

Agenda Item 4.5: Report on seismic disturbance and recommendations

Progress report from UK by the Joint Nature Conservation Committee (JNCC) on the implementation of resolution 4 to develop a monitoring system that will enable adaptive management of seismic survey activities

Submitted by: United Kingdom



ASCOBANS

NOTE:

IN THE INTERESTS OF ECONOMY, DELEGATES ARE KINDLY REMINDED TO BRING THEIR OWN COPIES OF THESE DOCUMENTS TO THE MEETING

Progress report from UK by the Joint Nature Conservation Committee (JNCC) on the implementation of resolution 4 to develop a monitoring system that will enable adaptive management of seismic survey activities

Introduction

Noise generated by marine seismic surveys can disturb marine mammals. The amount of disturbance may depend on the scale and timing of the surveys. There is a perception amongst some that past and present seismic surveys disturb marine mammals in some parts of ASCOBANS/UK waters however, at present, data does not exist in a suitable format to evaluate the scale of seismic activity and hence the relationship to any disturbance impacts. As a result the UK Government proposed that a database and map/atlas of high-intensity seismic survey effort was the best way to evaluate the amount of seismic survey that has been undertaken in the ACOBANS area, with each party contributing for their waters. The UK has a large offshore oil and gas industry that is likely to account for a significant proportion of seismic activity in the ASCOBANS area and it has been developing a pilot monitoring study using seismic survey data from the years 1997-1999. It is proposed that this system be further developed and refined into a useful planning tool for future seismic activity.

Progress – 2002/2003

Since 2000, a full consent process has been operating for all oil and gas exploration and production seismic surveys on the United Kingdom Continental Shelf (UKCS). Applicants wishing to undertake a seismic survey must apply to the Department of Trade and Industry (DTI) and have been granted a consent to undertake a survey under The Offshore Petroleum (Conservation of Habitats) Regulations 2001 that implement the Habitats and Wild Birds Directives to oil and gas activity on the UKCS. The consent includes a legally binding condition requiring proponents to follow, at all times, the JNCC Guidelines for Minimising Acoustic Disturbance to Marine Mammals from Seismic Surveys. The DTI consults both the relevant statutory nature conservation body and fisheries agencies when considering if a consent should be granted and depending on the type of survey, its duration and location, may insist on additional mitigation measures as it sees fit. For surveys in areas of particular conservation importance the DTI require a full written Environmental Assessment to be submitted as part of the application for consent.

As of March 2003, following on from procedural changes, applicants must also submit a report to the DTI within 12 weeks of completing a survey. This report includes the line kilometres shot per quadrant block per month to facilitate accurate recording of future survey effort within the UKCS. All data must also be copied to DEAL, the Digital Energy Atlas and Library website which acts as the DTI data repository and is managed by the British Geological Survey (BGS) on behalf of Common Data Access Limited (CDA). The use of the close-out form will ensure that from 2003 there is a complete dataset of all seismic surveys available in the required format so that effort maps can be plotted.

In order to develop a methodology to analyse seismic data once it has been added to DEAL, CDA has undertaken a pilot study (prepared by BGS) based on the 1997-99 data. It was hoped that this data set would be complete however, as can be seen from the table below (Table 1), not all relevant data sets have been submitted to DEAL. CDA have recently made a further call for these data sets and the DTI along with JNCC are working with operators to ensure the completion of the historical data set.

UK Pilot Study

There follows a description of a proposed methodology for calculating the levels of seismic activity and preliminary results for UK seismic activity for the period 1997-1999. It should be noted that the

dataset is currently incomplete and results are presented only to provide an example of the format that could be used in future.

Table 1 – Population of DEAL Dataset 1997 – 1999

YEAR	2D (as recorded by DEAL)	2D (Consents submitted to DTI)	%	3D (as recorded by DEAL)	3D (Consents submitted to DTI)	%
1997	11	35	31%	33	57	58%
1998	12	33	36%	13	49	27%
1999	8	13	62%	7	38	18%

The initial study was restricted to an analysis of activity in each quadrant by year. Depending upon the feedback received from the ASCOBANS committee and other interested parties, it is hoped the work will then be extended to cover further years (once data sets are complete) and refined to a monthly level as opposed to yearly. Please find below a summary of the process undertaken so far.

Seismic Survey in UK Waters 1997 – 1999

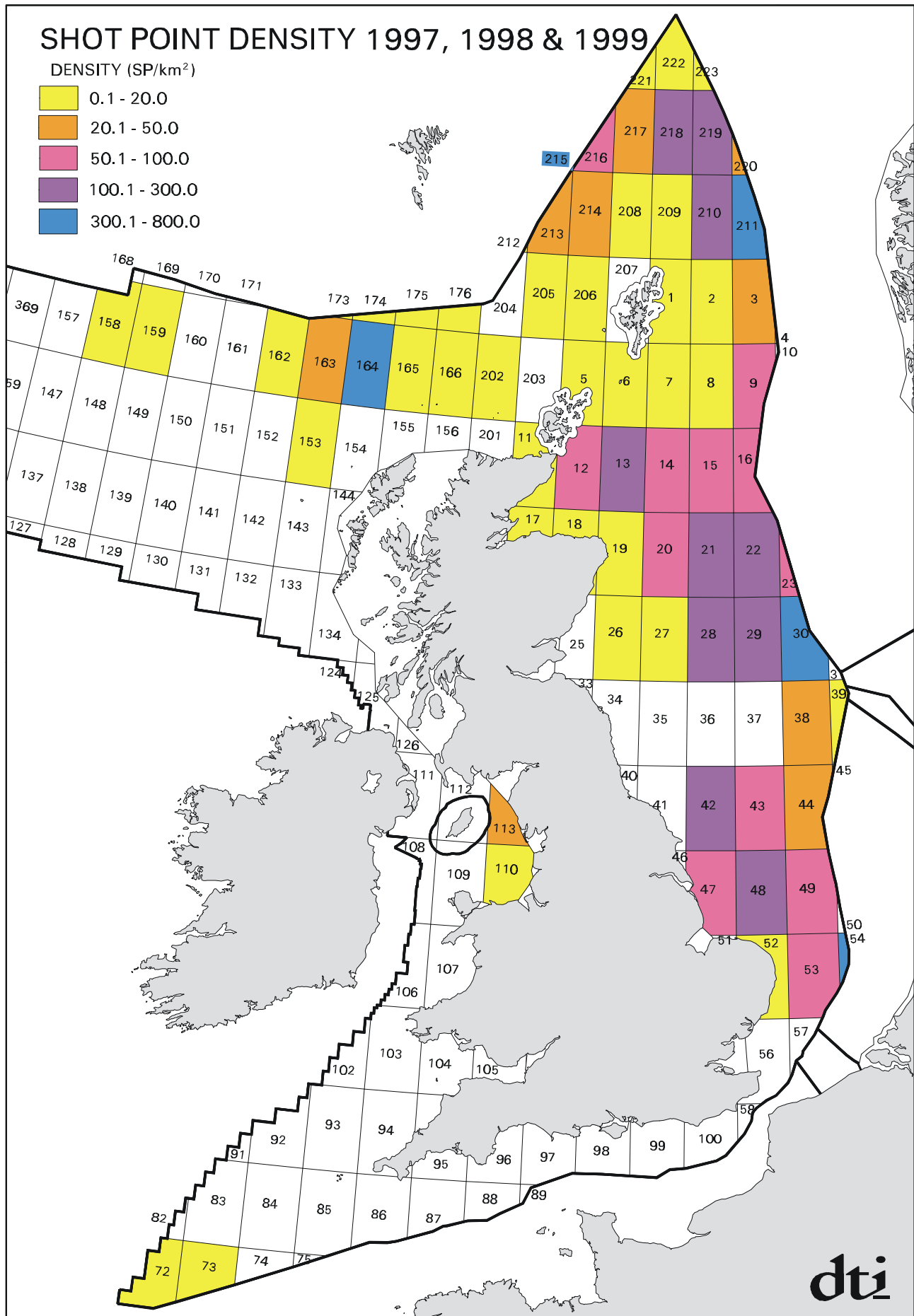
Introduction - In order to provide a comparable measure of seismic survey in each quadrant on the UKCS, the seismic activity will be based on a calculation of shot point density. This involves dividing the number of seismic shot points per quadrant by the offshore area of each quadrant. It should be noted that not all quadrants are the same size due to coastline, inshore waters and median line incursions. The following assumptions were made for the initial study:

- For 2D seismic surveys the average shot point interval is assumed to be 25 metres. This results in a shot point count of 40 SP/km.
- For 3D seismic surveys the average shot point interval is assumed to be 25 metres, with an average line spacing of 50 metres, for all surveys. This results in a shot point count of 800 SP/km². It has also been assumed that the outline polygon has a uniform shot point density.

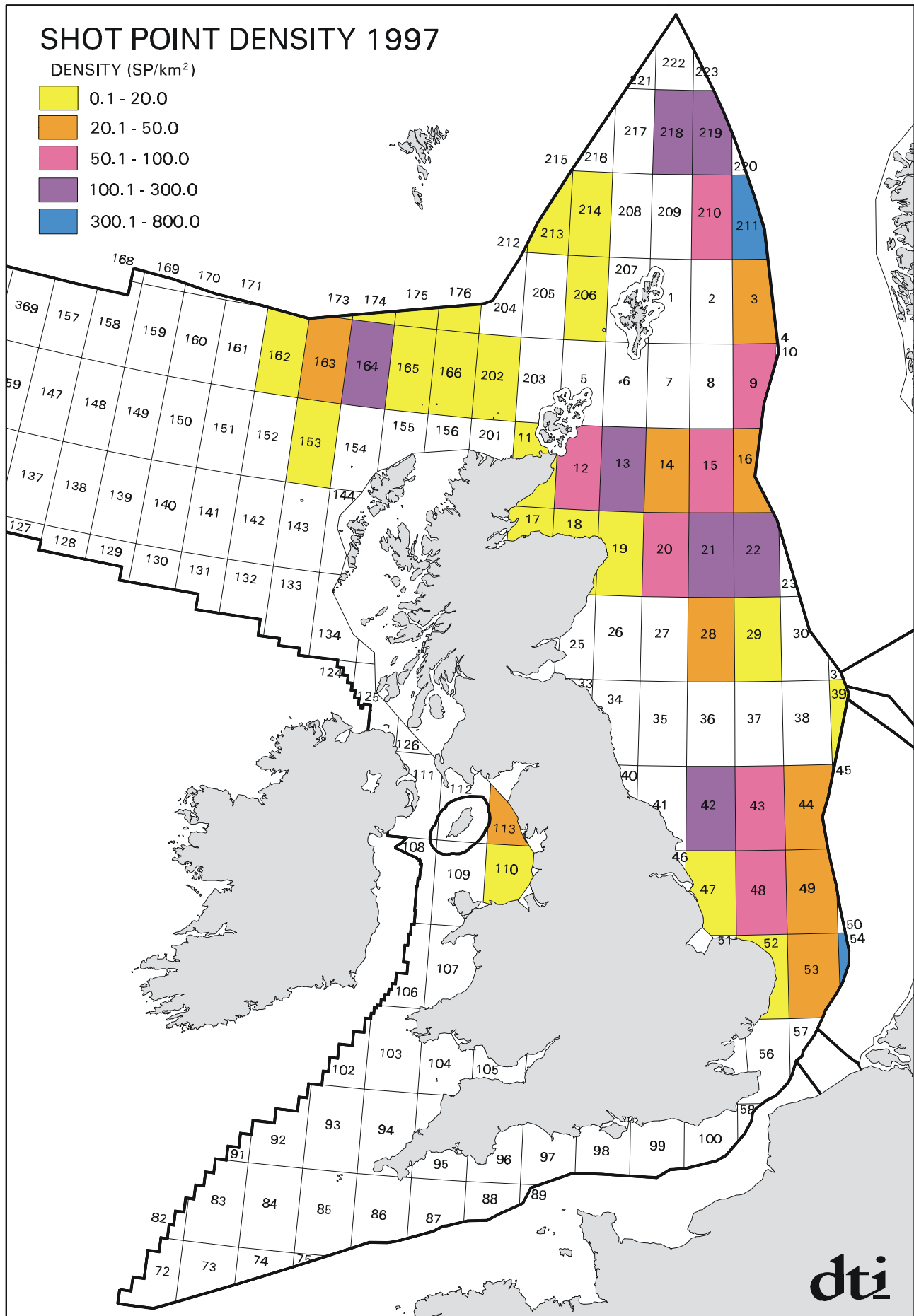
Method - For 2D seismic, the navigation tracks were overlaid on the quadrant polygons and the number of line kilometres per quadrant per year was calculated. The number of shot points per quadrant per year was then calculated using the assumption of 40 SP/km. For 3d seismic, the 3D seismic polygon areas were intersected with the quadrant polygons and the survey area per quadrant per year was calculated. The number of shot points per quadrant per year was then calculated using the assumption of 800 SP/km². The 2D and 3D values were then added together. The shot point density was then calculated by dividing the number of shots per quadrant per year by the offshore area of each quadrant.

Results – Appendix 1 (page 8) provides detail on the shot point density for each quadrant as calculated using the above methodology based on the dataset available to DEAL. It should be noted that as the dataset is incomplete these maps only represent a proportion of the amount of seismic activity that has occurred on the UKCS. (Table 1 above shows the limits of this dataset). This information has been plotted by DTI using a GIS tool to provide a cartographical representation (See Maps 1, 2, 3, 4). Four maps have been produced, one for each year 1997-1999 and one for all 3 years combined (cumulative shot point density).

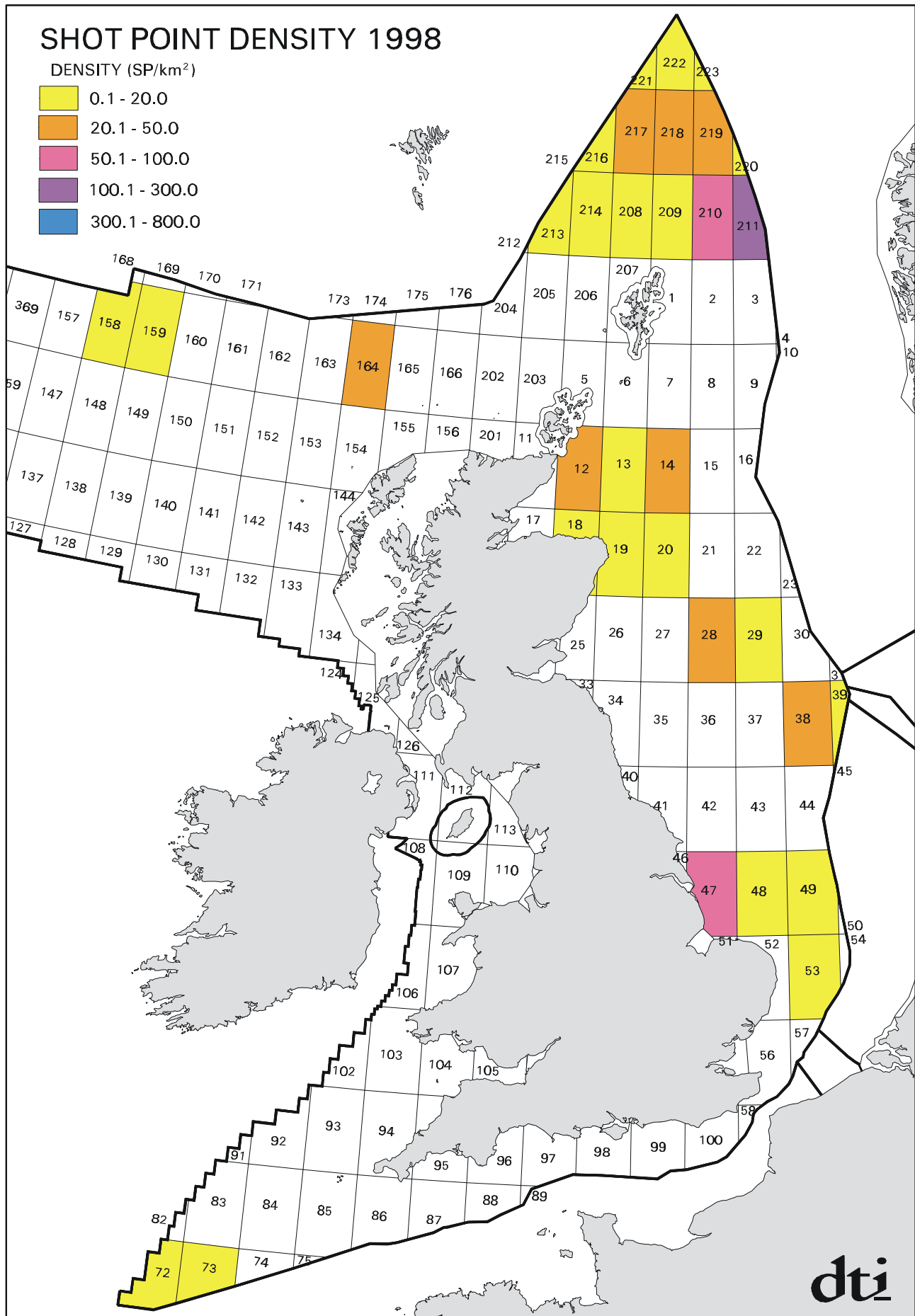
Map 1 – Cumulative Shot Point Density of Oil and Gas Seismic Surveys UKCS 1997 – 1999



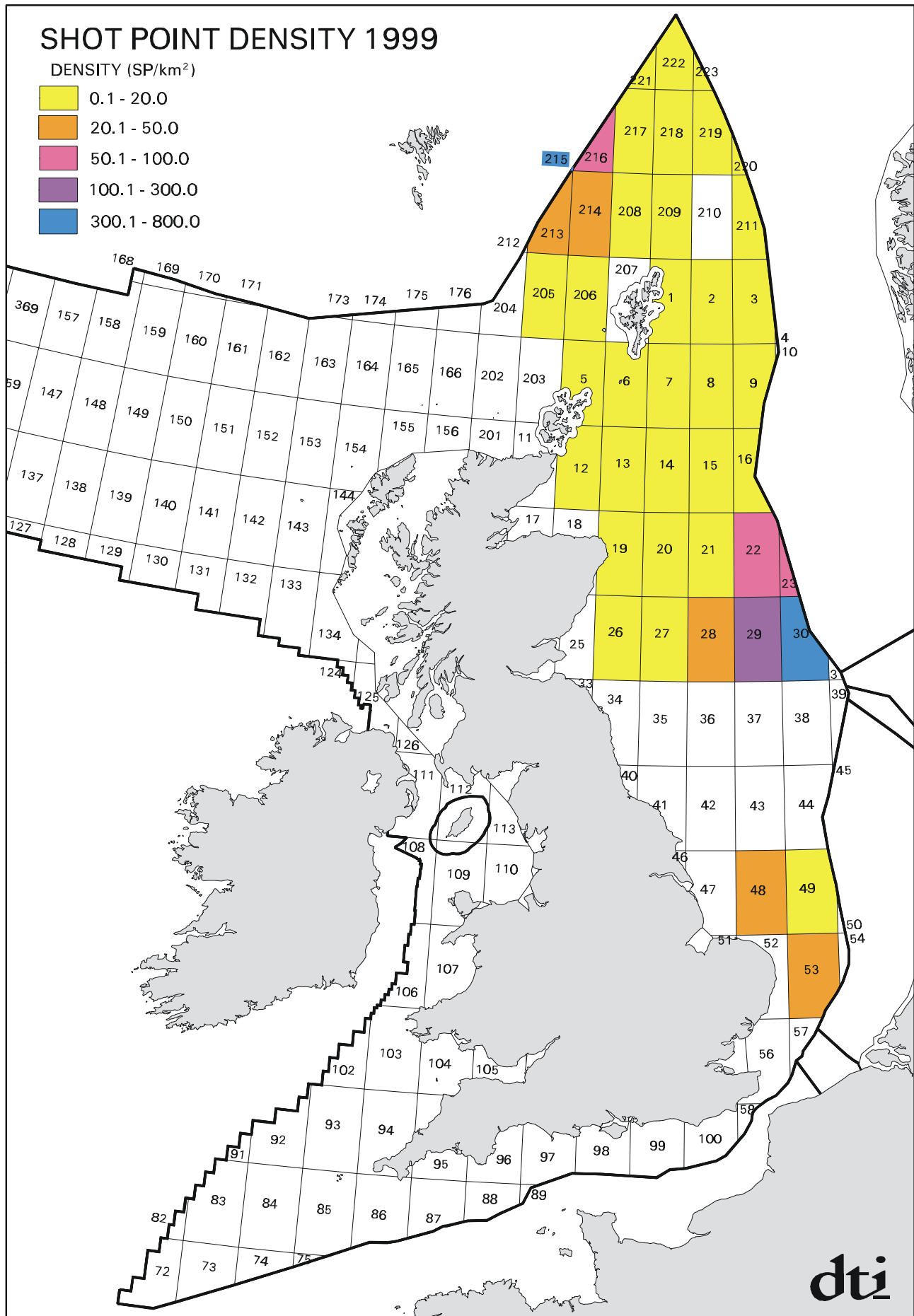
Map 2 – Shot Point Density of Oil and Gas Seismic Surveys UKCS 1997



Map 3 – Shot Point Density of Oil and Gas Seismic Surveys UKCS 1998



Map 4 – Shot Point Density of Oil and Gas Seismic Surveys UKCS 1999



Further Work

DEAL, DTI and JNCC are continuing to work with operators to improve the levels of seismic survey data within DEAL for the period up to 2002. It is planned that work will also be undertaken to ensure that fields such as start and end dates for surveys are populated with more accurate data to allow analysis of seismic activity on a monthly basis. Depending upon the quality of information received it is also hoped that, where populated, actual survey acquisition period, shot point and line intervals data will also be used rather than the assumptions. A greater degree of accuracy and quicker input of data will be possible for seismic surveys conducted from 2003 onwards due to the requirement to submit reports to the DTI as part of the seismic survey consent process.

It is also planned to develop a web-based tool, which will allow more in depth analysis of the DEAL dataset in relation to seismic activity. This would allow the user to choose the area and time period, which they are interested in analysing. Dependent on information supplied by other countries and after negotiations with DEAL, it may also be possible to add levels of seismic activity out with the UKCS to the DEAL dataset or for a similar database to be developed for the ASCOBANS area.

In a separate initiative the DTI, is investigating the use of GIS systems to plot proposed surveys as applications as they are received. In combination with legacy data, this will mean that applications for new surveys can be scrutinised in the context of past surveys and current proposed surveys. It is hoped that in this way the management of the seismic survey process can be managed to best effect.

For further background information on the above please visit:

DEAL & CDA - <http://www.ukdeal.co.uk/> (Information on DEAL database)

DTI – <http://www.og.dti.gov.uk> (Information on the consent procedure)

JNCC - <http://www.jncc.gov.uk> (includes Marine Mammal Observers reports 1996 - 1999)

Appendix 1 Raw Data Shot Point Density by UKCS quadrant

QUAD	1997		1998		1999	
	COUNT (SP)	DENSITY (SP/km ²)	COUNT (SP)	DENSITY (SP/km ²)	COUNT (SP)	DENSITY (SP/km ²)
1	0.00	0.00	0.00	0.00	105.60	0.02
2	0.00	0.00	0.00	0.00	6024.00	0.98
3	268744.00	46.15	0.00	0.00	1626.80	0.28
4	0.00	0.00	0.00	0.00	0.00	0.00
5	0.00	0.00	0.00	0.00	182.00	0.04
6	0.00	0.00	0.00	0.00	10183.60	1.72
7	0.00	0.00	0.00	0.00	26571.20	4.21
8	0.00	0.00	0.00	0.00	24118.40	3.82
9	318864.00	60.56	0.00	0.00	5916.00	1.12
10	0.00	0.00	0.00	0.00	0.00	0.00
11	20847.20	7.17	0.00	0.00	0.00	0.00
12	292302.00	50.40	127339.20	21.95	12409.60	2.14
13	724905.20	111.52	66713.20	10.26	13177.60	2.03
14	272226.80	41.91	188177.20	28.97	42302.00	6.51
15	333607.60	51.38	0.00	0.00	39675.60	6.11
16	181436.00	45.69	0.00	0.00	26404.00	6.65
17	17131.60	8.18	0.00	0.00	0.00	0.00
18	20147.60	9.07	94.00	0.04	0.00	0.00
19	42316.00	6.71	18275.60	2.90	17547.60	2.78
20	603549.20	90.37	30952.80	4.63	6600.40	0.99
21	1647930.00	246.87	0.00	0.00	51136.00	7.66
22	795008.00	120.17	0.00	0.00	541847.20	81.90
23	0.00	0.00	0.00	0.00	75328.00	65.15
25	0.00	0.00	0.00	0.00	0.00	0.00
26	0.00	0.00	0.00	0.00	44336.00	6.46
27	0.00	0.00	0.00	0.00	955.20	0.14
28	319272.00	46.57	215840.00	31.48	185880.00	27.11
29	39808.00	5.81	21544.00	3.14	1341328.00	195.72
30	0.00	0.00	0.00	0.00	1598288.00	313.23
31	0.00	0.00	0.00	0.00	0.00	0.00
33	0.00	0.00	0.00	0.00	0.00	0.00
34	0.00	0.00	0.00	0.00	0.00	0.00
35	0.00	0.00	0.00	0.00	0.00	0.00
36	0.00	0.00	0.00	0.00	0.00	0.00
37	0.00	0.00	0.00	0.00	0.00	0.00
38	0.00	0.00	229024.00	32.58	0.00	0.00
39	3784.40	2.18	18288.00	10.53	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00	0.00
41	0.00	0.00	0.00	0.00	0.00	0.00
42	1089464.00	151.09	0.00	0.00	0.00	0.00
43	402328.00	55.82	0.00	0.00	0.00	0.00
44	145928.00	23.17	0.00	0.00	0.00	0.00
45	0.00	0.00	0.00	0.00	0.00	0.00
46	0.00	0.00	0.00	0.00	0.00	0.00
47	39840.00	6.59	461912.00	76.36	0.00	0.00
48	503200.00	68.17	152.00	0.02	324592.00	43.97
49	354944.00	49.76	92176.00	12.92	91176.00	12.78
50	0.00	0.00	0.00	0.00	0.00	0.00

QUAD	1997		1998		1999	
	COUNT (SP)	DENSITY (SP/km ²)	COUNT (SP)	DENSITY (SP/km ²)	COUNT (SP)	DENSITY (SP/km ²)
51	0.00	0.00	0.00	0.00	0.00	0.00
52	2776.00	0.91	0.00	0.00	0.00	0.00
53	344464.00	48.95	184.00	0.03	326336.00	46.38
54	240800.00	336.09	0.00	0.00	0.00	0.00
56	0.00	0.00	0.00	0.00	0.00	0.00
57	0.00	0.00	0.00	0.00	0.00	0.00
58	0.00	0.00	0.00	0.00	0.00	0.00
72	0.00	0.00	12637.60	2.75	0.00	0.00
73	0.00	0.00	41435.60	8.46	0.00	0.00
74	0.00	0.00	0.00	0.00	0.00	0.00
75	0.00	0.00	0.00	0.00	0.00	0.00
82	0.00	0.00	0.00	0.00	0.00	0.00
83	0.00	0.00	0.00	0.00	0.00	0.00
84	0.00	0.00	0.00	0.00	0.00	0.00
85	0.00	0.00	0.00	0.00	0.00	0.00
86	0.00	0.00	0.00	0.00	0.00	0.00
87	0.00	0.00	0.00	0.00	0.00	0.00
88	0.00	0.00	0.00	0.00	0.00	0.00
89	0.00	0.00	0.00	0.00	0.00	0.00
91	0.00	0.00	0.00	0.00	0.00	0.00
92	0.00	0.00	0.00	0.00	0.00	0.00
93	0.00	0.00	0.00	0.00	0.00	0.00
94	0.00	0.00	0.00	0.00	0.00	0.00
95	0.00	0.00	0.00	0.00	0.00	0.00
96	0.00	0.00	0.00	0.00	0.00	0.00
97	0.00	0.00	0.00	0.00	0.00	0.00
98	0.00	0.00	0.00	0.00	0.00	0.00
99	0.00	0.00	0.00	0.00	0.00	0.00
100	0.00	0.00	0.00	0.00	0.00	0.00
102	0.00	0.00	0.00	0.00	0.00	0.00
103	0.00	0.00	0.00	0.00	0.00	0.00
104	0.00	0.00	0.00	0.00	0.00	0.00
105	0.00	0.00	0.00	0.00	0.00	0.00
106	0.00	0.00	0.00	0.00	0.00	0.00
107	0.00	0.00	0.00	0.00	0.00	0.00
108	0.00	0.00	0.00	0.00	0.00	0.00
109	0.00	0.00	0.00	0.00	0.00	0.00
110	4384.00	0.99	0.00	0.00	0.00	0.00
111	0.00	0.00	0.00	0.00	0.00	0.00
112	0.00	0.00	0.00	0.00	0.00	0.00
113	118920.00	46.80	0.00	0.00	0.00	0.00
124	0.00	0.00	0.00	0.00	0.00	0.00
125	0.00	0.00	0.00	0.00	0.00	0.00
126	0.00	0.00	0.00	0.00	0.00	0.00
127	0.00	0.00	0.00	0.00	0.00	0.00
128	0.00	0.00	0.00	0.00	0.00	0.00
129	0.00	0.00	0.00	0.00	0.00	0.00
130	0.00	0.00	0.00	0.00	0.00	0.00
131	0.00	0.00	0.00	0.00	0.00	0.00
132	0.00	0.00	0.00	0.00	0.00	0.00

QUAD	1997		1998		1999	
	COUNT (SP)	DENSITY (SP/km ²)	COUNT (SP)	DENSITY (SP/km ²)	COUNT (SP)	DENSITY (SP/km ²)
133	0.00	0.00	0.00	0.00	0.00	0.00
134	0.00	0.00	0.00	0.00	0.00	0.00
135	0.00	0.00	0.00	0.00	0.00	0.00
137	0.00	0.00	0.00	0.00	0.00	0.00
138	0.00	0.00	0.00	0.00	0.00	0.00
139	0.00	0.00	0.00	0.00	0.00	0.00
140	0.00	0.00	0.00	0.00	0.00	0.00
141	0.00	0.00	0.00	0.00	0.00	0.00
142	0.00	0.00	0.00	0.00	0.00	0.00
143	0.00	0.00	0.00	0.00	0.00	0.00
144	0.00	0.00	0.00	0.00	0.00	0.00
147	0.00	0.00	0.00	0.00	0.00	0.00
148	0.00	0.00	0.00	0.00	0.00	0.00
149	0.00	0.00	0.00	0.00	0.00	0.00
150	0.00	0.00	0.00	0.00	0.00	0.00
151	0.00	0.00	0.00	0.00	0.00	0.00
152	0.00	0.00	0.00	0.00	0.00	0.00
153	102903.60	15.69	0.00	0.00	0.00	0.00
154	0.00	0.00	0.00	0.00	0.00	0.00
155	0.00	0.00	0.00	0.00	0.00	0.00
156	0.00	0.00	0.00	0.00	0.00	0.00
157	0.00	0.00	0.00	0.00	0.00	0.00
158	0.00	0.00	14363.60	2.53	0.00	0.00
159	0.00	0.00	27712.00	4.31	0.00	0.00
160	0.00	0.00	0.00	0.00	0.00	0.00
161	0.00	0.00	0.00	0.00	0.00	0.00
162	1021.20	0.16	0.00	0.00	0.00	0.00
163	295336.80	46.98	0.00	0.00	0.00	0.00
164	1731342.80	272.28	252824.00	39.76	0.00	0.00
165	534.80	0.08	0.00	0.00	0.00	0.00
166	406.00	0.06	0.00	0.00	0.00	0.00
168	0.00	0.00	0.00	0.00	0.00	0.00
169	0.00	0.00	0.00	0.00	0.00	0.00
170	0.00	0.00	0.00	0.00	0.00	0.00
171	0.00	0.00	0.00	0.00	0.00	0.00
173	697.20	7.38	0.00	0.00	0.00	0.00
174	7220.40	10.36	0.00	0.00	0.00	0.00
175	4218.00	3.19	0.00	0.00	0.00	0.00
176	4888.80	2.56	0.00	0.00	0.00	0.00
201	0.00	0.00	0.00	0.00	0.00	0.00
202	68.00	0.01	0.00	0.00	0.00	0.00
203	0.00	0.00	0.00	0.00	0.00	0.00
204	0.00	0.00	0.00	0.00	0.00	0.00
205	0.00	0.00	0.00	0.00	2468.80	0.40
206	103.20	0.02	0.00	0.00	19578.80	3.20
207	0.00	0.00	0.00	0.00	0.00	0.00
208	0.00	0.00	13564.40	2.28	18302.80	3.08
209	0.00	0.00	49396.00	8.32	6350.40	1.07
210	468656.00	79.00	367276.00	61.91	0.00	0.00
211	1992376.00	498.12	915392.40	228.86	1503.20	0.38

QUAD	1997		1998		1999	
	COUNT (SP)	DENSITY (SP/km ²)	COUNT (SP)	DENSITY (SP/km ²)	COUNT (SP)	DENSITY (SP/km ²)
212	76.00	1.92	0.00	0.00	0.00	0.00
213	3604.80	0.99	2650.80	0.73	127526.40	35.18
214	1005.60	0.17	12417.60	2.09	237920.40	40.04
215	0.00	0.00	0.00	0.00	3185.60	774.71
216	0.00	0.00	24670.00	10.14	128940.40	52.99
217	0.00	0.00	156386.40	27.91	43309.20	7.73
218	706296.00	122.96	182314.00	31.74	15916.40	2.77
219	1256440.00	246.22	233751.20	45.81	3810.80	0.75
220	0.00	0.00	8870.40	15.72	7081.20	12.55
221	0.00	0.00	7309.60	6.65	2983.60	2.71
222	0.00	0.00	21742.40	5.57	5382.80	1.38
223	0.00	0.00	2922.00	4.12	493.20	0.70
337	0.00	0.00	0.00	0.00	0.00	0.00
338	0.00	0.00	0.00	0.00	0.00	0.00
339	0.00	0.00	0.00	0.00	0.00	0.00
341	0.00	0.00	0.00	0.00	0.00	0.00
342	0.00	0.00	0.00	0.00	0.00	0.00
343	0.00	0.00	0.00	0.00	0.00	0.00
344	0.00	0.00	0.00	0.00	0.00	0.00
345	0.00	0.00	0.00	0.00	0.00	0.00
346	0.00	0.00	0.00	0.00	0.00	0.00
347	0.00	0.00	0.00	0.00	0.00	0.00
348	0.00	0.00	0.00	0.00	0.00	0.00
349	0.00	0.00	0.00	0.00	0.00	0.00
351	0.00	0.00	0.00	0.00	0.00	0.00
352	0.00	0.00	0.00	0.00	0.00	0.00
353	0.00	0.00	0.00	0.00	0.00	0.00
354	0.00	0.00	0.00	0.00	0.00	0.00
355	0.00	0.00	0.00	0.00	0.00	0.00
356	0.00	0.00	0.00	0.00	0.00	0.00
357	0.00	0.00	0.00	0.00	0.00	0.00
358	0.00	0.00	0.00	0.00	0.00	0.00
359	0.00	0.00	0.00	0.00	0.00	0.00
362	0.00	0.00	0.00	0.00	0.00	0.00
363	0.00	0.00	0.00	0.00	0.00	0.00
364	0.00	0.00	0.00	0.00	0.00	0.00
365	0.00	0.00	0.00	0.00	0.00	0.00
366	0.00	0.00	0.00	0.00	0.00	0.00
367	0.00	0.00	0.00	0.00	0.00	0.00
368	0.00	0.00	0.00	0.00	0.00	0.00
369	0.00	0.00	0.00	0.00	0.00	0.00