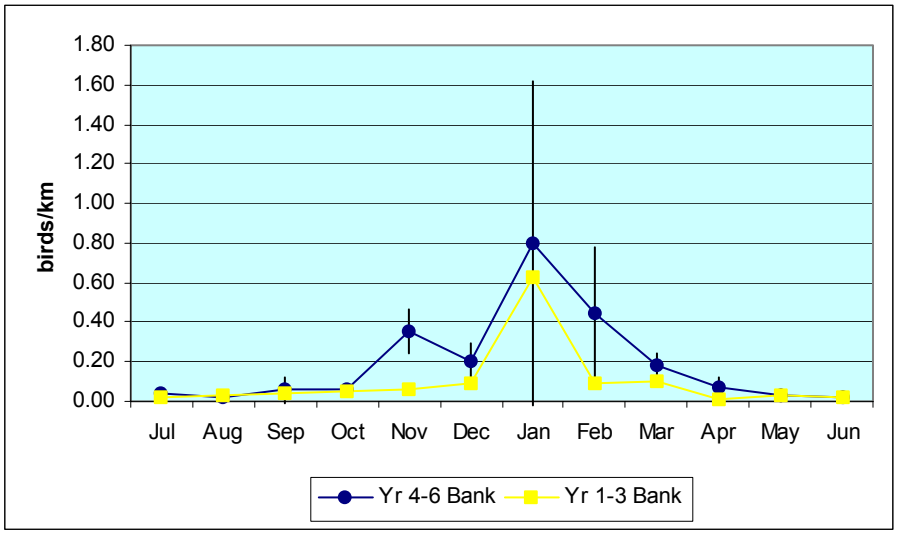

Figure 39 Shag abundance on the Bank – compiled

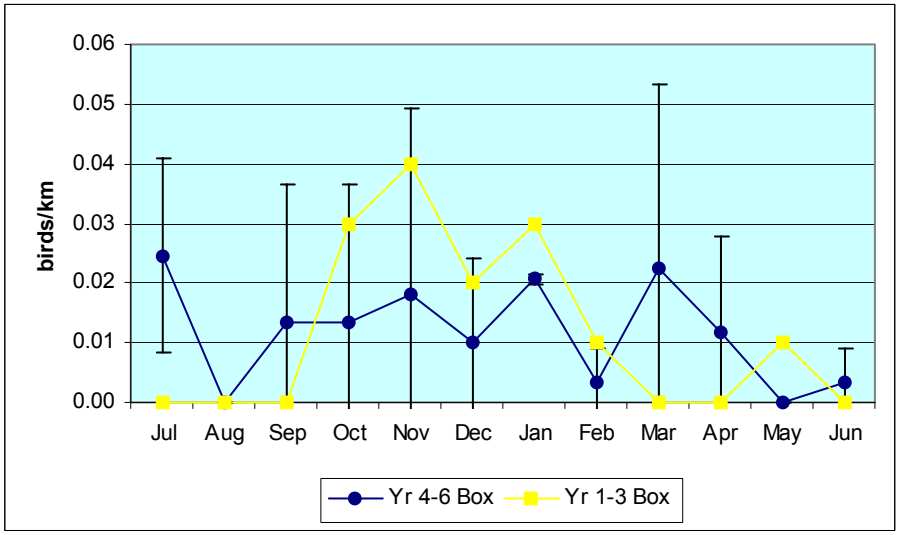

Figure 40 Shag abundance on the box – compiled

The remaining species are treated collectively as due to their low abundances, no significant patterns of change can described at this stage.

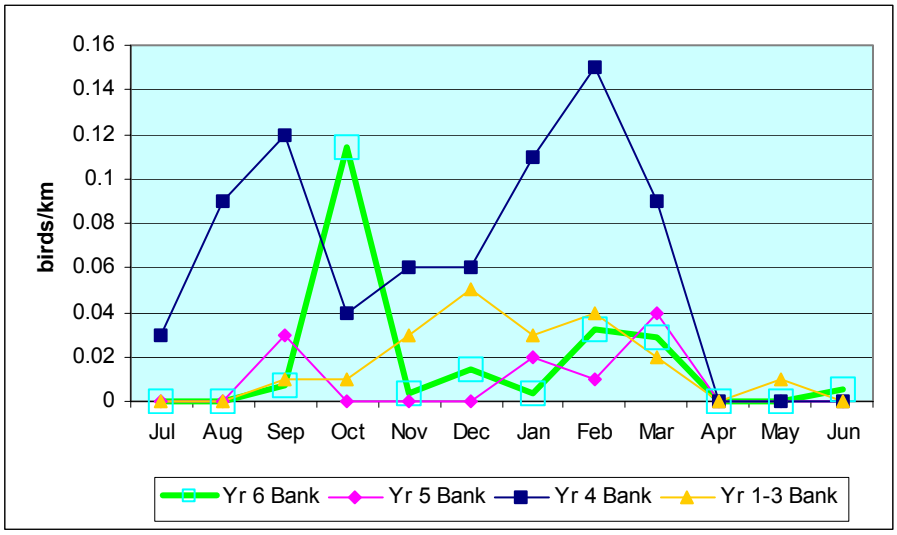

Figure 41 Herring Gull abundance on the Bank

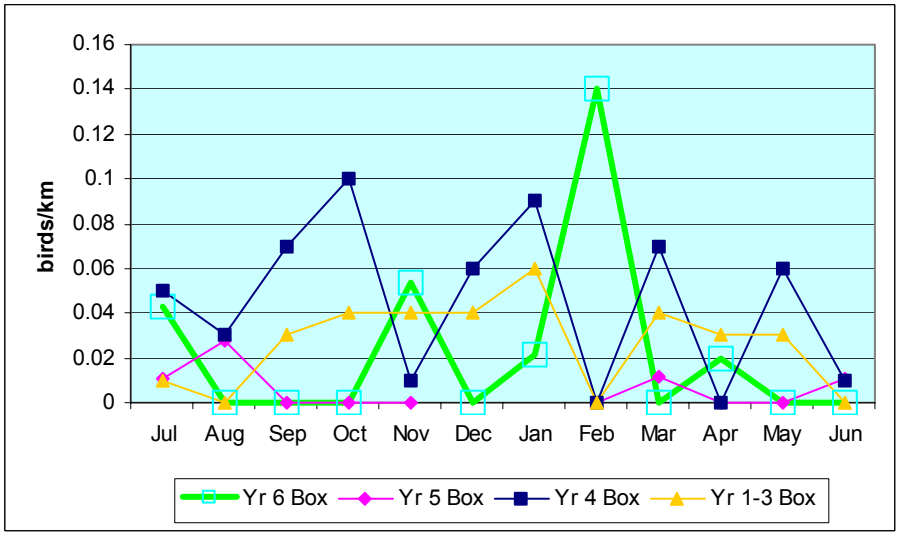

Figure 42 Herring Gull abundance on the Box

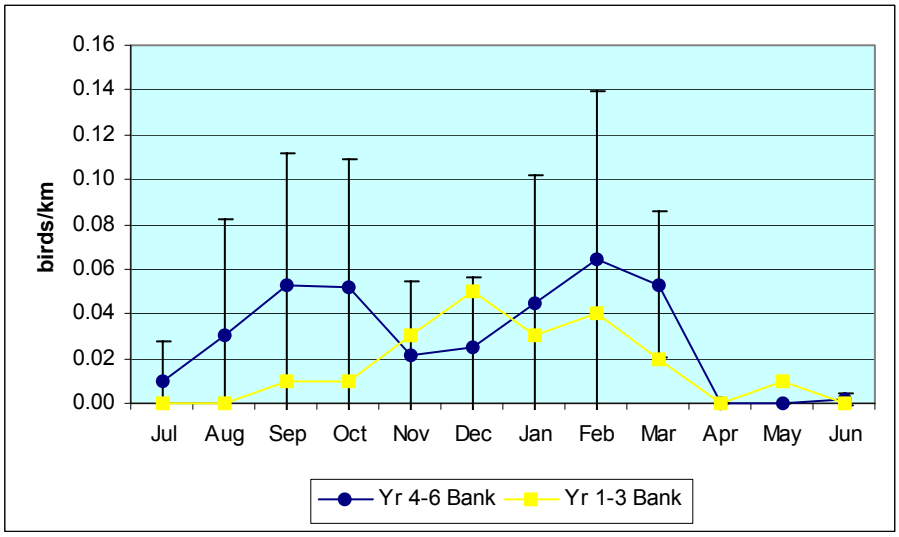

Figure 43 Herring Gull abundance on the Bank – compiled

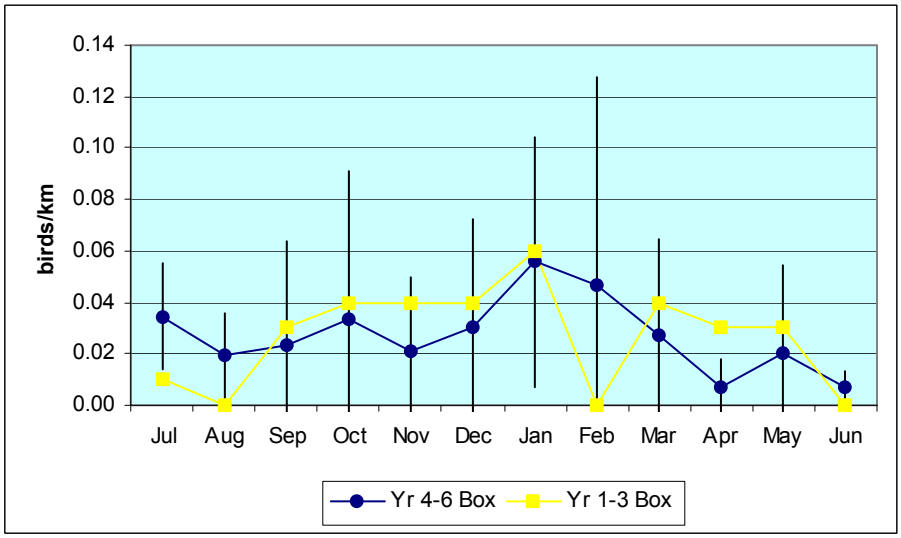

Figure 44 Herring Gull abundance on the box – compiled

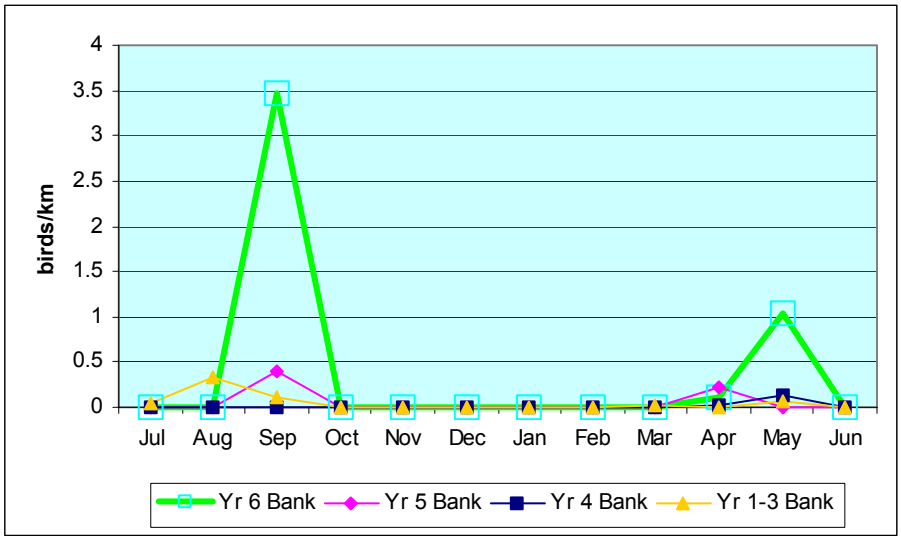

Figure 45 Common Tern abundance on the Bank

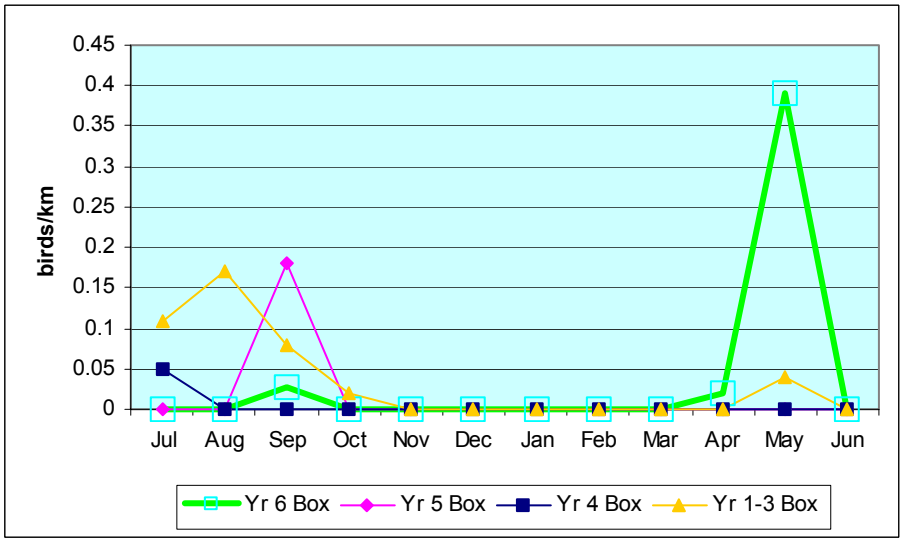

Figure 46 Common Tern abundance on the box

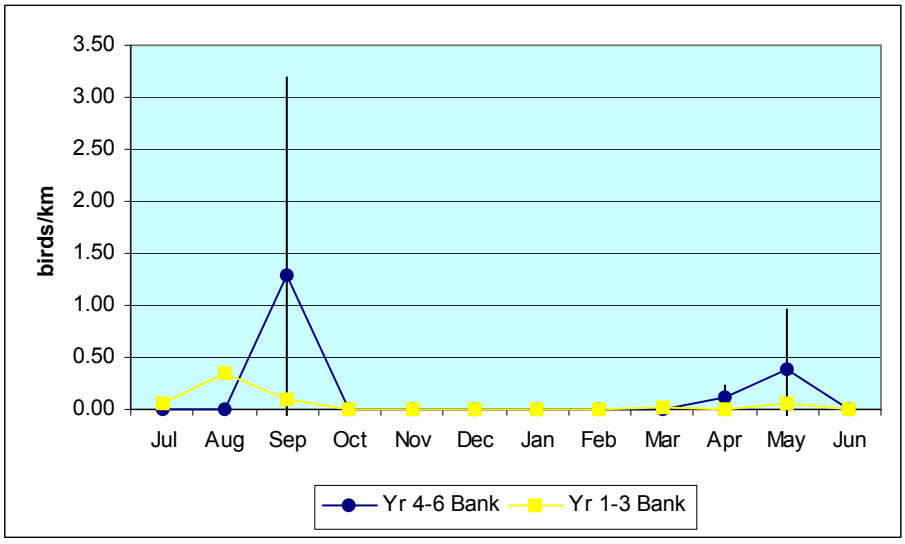

Figure 47 Common Tern abundance on the Bank – compiled

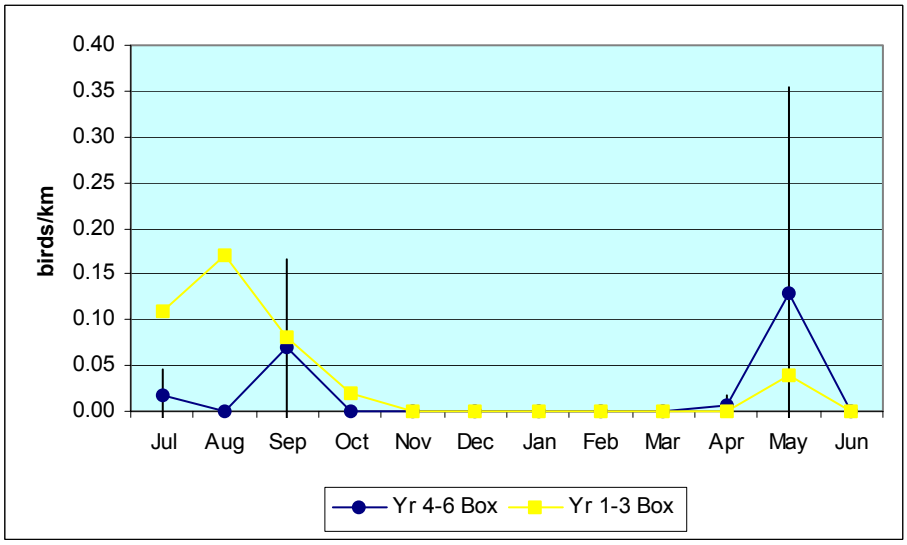

Figure 48 Common Tern abundance on the Box – compiled

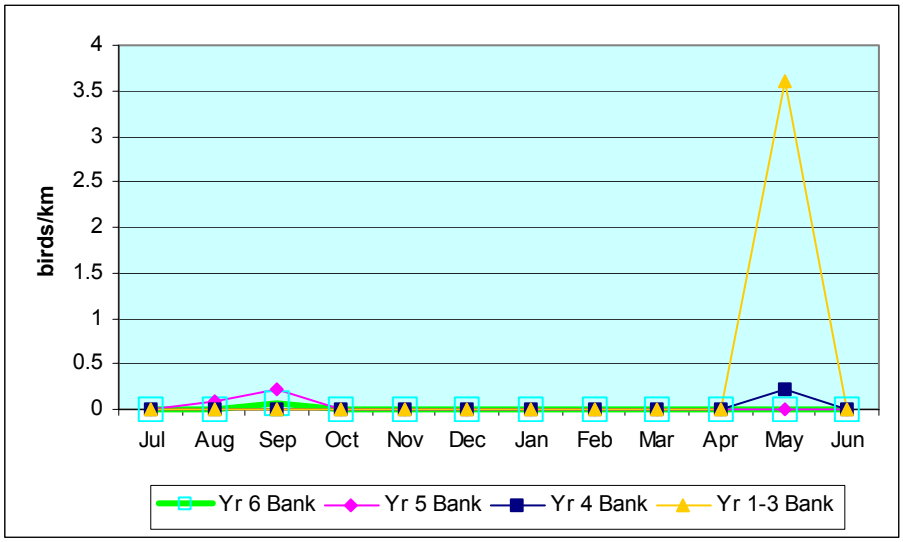

Figure 49 Arctic Tern abundance on the Bank

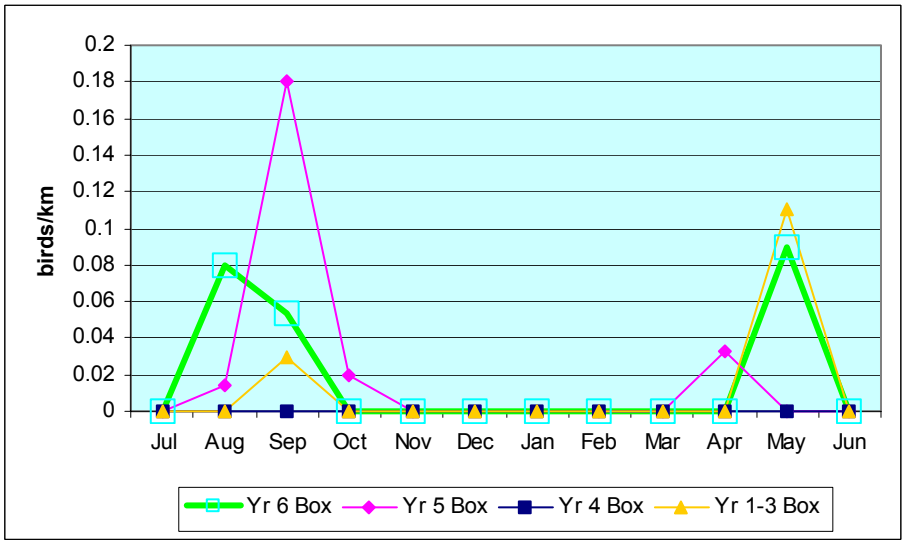

Figure 50 Arctic Tern abundance on the Box

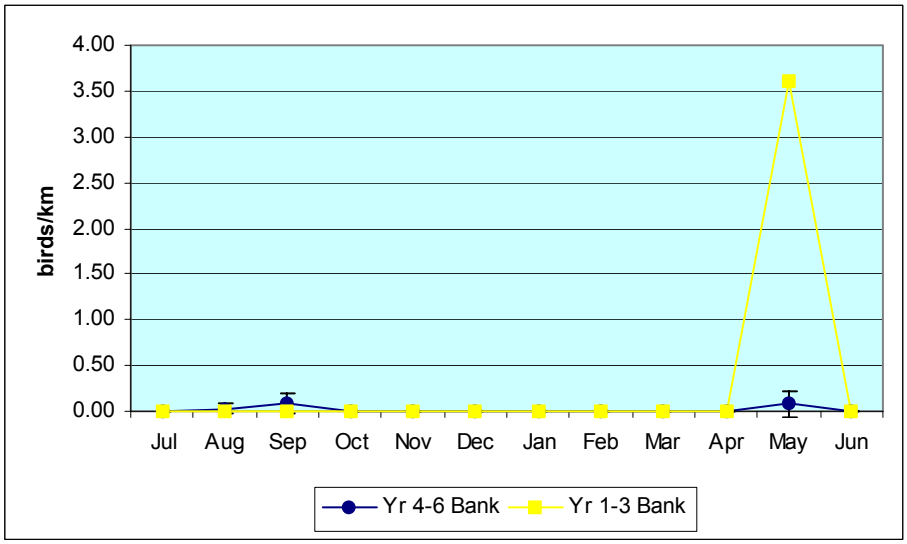

Figure 51 Arctic Tern abundance on Bank – compiled

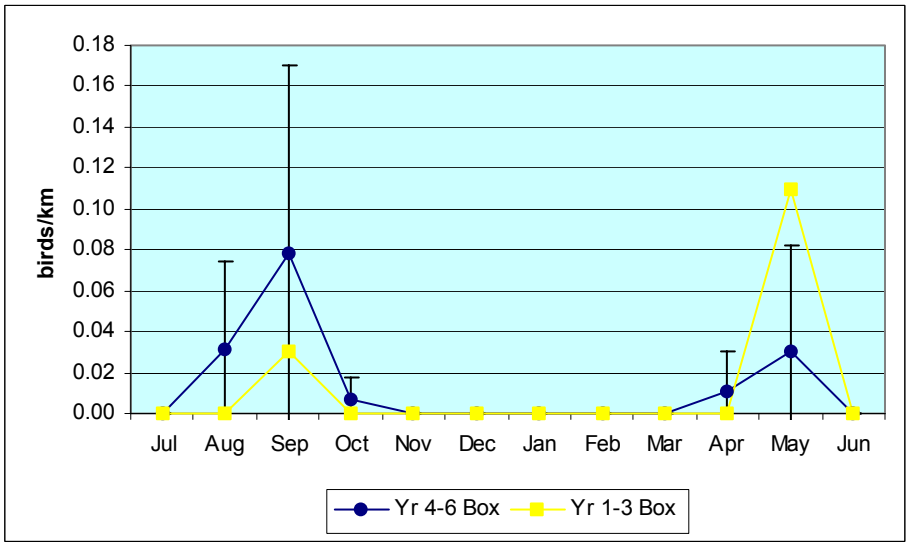

Figure 52 Arctic Tern abundance on the Box – compiled

Marine Mammal monitoring

Although grey seals and Risso's dolphins were found occasionally along the Arklow Bank the main marine mammal that was regularly noted was the harbour porpoise. Figure 53 compares the abundance of harbour porpoises recorded on the Arklow Bank with previous years' data. High peaks were recorded during the months of August and September. Abundances were back to usual levels by October with the next main increase occurring in June.

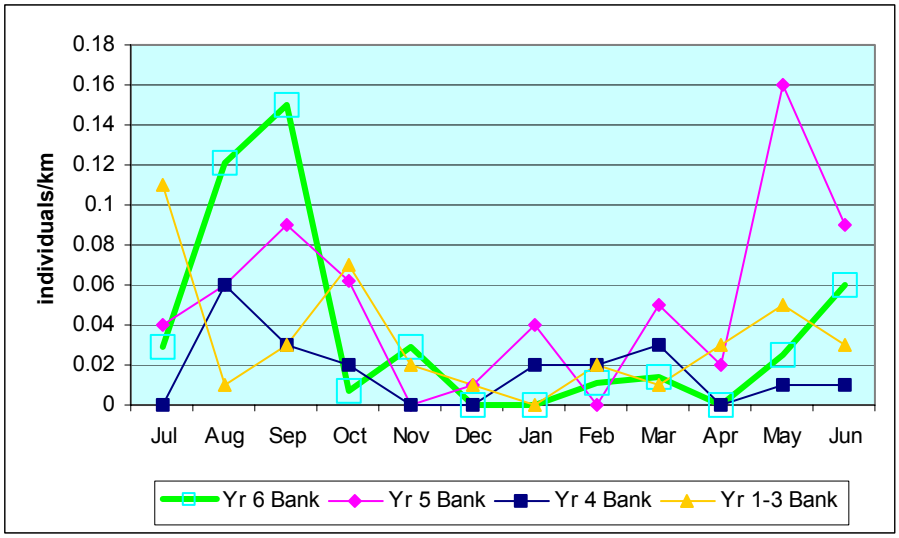

Figure 53 Harbour porpoise abundance on the Bank

This aforementioned peak was also recorded in the area around the Arklow Bank i.e. the box area (Figure 54). In fact this is the highest value recorded heretofore for this section of the study area.

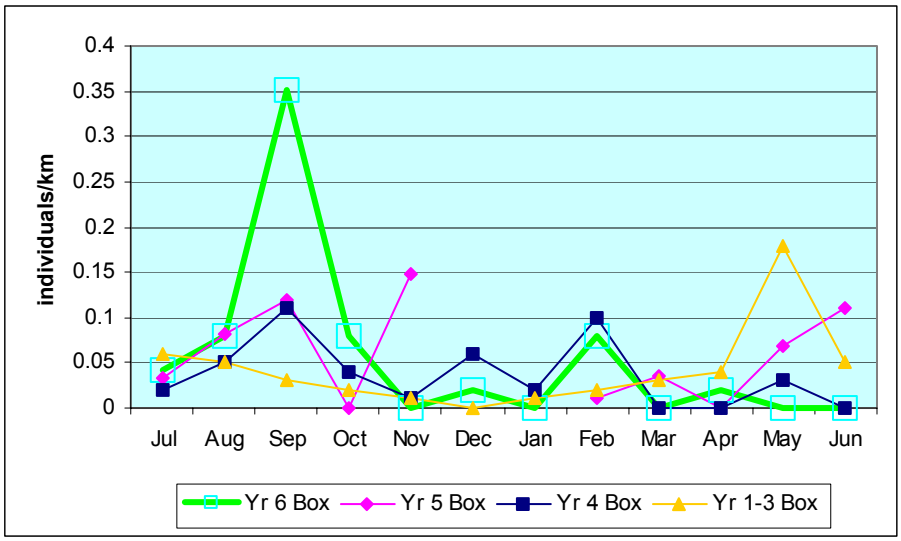

Figure 54 Harbour porpoise abundance on the Box area

Harbour Porpoise seem to favour the box section of the study area. In comparing the two compiled datasets of years no apparent pattern was discernable for the abundances occurring on the bank (Figure 55). For the box, there may be a slight but significant increase in abundances during the autumn and winter months (Figure 56).

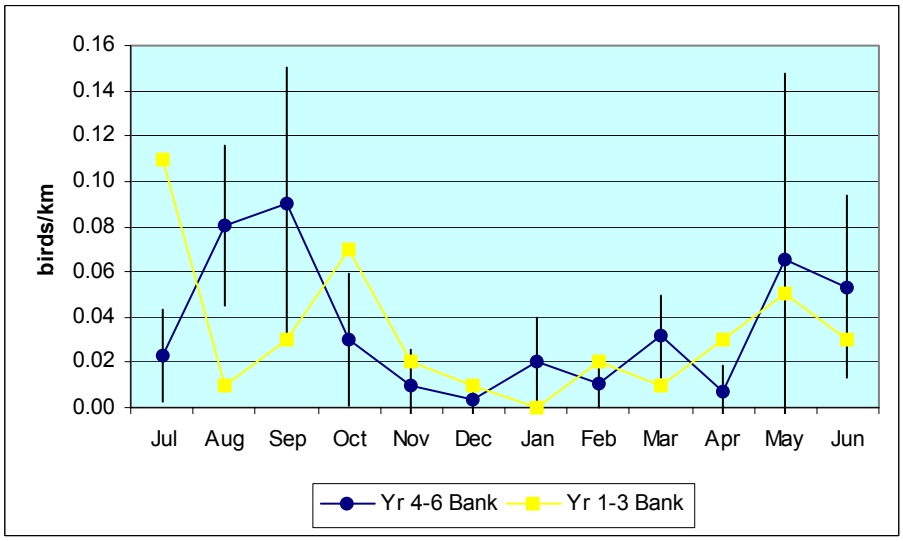

Figure 55 Harbour Porpoise abundance on the Bank – compiled

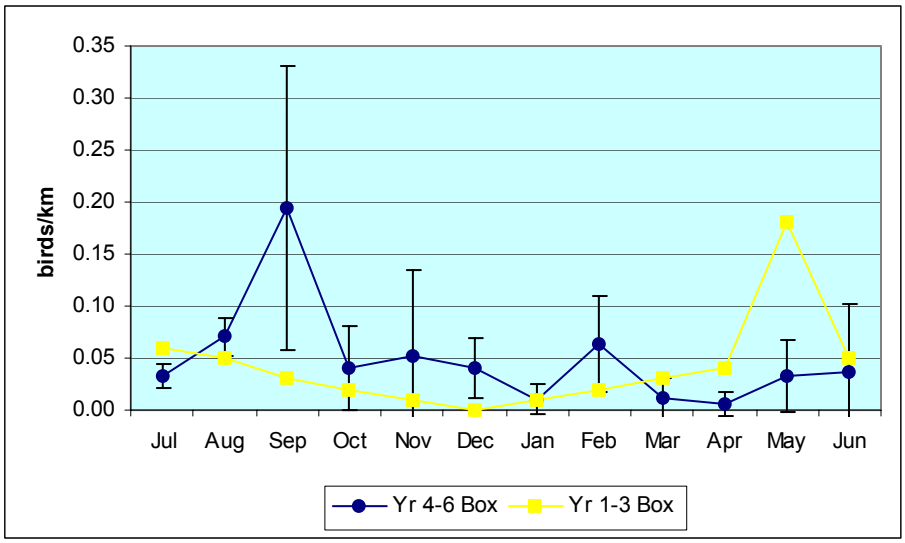

Figure 56 Harbour Porpoise abundance on the Box – compiled

Plankton Sampling

In total 10 plankton samples were taken on a monthly basis. Due to inclement weather it was not possible to carry out the September or March sampling. The sampling sites, numbered one to 10 are located along the bank with site no.1 being the most northerly through to site No 10, the most southerly.

Table 3 presents the preliminary statistics concerning the overall numbers of zooplankton found per site per month as well as a measure of the diversity of the plankton i.e. the number of species or group of species found at each site per month. This data is presented in graphical form where it can be seen that mean individuals captured during sampling are usually at its lowest at the middle section of the bank (Figure 57). However the diversity (i.e. the amount of different species or species groups) seem to be rather uniform over the length of the bank (Figure 58).

April, August and May plankton sampling proved to be the most productive in terms of individual plankton numbers (Figure 59). Again, in a similar fashion to the site-by-site analysis, the numbers of plankton groups found did not vary to any great degree on a month-by-month basis (Figure 60).

Table 3 Summary statistics of the zooplankton data

Site No.	Month	Individuals	Species/group count
Site 1	July	16	6
	August	84	4
	October	2	1
	November	8	6
	December	12	7
	January	1	1
	February	29	9
	April	22	5
	May	214	12
	June	41	10
Site 2	July	35	6
	August	339	6
	October	44	6
	November	7	4
	December	15	5
	January	21	7
	February	29	8
	April	413	9
	May	419	8
	June	151	15
Site 3	July	73	7
	August	546	8
	October	8	3
	November	75	7
	December	15	4
	January	9	3
	February	62	7
	April	186	11
	May	207	6
	June	58	10
Site 4	July	23	5
	August	48	5
	October	7	1
	November	28	5
	December	2	0
	January	4	2
	February	6	5
	April	163	10
	May	33	6
	June	38	6
Site 5	July	14	6
	August	70	8
	October	7	2
	November	5	3
	December	5	3

	January	1	1
	February	43	8
	April	20	6
	May	29	5
	June	18	7
Site 6	July	30	5
	August	112	8
	October	13	6
	November	32	7
	December	32	6
	January	1	1
	February	15	5
	April	65	7
	May	104	7
	June	34	9
Site 7	July	37	6
	August	43	8
	October	10	5
	November	64	6
	December	10	4
	January	0	0
	February	5	3
	April	59	10
	May	20	3
	June	98	8
Site 8	July	35	6
	August	199	8
	October	68	9
	November	90	7
	December	86	7
	January	3	3
	February	32	10
	April	863	15
	May	113	6
	June	76	11
Site 9	July	29	7
	August	229	11
	October	27	7
	November	237	7
	December	69	7
	January	4	2
	February	5	2
	April	477	10
	May	194	5
	June	156	9
Site 10	July	61	6
	August	59	9
	October	22	6
	November	211	5
	December	11	3

January	0	0
February	10	5
April	298	15
May	47	5
June	34	5

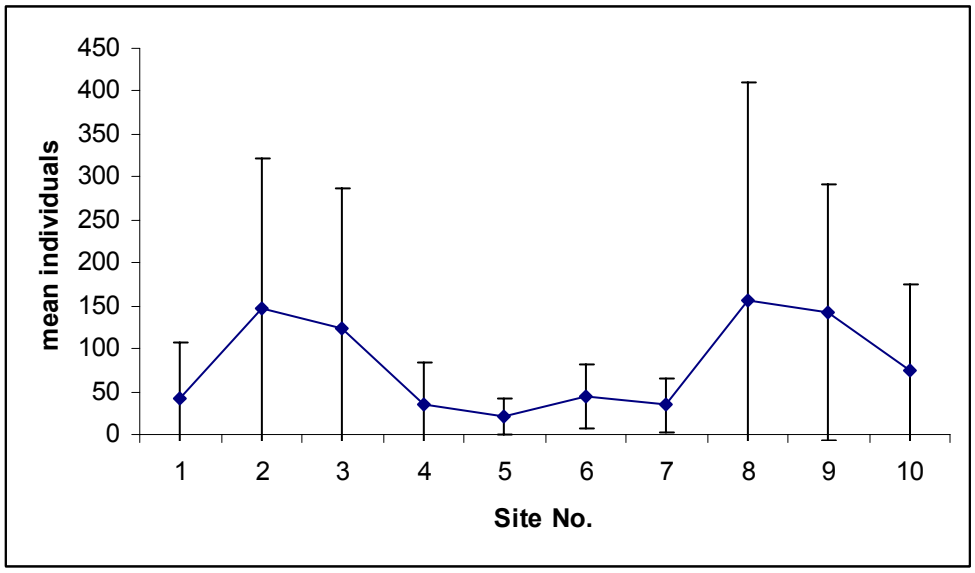

Figure 57 Mean individuals (± SD) of zooplankton per sample site

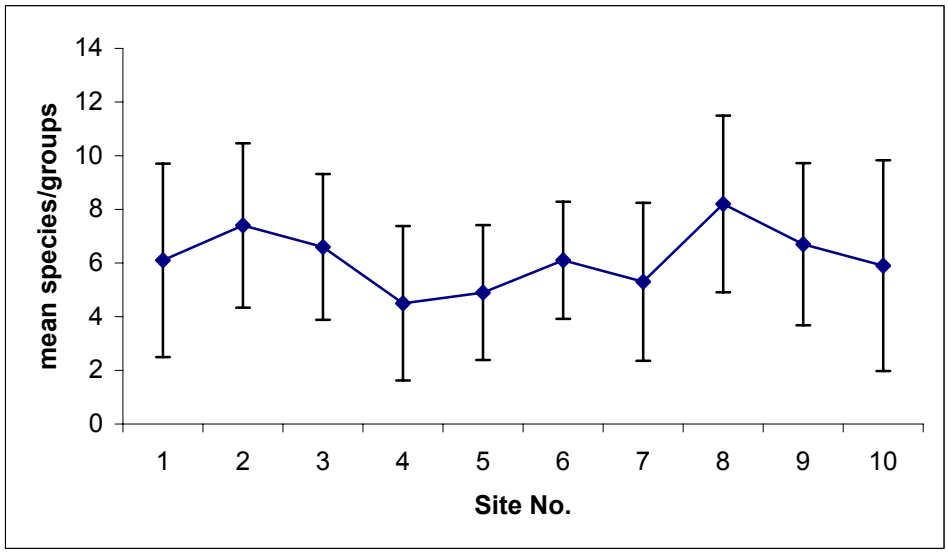

Figure 58 Species/group richness (± SD) of zooplankton per sample site

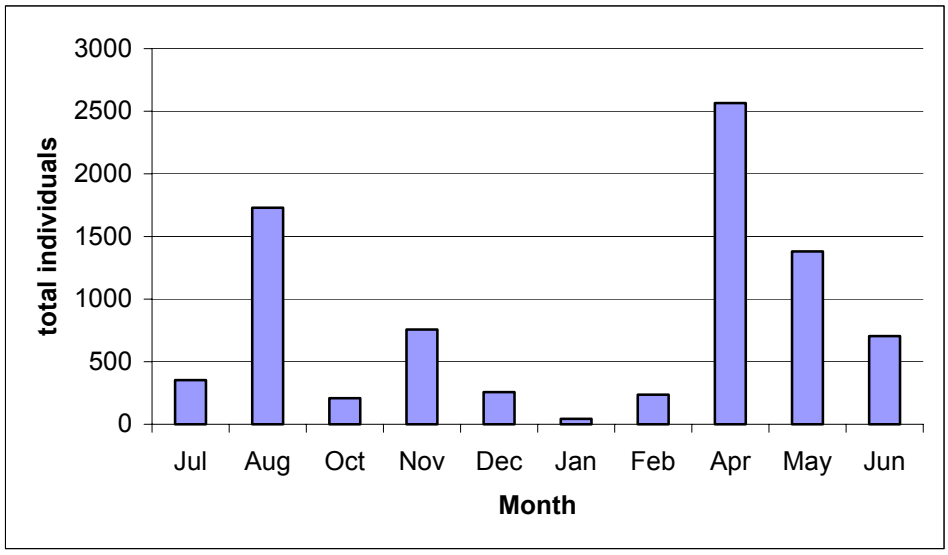

Figure 59 Total number of individuals for each month of sampling

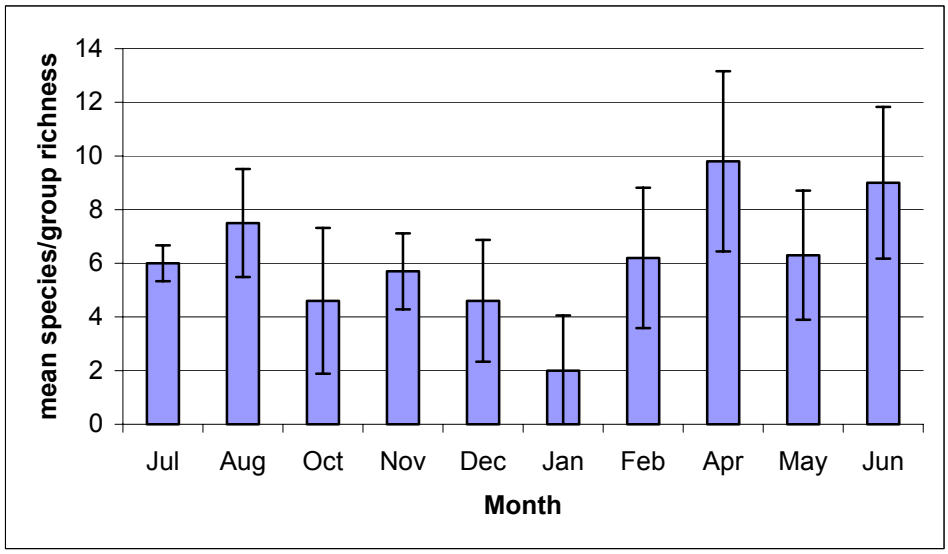

Figure 60 Mean count (+SD) of species/group richness

6 CONCLUSION

This document reports on 12 months of data and 11 of these months have been monitored on an interim basis. Critically this year's monitoring is the sixth year of intensive monitoring in a row and also relates to the third year of post construction data. This is the first report that compares the pre-construction seabird and marine mammal (Years 1 – 3) with the post-construction data (Years 4 – 6). Preliminary analyses of the species that are regularly present in the study area in numbers that are large enough for the investigation of change in the pattern of usage, are carried out. Red-throated Diver, Gannet and Fulmar appear to have decreased in abundance with Guillemot, Razorbill, Kittiwake and Common Gull appearing to have increased in numbers. Before a statement of fact can be made whether a species of seabird has increased or decreased in the study area both the methodology and values have to be validated to ensure that the data collected from year to year are of a compatible nature for rigorous statistical testing to be carried out on them.

7 REFERENCES

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