

MkII Airborne Laser Fluorosensor Survey Reprocessing And Interpretation Report: Great Australian Bight, Southern Australia

**Prepared For
AGSO – Geoscience Australia**

June 2001

Record 2001/18

AGSOCAT NO. 34395

Prepared by:	Robert Cowley Signalworks Pty Ltd A.B.N. 26 066 681 598
Email:	rob.cowley@explorationist.com
WWW:	http://www.explorationist.com/
Date:	June 2001

AGSO – Geoscience Australia

Chief Executive Officer: Neil Williams

Department of Industry, Science & Resources

Minister for Industry, Science & Resources: Senator The Hon. Nick Minchin
Parliamentary Secretary: The Hon. Warren Entsch, MP

© Commonwealth of Australia 2001

This work is copyright. Apart from any fair dealings for the purposes of study, research, criticism or review, as permitted under the Copyright Act, no part may be reproduced by any process without written permission. Inquiries should be directed to the Communications Unit, AGSO – Geoscience Australia, GPO Box 378, Canberra City, ACT, 2601.

ISSN: 1039-0073
ISBN: 0 642 466971

Bibliographic reference: Cowley, R., 2001. MkII Airborne Laser Fluorosensor Survey Reprocessing And Interpretation Report: Great Australian Bight, Southern Australia. AGSO – Geoscience Australia, Record 2001/18. AGSOCAT NO. 34395.

AGSO – Geoscience Australia has tried to make the information in this product as accurate as possible. However, it does not guarantee that the information is totally accurate or complete. Therefore, you should not rely solely on this information when making a commercial decision.

Contents

Summary

1. Introduction

2. ALF Survey Analysis

- 2.1 Fluor Mapping
- 2.2 Adjacent Fluor Detection

3. Conclusions and Recommendations

Appendices

- Appendix 1. Data Acquisition QC
- Appendix 2. Survey Navigation QC
- Appendix 3. CD Contents

Figures

- Figure 1. Great Australian Bight ALF MkII Survey Location Map
- Figure 2. The Great Australian Bight ALF MkII Survey
- Figure 3. The Great Australian Bight ALF MkII Survey (Western Map Sheet)
- Figure 4. The Great Australian Bight ALF MkII Survey (Central Map Sheet)
- Figure 5. The Great Australian Bight ALF MkII Survey (Eastern Map Sheet)
- Figure 6. A Plot of the F/R Values and Rescaled Average F/R for a Line
- Figure 7. The Bight MkII ALF Survey First Pass Fluor Map
- Figure 8. The Bight MkII ALF Survey Refined Fluor Map
- Figure 9. Detailed Map of the Noisy Lines with Average Raman Plotted
- Figure 10. Line 134 F/R Plot
- Figure 11. Line 141 F/R Plot
- Figure 12. Line 152 F/R Plot
- Figure 13. Line 271 Noisy End of Line Spectra
- Figure 14. The Bight MkII ALF Survey Confident Fluor Map
- Figure 15. Bight MkII ALF Survey Confident Fluor Map (Western Map Sheet)
- Figure 16. Bight MkII ALF Survey Confident Fluor Map (Central Map Sheet)
- Figure 17. Bight MkII ALF Survey Confident Fluor Map (Eastern Map Sheet)
- Figure 18. The F/R Histogram for the Confident Fluors
- Figure 19. Bight ALF MkII Survey Selected Spectra
- Figure 20. Bight ALF Fluor Map. Adjacent Fluors Plotted with Large Blue Symbols
- Figure 21. The Average Raman Peak Plotted for All Lines
- Figure 22. The Averaged Raman Variance Plotted for All Lines
- Figure 23. Average Raman Peak Map
- Figure 24. Raman Variance Map
- Figure 25. Averaged F/R Map
- Figure 26. The Average Point Spacing Plotted for All Lines

Tables

- Table 1. Great Australian Bight ALF MkII Survey Data Acquisition Summary
 - Table 2. Great Australian Bight ALF MkII Survey Line Navigation Summary
-

Summary

The Bight airborne laser fluorosensor (ALF) MkII survey was acquired in 1989 by BP over the Great Australian Bight, southern Australia. The survey was designed to detect natural oil seepage over a region of the Bight in an effort to refine the petroleum prospectivity assessment.

The survey spanned 850km in the east-west direction with an average north-south extent of about 100km. The western part of the survey is aligned E-W and the eastern part is aligned WNW-ESE and extends south of Eyre Peninsula towards Kangaroo Island.

This report presents a re-interpretation of the BP data by Signalworks Pty Ltd using the *ALF Explorer™* software. A total of 941 confident fluors were interpreted out of the 1,824,227 recorded spectra. This is an average fluor density of 0.52 fluors per thousand spectra.

The final fluor map shows three main regions having relatively dense fluors. A large patch over the Platypus-1 and Greenly-1 wells extends about 60km east-west and 100km north-south. Dense fluor patches are found near the middle of the survey but many of the lines in this area are affected by noise. Many lines here were excluded from the analysis because of high fluorescence on Raman (F/R) variance, which may still affect the remaining lines to a lesser degree. A patch of fluors is also found at the western end of the survey.

While fluor density variations can be seen on the fluor map, the geological implications are not clear. The MkII ALF system is susceptible to noise and produces less confident fluor maps than the MkIII system. Some mapped fluor density variations may be influenced by sea state or water property variations.

1. Introduction

The Great Australian Bight (southern Australia) airborne laser fluorosensor (ALF) MkII survey was acquired in 1989 by BP. The MkII system used a 308nm laser wavelength, longer than the 266nm used in the later MkIII system. The Raman peak wavelength is 344nm (293nm MkIII) and the fluorescence region is 370nm to 580nm (320nm to 580nm MkIII).

Each recorded spectrum is the average of ten detected spectra. The averaging was done by BP to reduce the data recording rate, which was limited by the available hardware. The MkIII system uses faster hardware and records all detected spectra without averaging.

This report presents a reprocessing and re-interpretation of the original BP data using the *ALF Explorer™* software, which consists of a database linked to a set of data processing, analysis and display modules. BP documented the original data processing and interpretation in a report by Mackintosh and Williams (1990*).

Survey lines were numbered from 1 to 281 but many lines had several segments. A total of 593 line segments were detected in this survey using a line break distance of 100m. Lines 201 and 203 had 112 and 78 segments respectively. A noisy navigation system may have produced apparent breaks on these lines. If the extra segments on these lines are excluded, the survey contains 405 segments.

The lines were acquired at approximately 3,000m line spacing in a N-S orientation and a flying height of 100m. A total of 1,824,227 spectra were recorded at an average point spacing of 16m to 22m. About 33,460 km of line data were acquired.

Some lines in the MkII ALF surveys may use the same Line and Point values as other lines. The main ALF data table in the *ALF Explorer™* database (RawAlfData) uses the Line and Point fields as key fields, which cannot contain duplicates. Lines that contain duplicated Line and Point values are stored in separate tables (eg. RawAlfData2).

The main ALF data table contains 1,447,797 ALF spectra. RawAlfData2, RawAlfData3, RawAlfData4 and RawAlfData5 contain 212,513, 46,363, 32,481 and 85,073 spectra respectively.

The survey area is shaded in green on the location map (Figure 1).

A total of 941 confident fluors were interpreted out of the 1,824,227 recorded spectra. This is an average fluor density of 0.52 fluors per thousand spectra.

* Bibliographic reference:

Mackintosh, J.M. and Williams, A.K., 1990. ALF Survey of the Great Australian Bight. Volume 1, A – Basic Data Report; Volume 2, B – Interpretive Data Report; Volume 3, C – BP In-house Report. Remote Sensing Group, BP Exploration (unpubl. report).

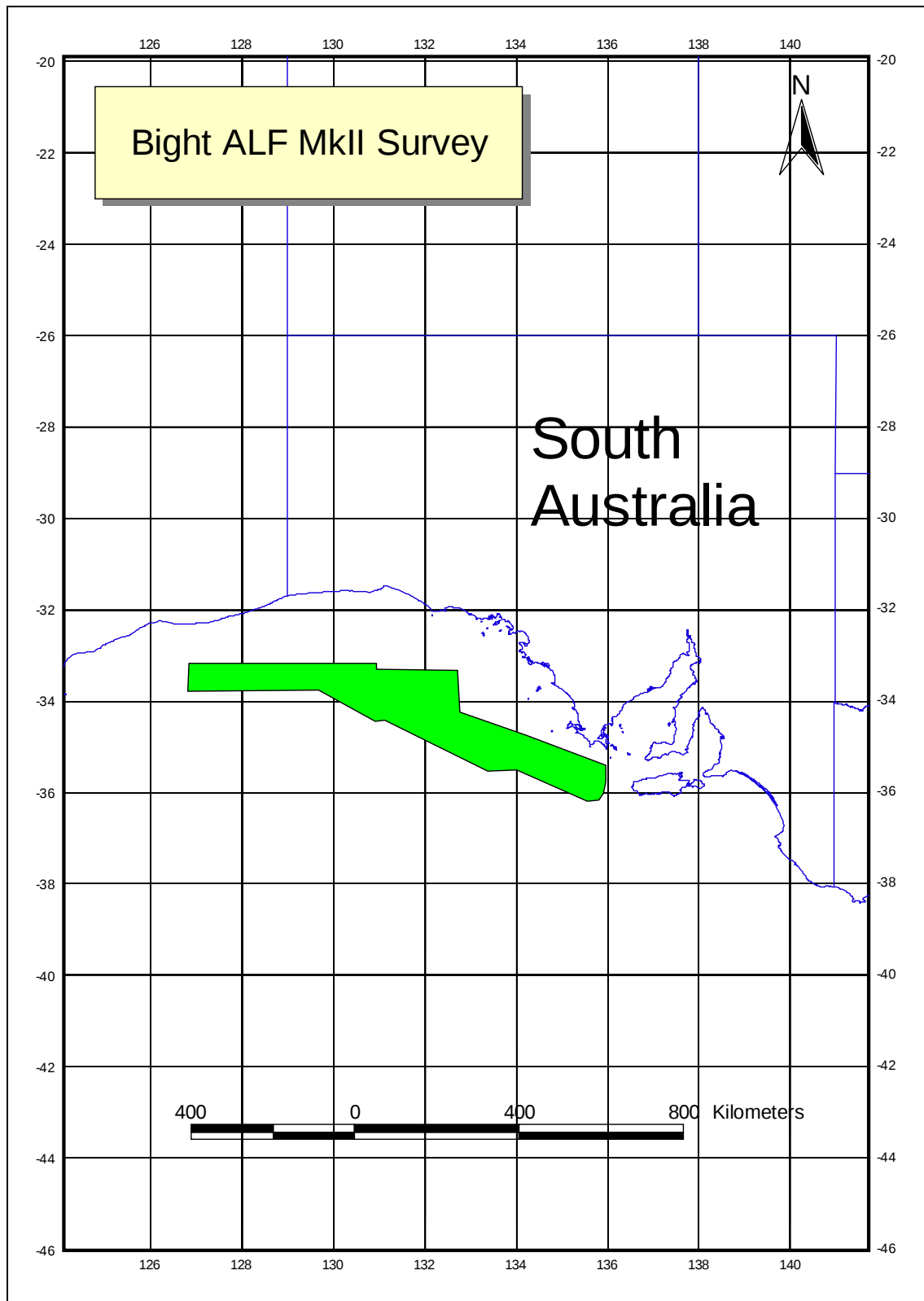


Figure 1. Great Australian Bight ALF MkII Survey Location Map.

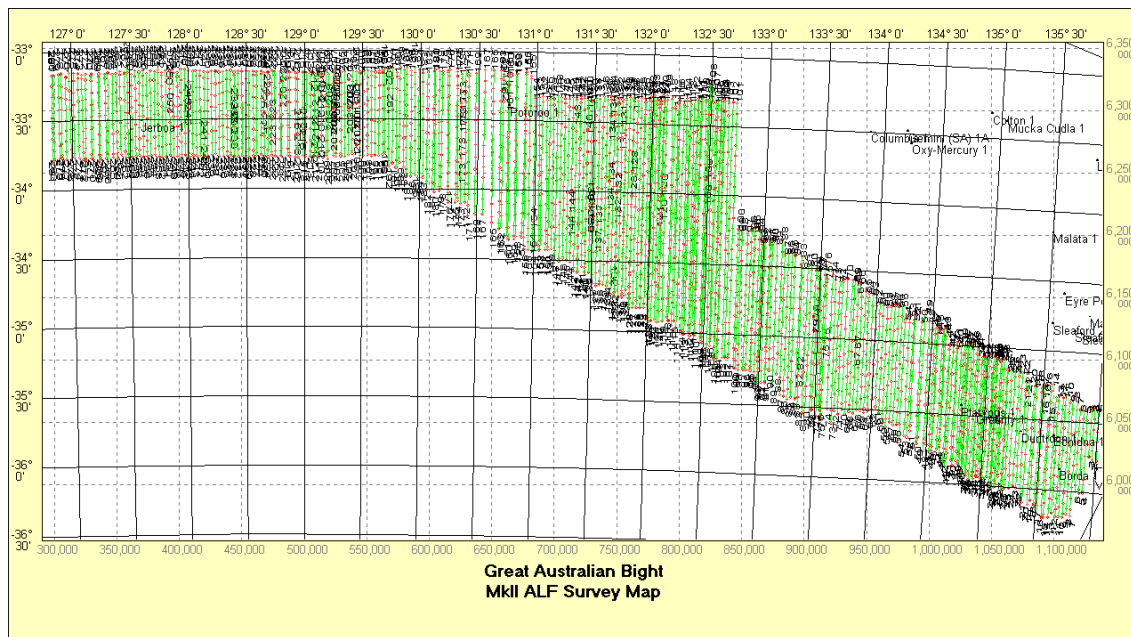


Figure 2. The Great Australian Bight ALF Mk II Survey.

Figure 2 shows a map of the Great Australian Bight ALF Mk II survey with point symbols annotated in red at a spacing of 500. The survey is very large and spans nearly 850km in the E-W direction.

For more detailed mapping, the survey area was split into three regions, west, central and east. These detailed map areas are shown in Figures 3, 4 and 5.

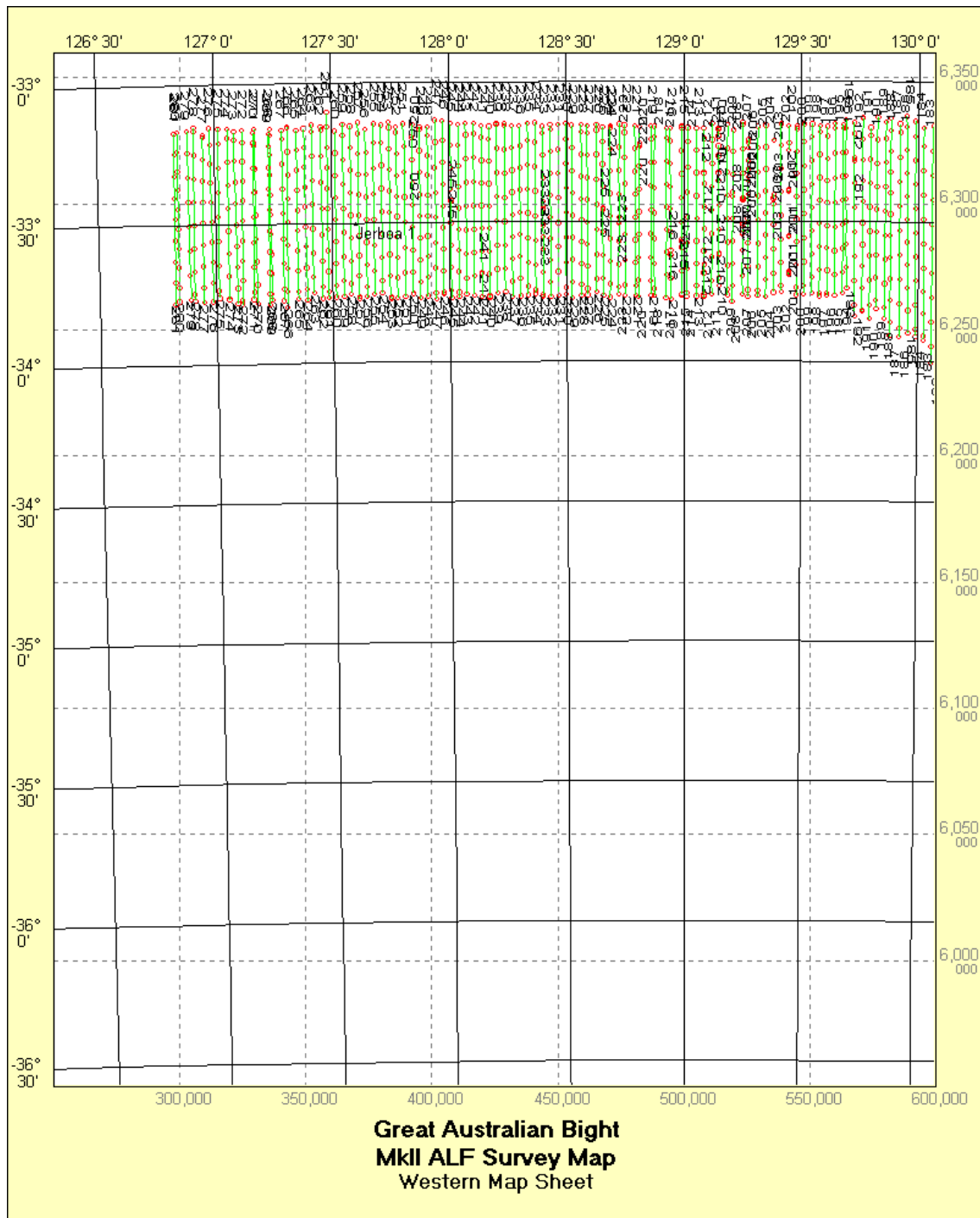


Figure 3. The Great Australian Bight ALF Mk II Survey (Western Map Sheet).

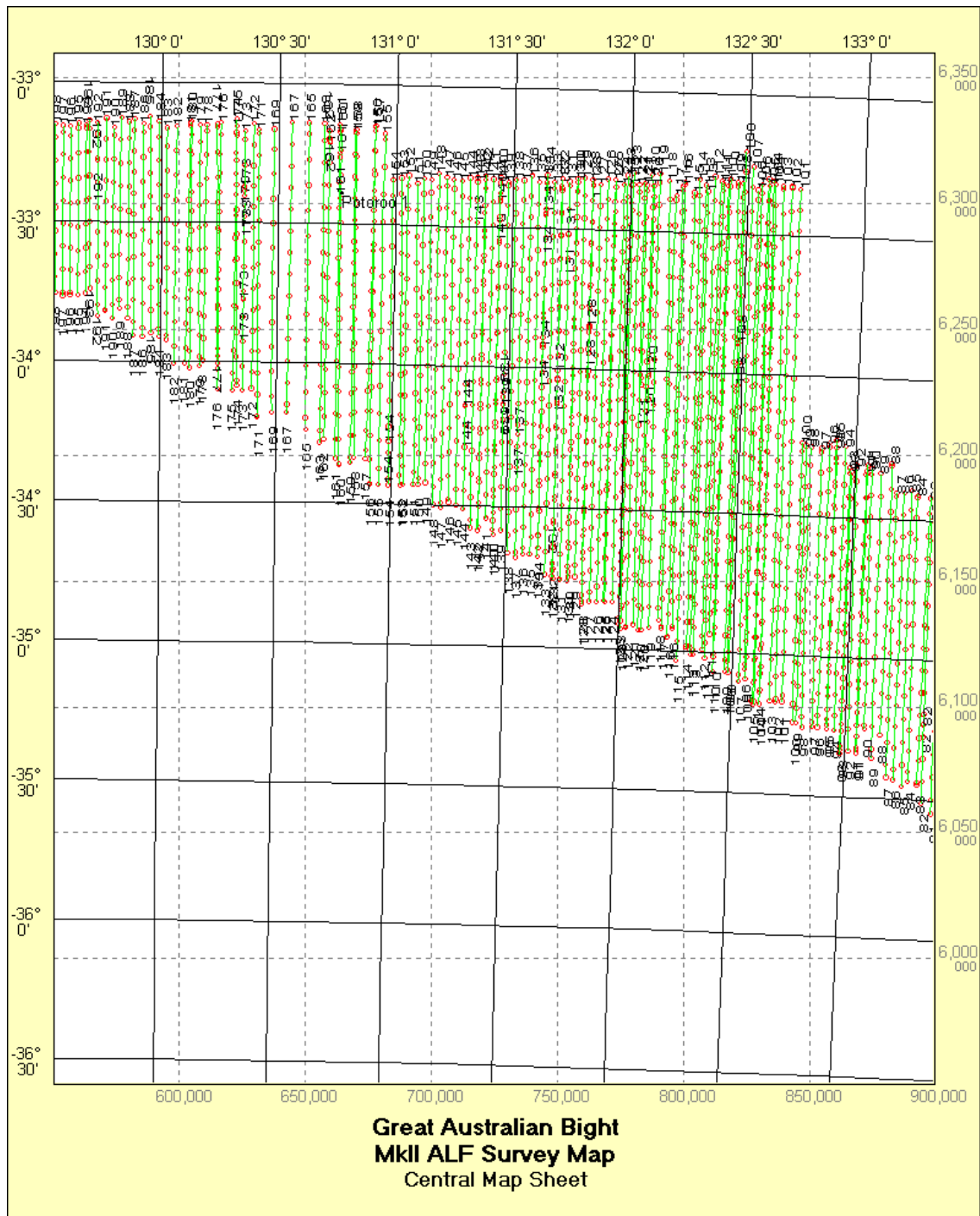


Figure 4. The Great Australian Bight ALF Mk II Survey (Central Map Sheet).

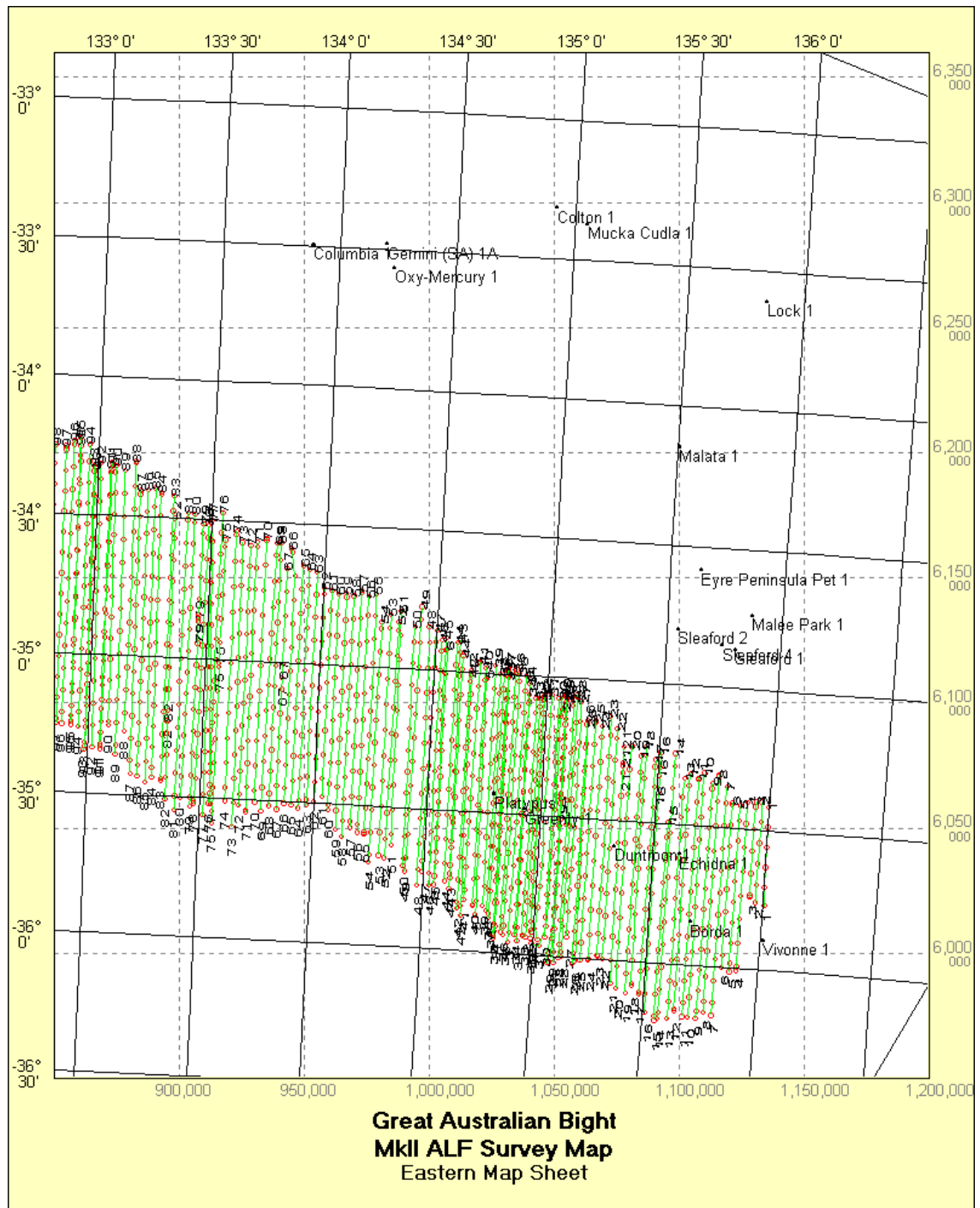


Figure 5. The Great Australian Bight ALF Mk II Survey (Eastern Map Sheet).

Mapping Specifications:

The geodetic coordinates of the supplied ALF data used the AGD66 geodetic datum. Because of inconsistencies in the AGD66 datum, there is no single set of transformation parameters that can accurately transform the coordinates into the WGS84 or AGD84 datums. The AGD66 datum coordinates were assumed to be approximately equal to the AGD84 coordinates for the accuracy of mapping required in this report.

Projection: Southern UTM Zone 52 (Central Meridian 129 degrees east)

Whole survey mapping region:

Min Easting:	280,000
Max Easting:	1,165,000
Min Northing:	5,950,000
Max Northing:	6,360,000

Western mapping region:

Min Easting:	250,000
Max Easting:	600,000
Min Northing:	5,950,000
Max Northing:	6,360,000

Central mapping region:

Min Easting:	550,000
Max Easting:	900,000
Min Northing:	5,950,000
Max Northing:	6,360,000

Eastern mapping region:

Min Easting:	850,000
Max Easting:	1,200,000
Min Northing:	5,950,000
Max Northing:	6,360,000

2. ALF Survey Analysis

2.1. Fluor Mapping

Fluorescence anomalies (fluors) were detected using a number of spectral parameters calculated for each record in the raw data tables. Parameters include Raman area (R), fluorescence area (F), F/R ratio, averaged F/R ratio, fluorescence “jitter” (J) and J/F ratio. The averaged F/R is used to determine the background F/R levels. The “jitter” is the average difference in adjacent spectrum values in the fluorescence region and is a measure of the noise in the record.

Fluors are initially selected using their F/R value relative to the background level. A 101 point moving average filter is used to generate an estimate of the background level. Because the F/R values have different amounts of scatter or variance between lines, the relative F/R cut-off value used to select fluors must be adjusted for each line.

Figure 6 shows the F/R values plotted for all points in a line. The rescaled average F/R is plotted in blue. The rescaling value is chosen so that only possible fluors lie above the blue line.

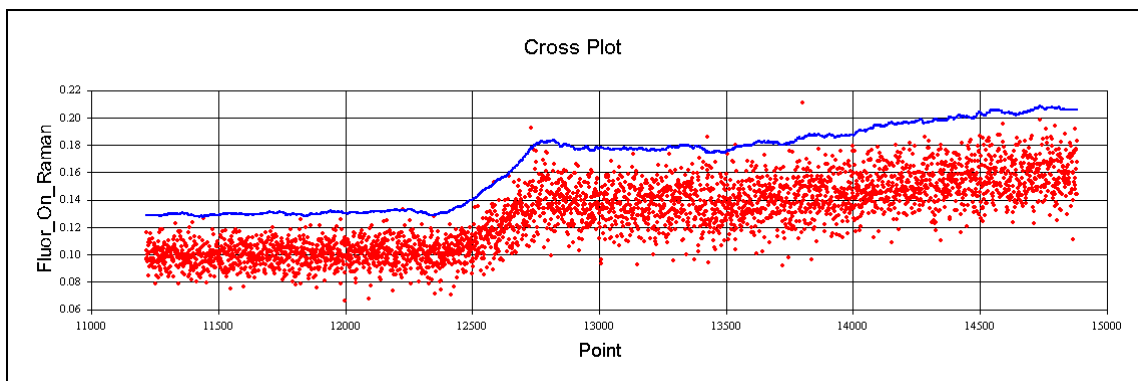


Figure 6. A plot of the F/R values and Rescaled Average F/R for a Line.

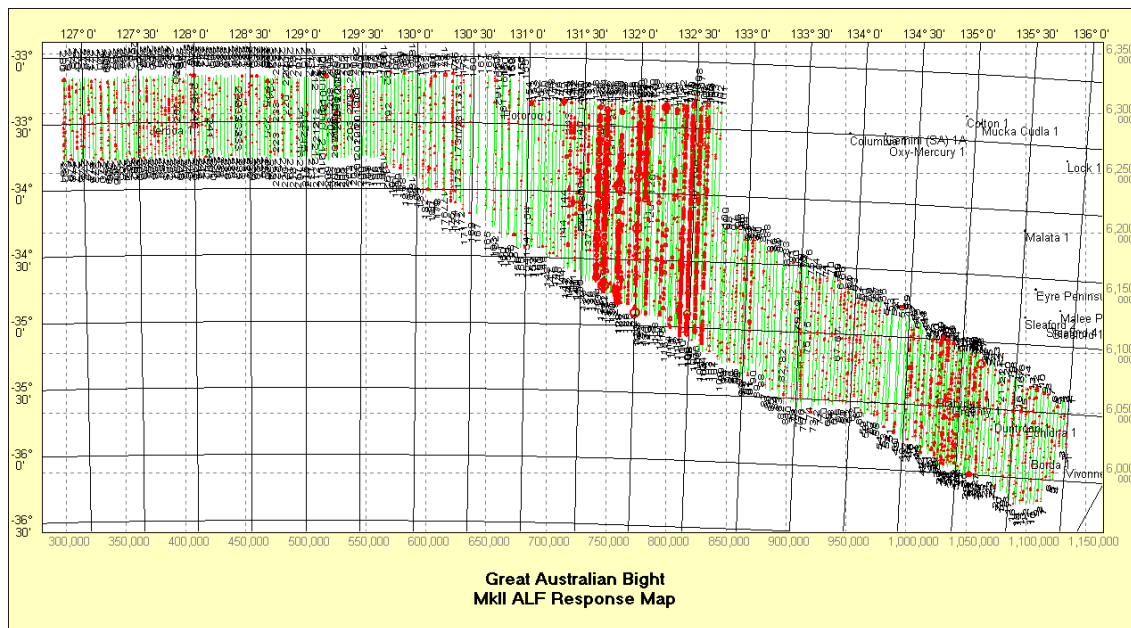


Figure 7. The Bight MkII ALF Survey First Pass Fluor Map.

A map of the first pass picking fluor response is shown in Figure 7. A large proportion of these selected fluors are of poor quality, having either high noise levels or low intensity. The following query uses the F/R area and fluorescence jitter parameters to select only good quality picks from the spectra parameters table:

```
SELECT * FROM [Fluors 1 Spectra Params] WHERE Fluor_Jitter_On_Area < .0045 AND  
Fluor_On_Raman > 0.2
```

The following query selects the corresponding records in the ALF spectra table:

```
SELECT [Fluors 1].* FROM [Fluors 1], [Conf Fluors 1 Spectra Params] WHERE [Fluors  
1.Line] = [Conf Fluors 1 Spectra Params.Line] AND [Fluors 1.Point] = [Conf Fluors 1  
Spectra Params.Point]
```

Figure 8 shows the map of refined fluor picks. Many of the picks scattered across the survey have been removed because they do not match the quality criteria. The region of dense, high intensity fluors plotted in the middle of the survey area is probably caused by data acquisition problems.

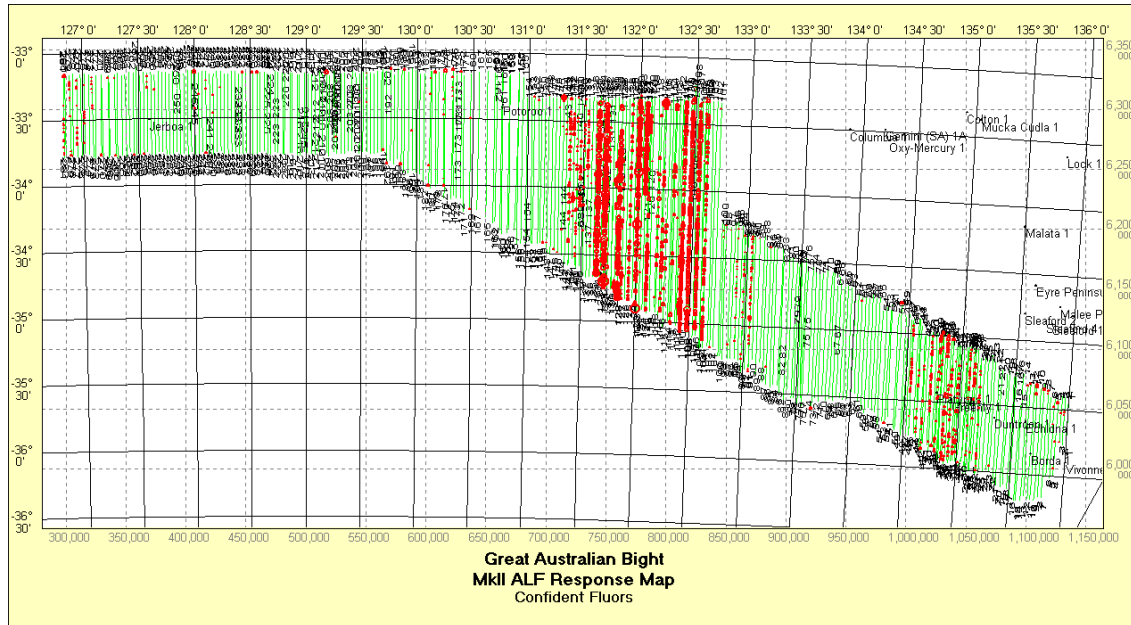


Figure 8. The Bight MkII ALF Survey Refined Fluor Map.

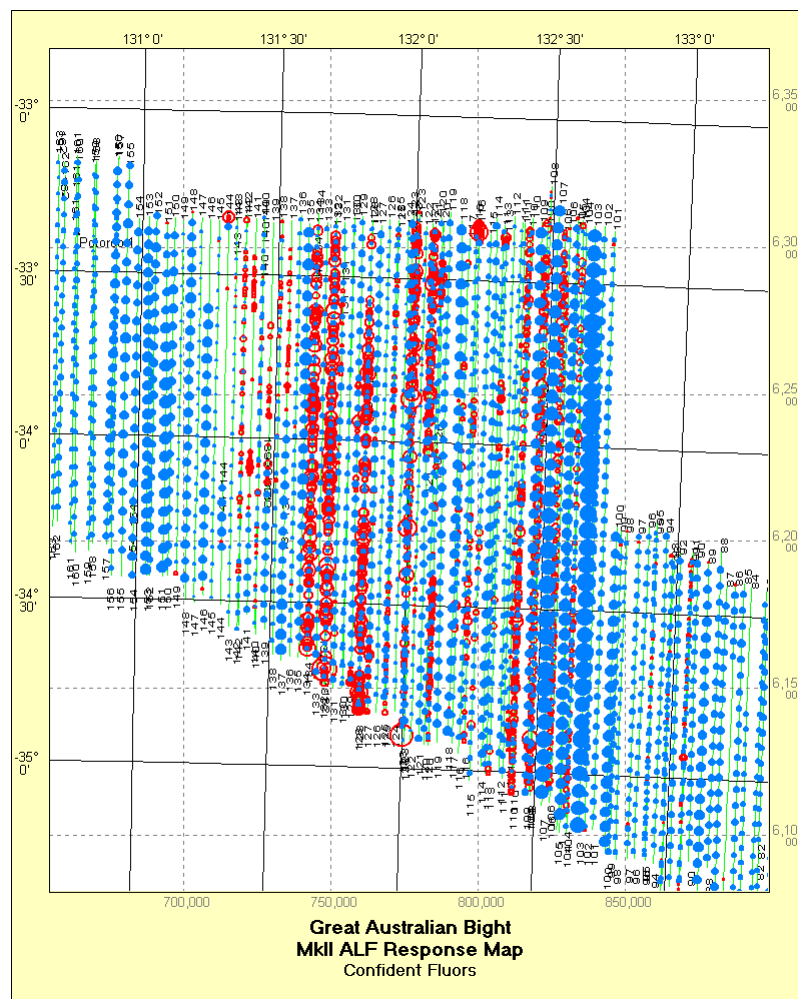


Figure 9. Detailed Map of the Noisy Lines with Average Raman Plotted.

Several lines near the middle of the survey show many fluors along their entire length. These lines are plotted in detail in Figure 9. The F/R is plotted in red for the detected fluors and the averaged Raman peak is plotted in blue.

The noisy lines tend to have a low average Raman peak level. Figure 10 shows the F/R plots for line 134. The F/R variance is high, ranging from negative values up to values larger than one. F/R plots for lines 141 and 152 are shown in Figures 11 and 12. Line 141 shows several noisy patches, but with no negative F/R values. Line 152 appears to contain good quality data having relatively low F/R variance.

The following query was used to exclude the noisy lines like line 134 from the fluors picked from the main table of spectra (RawAlfData):

```
SELECT * FROM [Conf Fluors 1] WHERE Line NOT IN (104, 106, 108, 110, 120, 121, 123, 125, 128, 130, 132, 134)
```

The number of detected fluors was reduced from 2,338 to 817.

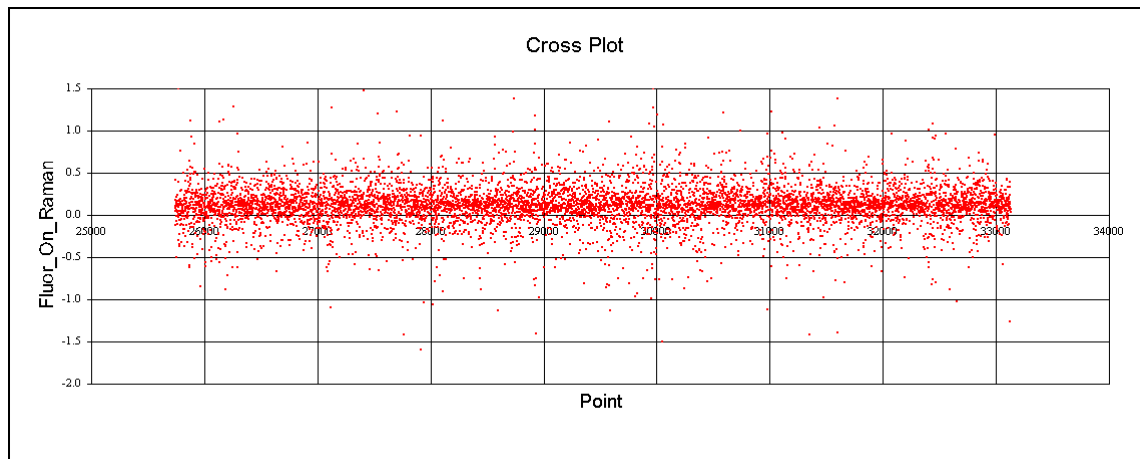


Figure 10. Line 134 F/R Plot.

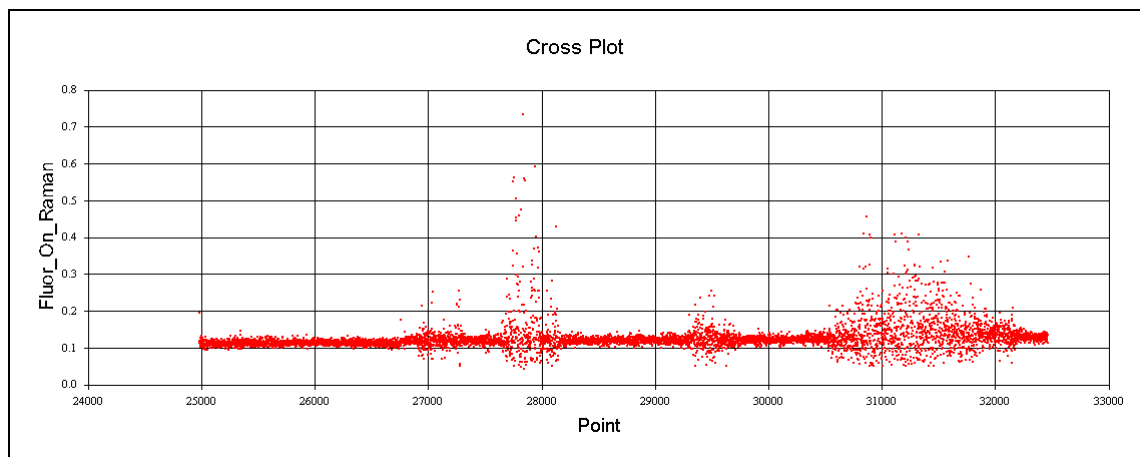


Figure 11. Line 141 F/R Plot.

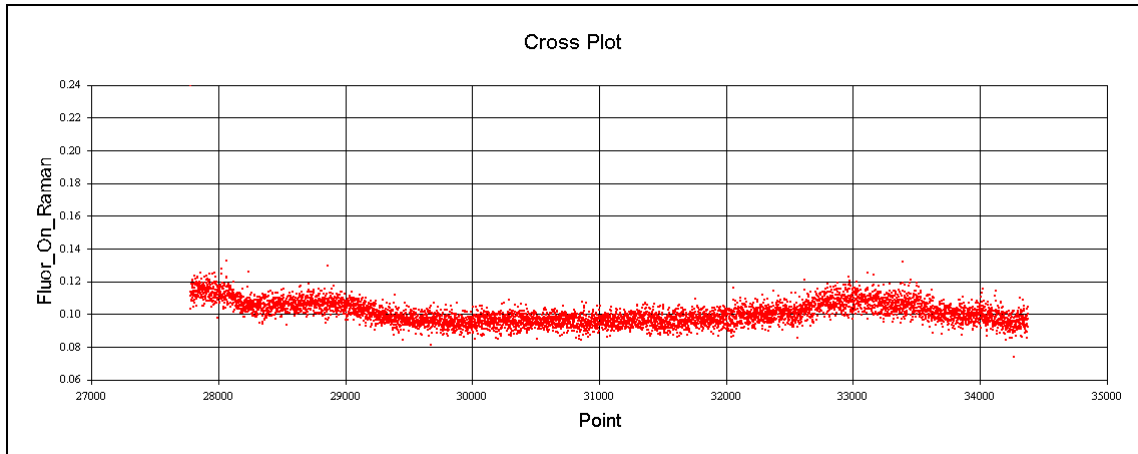


Figure 12. Line 152 F/R Plot.

Noisy spectra are also often found at the start or end of a line. Figure 13 shows the amplitude increase at long wavelengths that characterises this type of noise. These records were found by selecting records at the end of the lines in the map view and deleted from the tables of picked fluors.

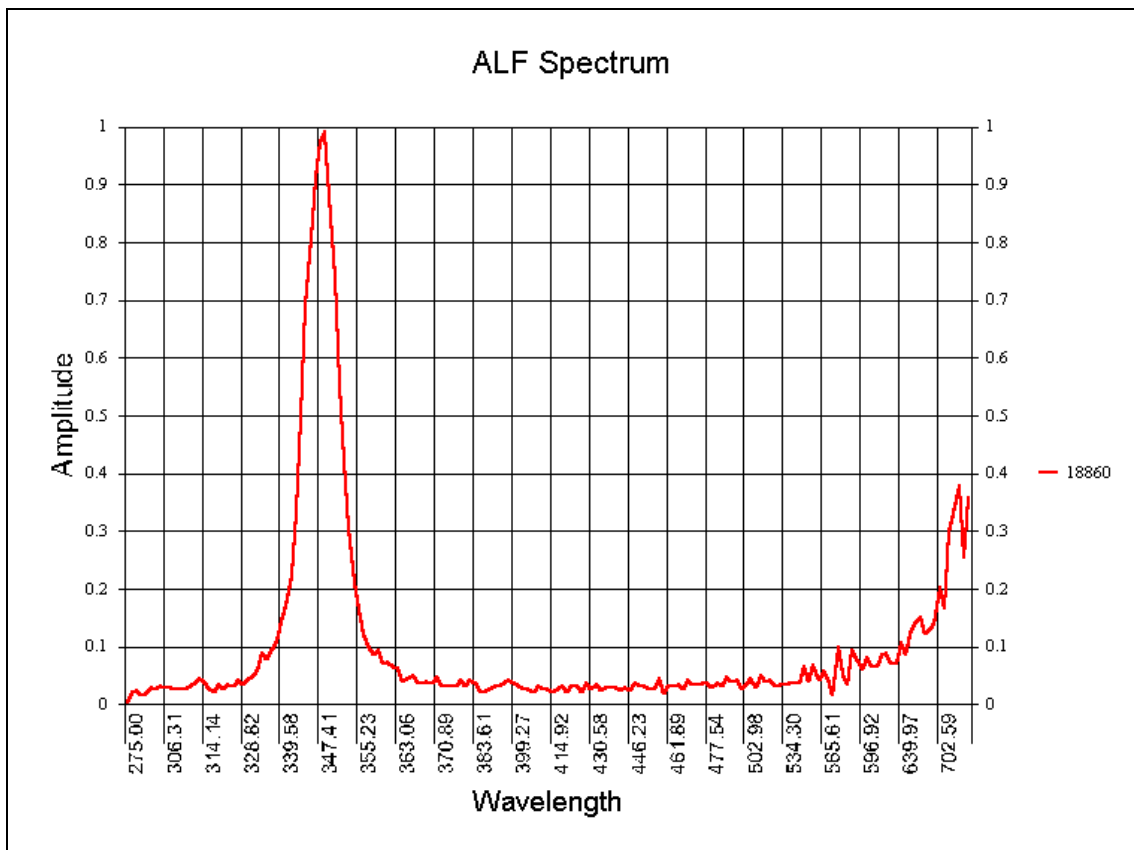


Figure 13. Line 271 Noisy End of Line Spectra.

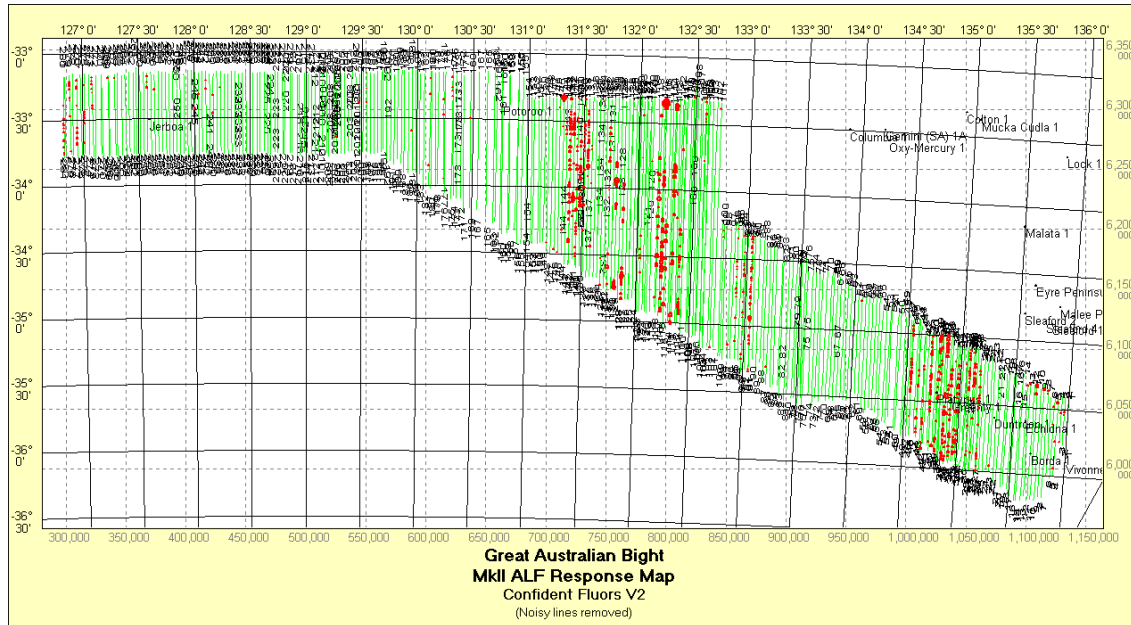


Figure 14. The Bight MkII ALF Survey Confident Fluor Map.

Figure 14 show the confident fluor map with the noisy data removed. 941 confident fluors are plotted. Each fluor is plotted as a red circle with the size proportional to the F/R ratio, which is a measure of the fluorescence intensity.

More detailed maps of the western, central and eastern parts of the survey are shown in Figures 15, 16 and 17.

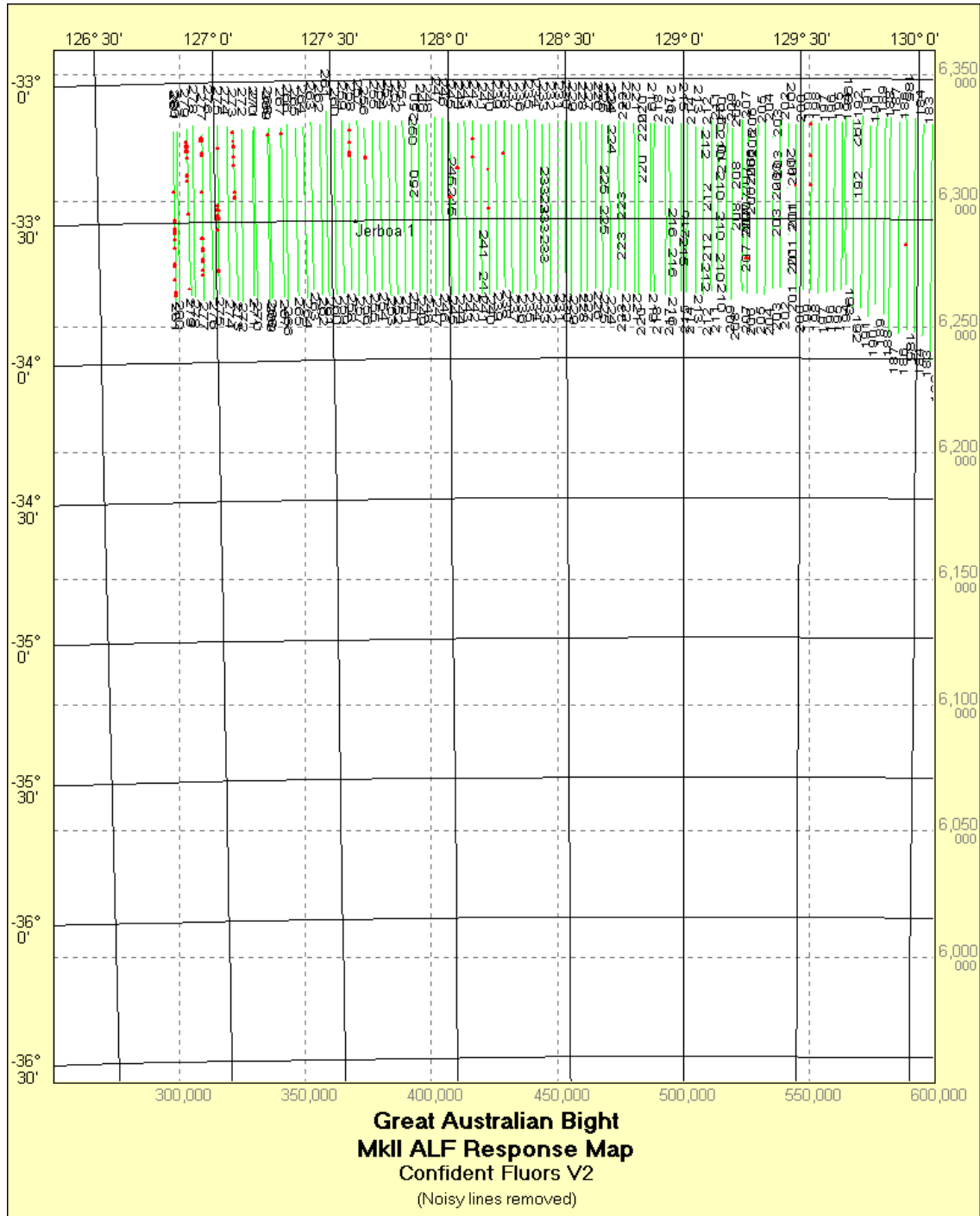


Figure 15. The Bight ALF Survey Confident Fluor Map (Western Map Sheet).

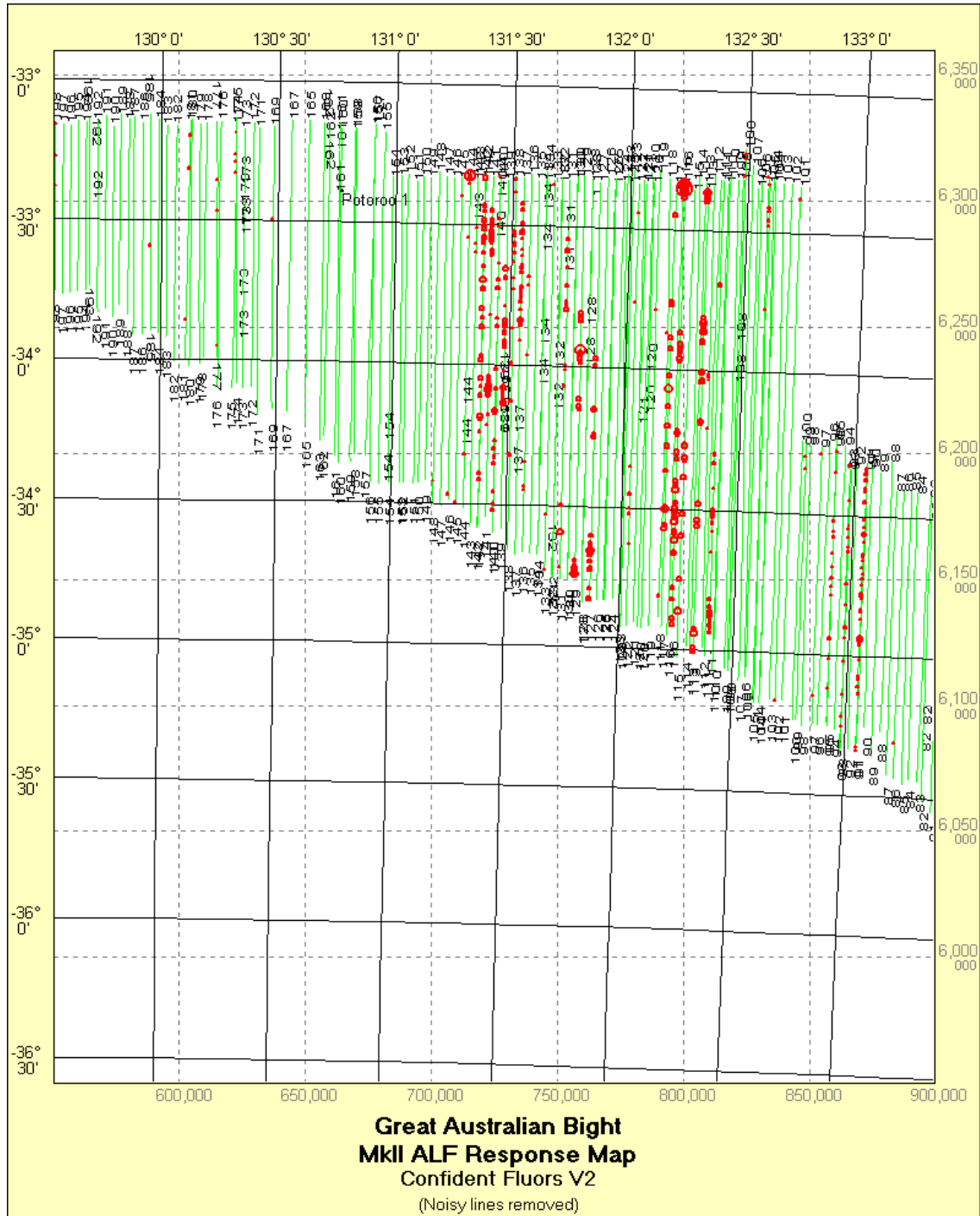


Figure 16. The Bight ALF Survey Confident Fluor Map (Central Map Sheet).

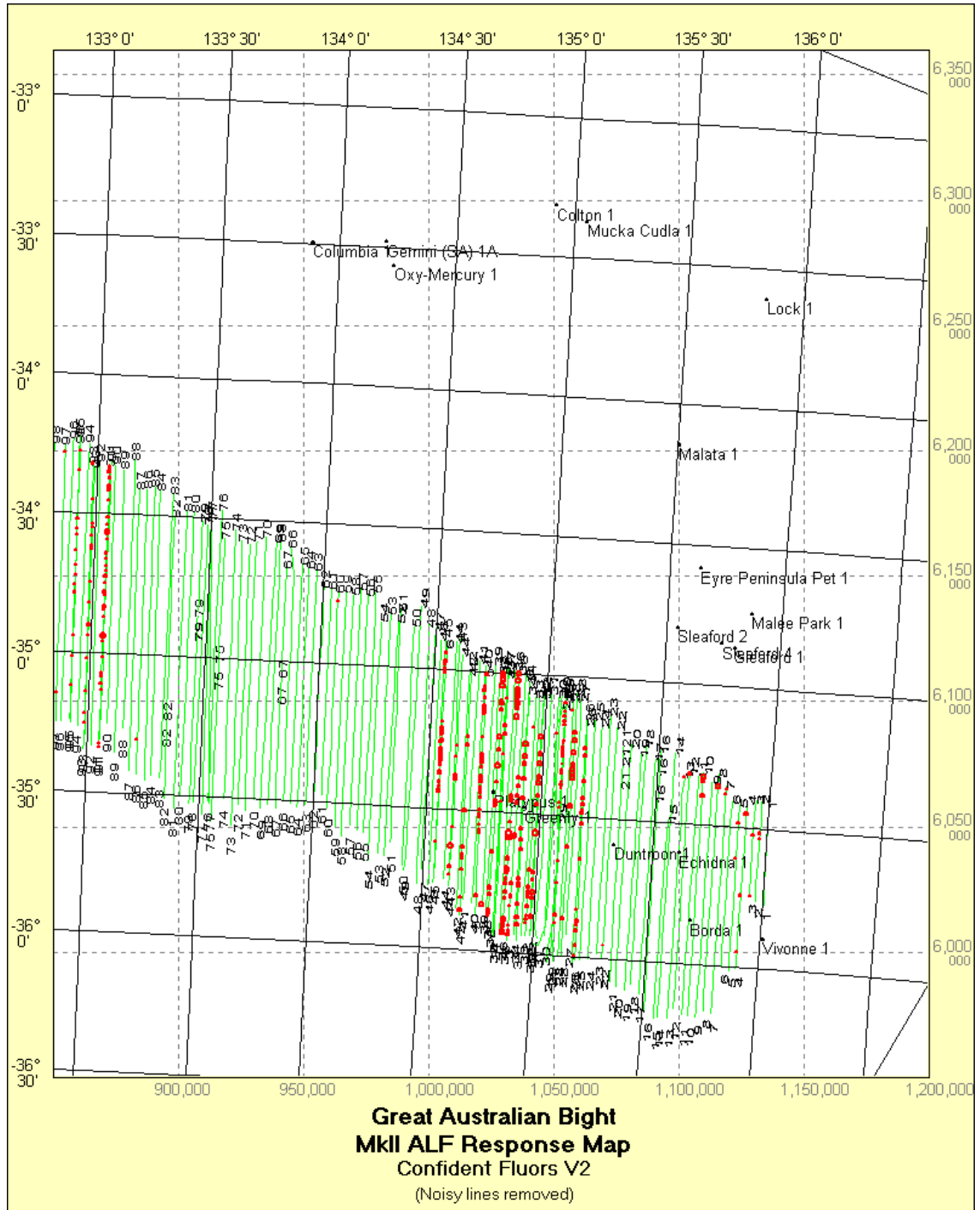


Figure 17. The Bight ALF Survey Confident Fluor Map (Eastern Map Sheet).

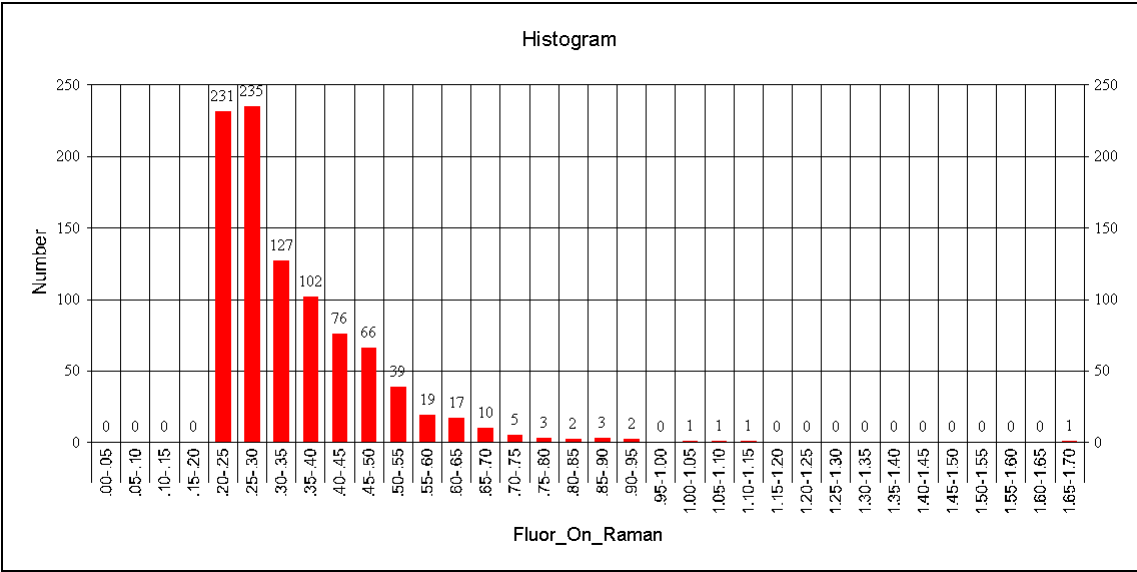
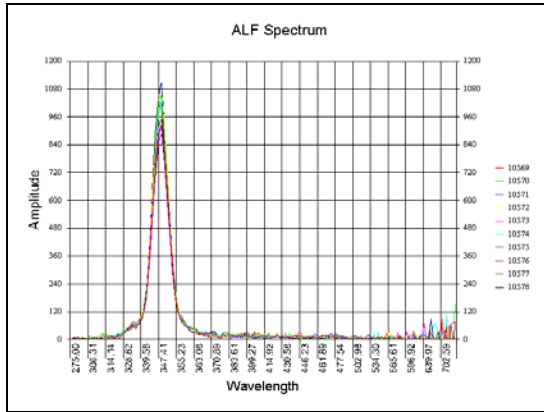
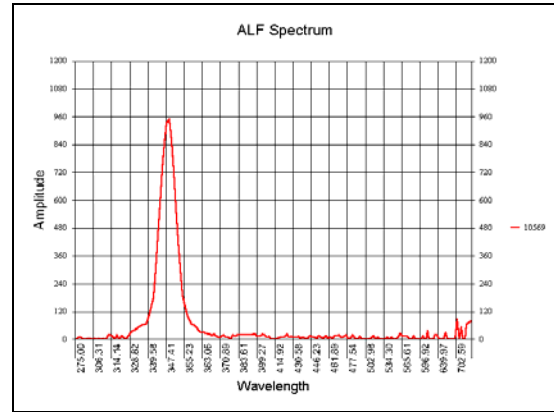


Figure 18. The F/R Histogram for the Confident Fluors.

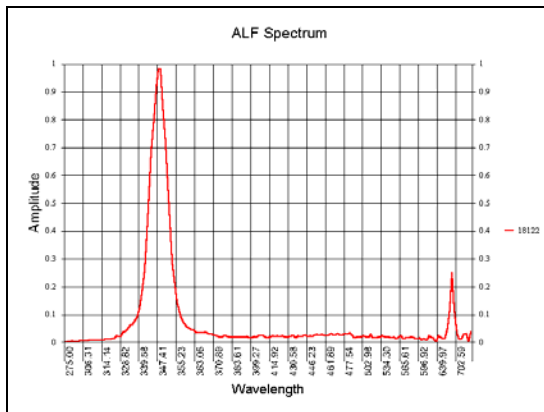
Figure 18 shows the fluor intensity (F/R) histogram for the confident fluor picks. Because a F/R cut-off of 0.20 was used as one of the fluor quality criteria, no fluors are plotted below the 0.20 range on the histogram.



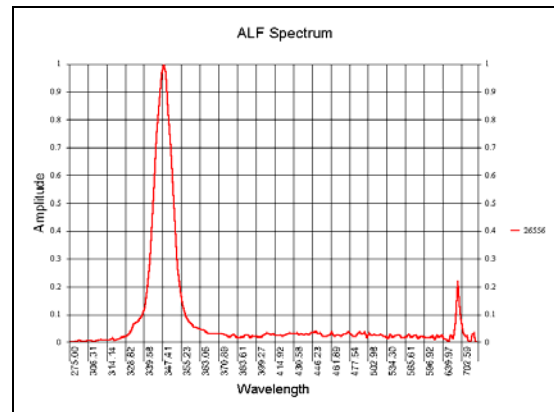
a) Line 37 Ten Adjacent Spectra.



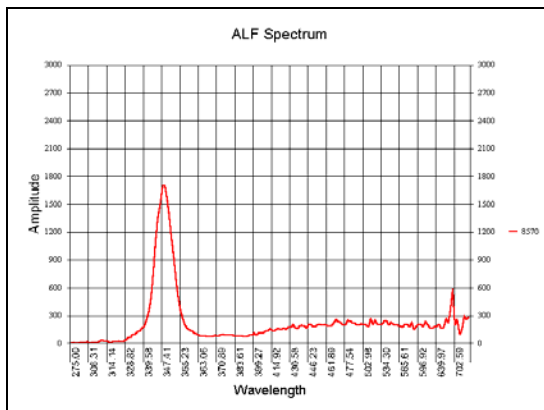
b) Line 375 No Fluor



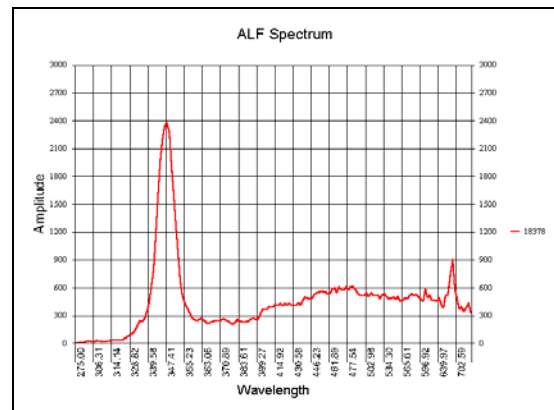
c) Line 99 Small Fluor



d) Line 91 Small to Medium Fluor



e) Line 127 Medium Fluor.



f) Line 116 Largest Fluor.

Figure 19. Bight ALF MkII Survey, Selected Spectra.

Figure 19 shows a selection of spectra from the Bight survey. Figure 19a shows a set of ten adjacent spectra on line 37. Because each recorded spectrum is the average of ten measured spectra, the variation in Raman peak is reduced. Figure 19b shows a single non-fluor spectrum. Figures 19c to 19f show picked fluors of increasing intensity.

2.2. Adjacent Fluor Detection

35 fluors out of the 941 picked fluors were found to be adjacent. Figure 20 shows the Bight fluor map with the adjacent fluors plotted with large blue symbols.

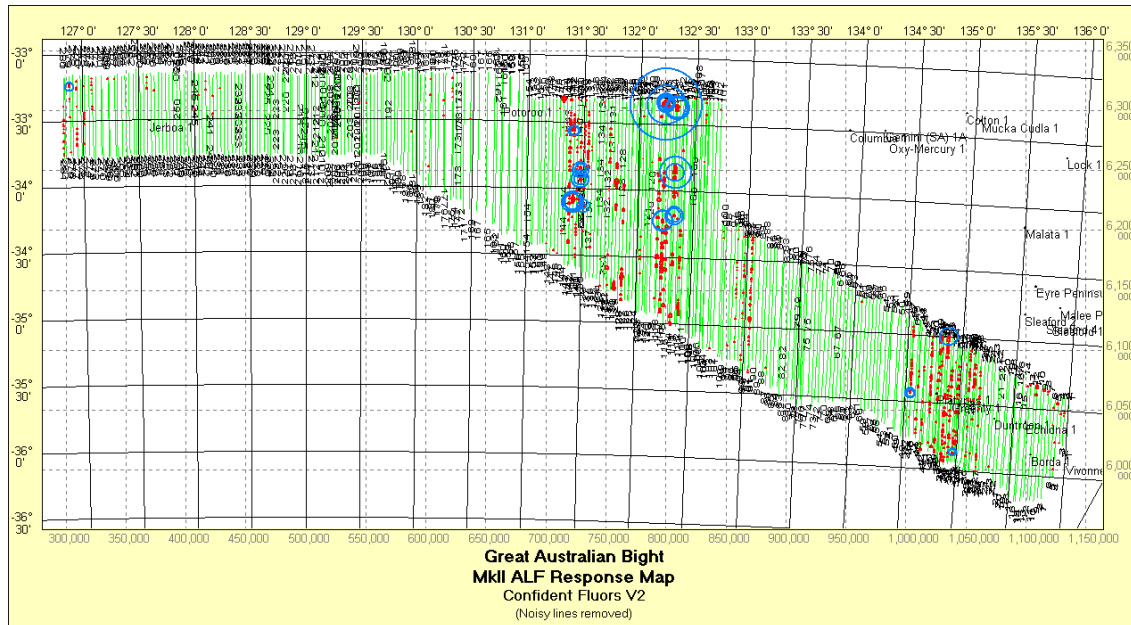


Figure 20. Bight ALF Fluor Map. Adjacent Fluors Plotted with Large Blue Symbols.

3. Conclusions and Recommendations

The spectra averaging process used to record MkII ALF data, combined with relatively high noise levels make fluor picking difficult with the Great Australian Bight ALF survey. The data is probably not suitable for reliably identifying the isolated, low intensity fluors usually detectable on ALF MkIII surveys. The use of sensitive fluor detection methods and noise rejection processes has however allowed fluor patterns to be mapped over the survey area.

The 3km line spacing is not sufficiently close to detect most fluor clusters. For example, the line spacing of 300m used on the MkIII ALF survey over the Skua field, Timor Sea (Cowley, 2000*), was only just sufficient to detect the fluor cluster lying near that accumulation.

A 101-point average F/R level is calculated for each spectrum to estimate the background level, which may vary across the survey area. Possible fluors are only selected if the F/R level is significantly above the background level. Detected spectra having low F/R or high random noise levels are rejected as unreliable picks. Manual checking is also used to remove noisy records.

The final fluor map shows three main regions having relatively dense fluors. A large patch over the Platypus-1 and Greenly-1 wells extends about 60km east-west and 100km north-south. Dense fluor patches are found near the middle of the survey but many of the lines in this area are affected by noise. Many lines here were excluded from the analysis because of high F/R variance, which may still affect the remaining lines to a lesser degree. A patch of fluors is also found at the western end of the survey.

*Bibliographic reference:

Cowley, R., 2000. 1996 Vulcan Sub-basin Airborne Laser Fluorosensor Survey Interpretation Report. Record 2000/33.

Appendix 1. Data Acquisition QC

Line	Sections	Clipped	Avg Raman Peak	Avg Raman Variance
1	0	0	0	0
1	0	0	0	0
1	0	0	0	0
2	23	0	7	5
4	34	0	6	5
6	37	0	6	5
8	0	0	0	0
8	47	0	6	5
10	53	0	6	5
12	0	0	0	0
12	47	0	6	4
14	58	0	6	4
16	46	0	6	4
16	4	0	5	4
18	51	0	6	5
20	48	0	6	5
21	2	0	24	21
21	0	0	0	0
21	0	0	0	0
21	45	0	21	22
22	0	0	0	0
22	0	0	0	0
22	0	0	0	0
22	51	0	6	5
23	54	0	14	12
24	47	0	6	5
25	53	0	13	11
26	52	0	7	6
27	55	0	13	11
28	51	0	7	5
29	19	0	11	12
29	57	0	14	13
30	55	0	7	6
30	0	0	0	0
30	0	0	0	0
31	56	0	13	11
32	48	0	7	6

Table 1a. Great Australian Bight ALF MkII Survey Data Acquisition Summary.

Line	Sections	Clipped	Avg Raman Peak	Avg Raman Variance
34	57	0	7	6
36	52	0	7	6
37	55	0	6	5
38	53	0	7	5
39	47	0	6	5
41	52	0	6	5
42	51	0	7	6
43	49	0	6	5
44	44	0	7	6
45	49	0	6	5
47	49	0	6	5
48	51	0	7	5
49	54	0	6	5
50	54	0	7	5
51	46	0	6	6
52	44	0	7	5
53	46	0	6	5
54	52	0	7	5
55	49	0	6	5
56	44	0	7	5
57	46	0	6	5
58	52	0	11	9
59	48	0	6	5
60	50	0	7	6
61	42	0	6	5
62	44	0	7	5
63	50	0	6	5
64	54	0	7	6
65	49	0	6	5
66	53	0	7	7
67	21	0	8	7
67	27	0	7	5
68	61	0	8	7
69	51	0	7	6
70	52	0	8	7
71	61	0	7	6
72	56	0	8	9

Table 1b. Great Australian Bight ALF MkII Survey Data Acquisition Summary (cont).

Line	Sections	Clipped	Avg Raman Peak	Avg Raman Variance
73	58	0	7	6
74	52	0	8	8
75	32	0	8	6
75	25	0	8	6
76	68	0	21	23
77	66	0	9	8
77	67	0	8	6
78	62	0	22	24
79	42	0	16	13
79	0	0	0	0
79	0	0	0	0
79	20	0	15	12
80	67	0	17	17
81	63	0	15	13
82	46	0	19	17
82	16	0	15	14
83	63	0	15	13
84	67	0	15	13
85	63	0	19	18
86	66	0	16	13
87	63	0	22	21
88	59	0	21	25
89	60	0	26	25
90	61	0	18	22
91	61	0	13	10
92	62	0	18	21
93	65	0	15	11
94	67	0	16	17
95	61	0	15	12
96	62	0	15	15
97	65	0	16	14
98	66	0	12	11
99	62	0	17	15
101	120	0	17	15
103	103	0	48	139
104	102	0	10	9
106	100	0	12	13

Table 1c. Great Australian Bight ALF MkII Survey Data Acquisition Summary (cont).

Line	Sections	Clipped	Avg Raman Peak	Avg Raman Variance
106	103	0	10	9
107	105	0	39	69
108	65	0	10	9
108	32	0	10	9
109	97	0	27	40
110	107	0	10	7
111	84	0	14	14
112	96	0	12	12
113	99	0	15	15
115	104	0	16	29
116	85	0	15	15
117	80	0	15	24
120	43	0	14	13
120	54	0	14	14
121	37	0	14	17
122	96	0	10	7
123	99	0	14	16
123	91	0	9	7
124	84	0	10	8
125	82	0	13	13
126	97	0	11	8
127	96	0	20	28
128	92	0	10	9
129	91	0	19	27
130	79	0	9	8
131	9	0	16	19
131	70	0	18	21
132	38	0	9	7
132	39	0	9	7
132	3	0	9	7
133	80	0	15	16
134	0	0	0	0
134	0	0	0	0
134	40	0	9	9
134	32	0	9	9
135	82	0	26	56
136	91	0	12	12

Table 1d. Great Australian Bight ALF MkII Survey Data Acquisition Summary (cont).

Line	Sections	Clipped	Avg Raman Peak	Avg Raman Variance
137	28	0	27	59
137	56	0	21	42
138	74	0	12	11
139	48	0	20	37
139	1	0	18	26
139	27	0	21	36
140	4	0	11	12
140	72	0	12	14
140	75	0	10	9
141	73	0	18	29
142	68	0	9	9
142	72	0	12	14
143	0	0	0	0
143	75	0	9	6
144	54	0	23	23
144	23	0	24	27
145	66	0	9	7
146	66	0	26	27
147	72	0	9	6
148	71	0	25	27
149	60	0	8	6
150	58	0	24	26
151	56	0	29	34
152	65	0	23	25
153	75	0	28	35
154	8	0	22	24
154	0	0	0	0
154	50	0	23	25
155	63	0	25	33
156	74	0	13	17
157	83	0	24	31
158	0	0	0	0
158	69	0	16	20
159	75	0	11	7
160	69	0	16	18
161	58	0	12	9
161	5	0	10	9

Table 1e. Great Australian Bight ALF MkII Survey Data Acquisition Summary (cont).

Line	Sections	Clipped	Avg Raman Peak	Avg Raman Variance
162	63	0	16	20
162	0	0	0	0
162	1	0	16	17
163	70	0	13	8
165	59	0	13	8
167	65	0	7	4
169	57	0	6	4
171	65	0	6	5
172	62	0	7	5
173	17	0	6	4
173	18	0	6	5
173	0	0	0	0
173	1	0	5	4
173	10	0	6	5
174	52	0	7	6
175	61	0	7	5
176	67	0	8	6
177	46	0	7	6
178	51	0	8	6
179	55	0	7	6
180	62	0	8	6
181	47	0	7	6
182	47	0	10	8
183	43	0	8	7
184	44	0	8	6
185	46	0	8	6
186	42	0	8	6
186	0	0	0	0
187	50	0	9	7
188	40	0	7	5
189	40	0	9	7
190	38	0	7	6
191	45	0	10	8
192	31	0	7	6
192	7	0	7	5
193	35	0	10	7
194	34	0	9	9

Table 1f. Great Australian Bight ALF MkII Survey Data Acquisition Summary (cont).

Line	Sections	Clipped	Avg Raman Peak	Avg Raman Variance
195	34	0	7	8
196	37	0	9	9
197	36	0	7	8
198	35	0	9	8
199	34	0	7	7
200	36	0	9	8
201	4	0	6	7
201	0	0	0	0
	109 deleted			
201	0	0	0	0
202	35	0	10	9
203	17	0	7	7
203	0	0	0	0
	75 deleted			
203	0	0	0	0
204	37	0	10	8
205	35	0	7	6
206	23	0	8	9
206	0	0	0	0
206	2	0	7	7
206	2	0	7	8
206	0	0	0	0
206	0	0	0	0
206	1	0	8	9
207	11	0	7	6
207	1	0	7	6
207	1	0	7	7
207	1	0	7	6
207	0	0	0	0
207	14	0	6	5
208	13	0	7	8
208	23	0	8	9
209	35	0	7	6
210	2	0	7	7
210	5	0	8	8
210	16	0	7	9
210	4	0	7	9

Table 1g. Great Australian Bight ALF MkII Survey Data Acquisition Summary (cont).

Line	Sections	Clipped	Avg Raman Peak	Avg Raman Variance
210	1	0	7	7
210	0	0	0	0
210	1	0	7	7
211	35	0	6	6
212	9	0	7	8
212	20	0	8	10
212	6	0	8	9
212	0	0	0	0
213	36	0	6	5
214	32	0	7	8
215	11	0	7	6
215	0	0	0	0
215	0	0	0	0
215	23	0	6	6
216	25	0	7	7
216	9	0	8	8
217	36	0	6	6
218	33	0	7	7
219	34	0	6	5
220	3	0	7	6
220	32	0	7	6
221	37	0	6	5
222	33	0	7	5
223	15	0	6	6
223	19	0	6	5
224	0	0	0	0
224	36	0	8	6
225	17	0	5	5
225	18	0	6	5
226	33	0	8	8
227	37	0	6	5
228	38	0	9	8
229	37	0	7	5
230	34	0	9	8
231	34	0	6	5
232	39	0	9	8
233	16	0	5	6

Table 1h. Great Australian Bight ALF MkII Survey Data Acquisition Summary (cont).

Line	Sections	Clipped	Avg Raman Peak	Avg Raman Variance
233	0	0	0	0
233	5	0	5	5
233	12	0	6	5
234	33	0	8	7
235	34	0	6	5
236	38	0	8	7
237	37	0	6	5
238	34	0	8	7
239	34	0	6	5
240	37	0	8	7
241	31	0	6	5
241	5	0	6	6
242	36	0	9	6
243	35	0	6	4
244	39	0	8	7
245	13	0	5	4
245	21	0	6	4
246	39	0	8	7
247	35	0	10	9
248	41	0	8	6
249	38	0	10	9
250	30	0	7	6
250	6	0	7	6
251	33	0	10	9
252	40	0	7	5
253	41	0	10	9
254	35	0	7	5
255	32	0	10	8
256	37	0	7	5
257	42	0	10	8
258	36	0	7	5
259	35	0	10	8
260	36	0	8	6
261	44	0	10	7
262	32	0	13	12
263	34	0	9	7
264	41	0	12	11

Table 1i. Great Australian Bight ALF MkII Survey Data Acquisition Summary (cont).

Line	Sections	Clipped	Avg Raman Peak	Avg Raman Variance
265	40	0	9	6
266	38	0	13	11
267	33	0	10	11
268	42	0	12	10
269	39	0	9	10
270	37	0	12	10
271	33	0	9	9
272	43	0	12	10
273	39	0	9	9
274	36	0	12	9
275	34	0	9	9
276	43	0	11	9
277	38	0	8	8
278	36	0	10	8
279	34	0	8	7
280	42	0	10	7
281	38	0	8	6
1	124	0	30	40
29	57	0	12	12
33	58	0	12	13
37	58	0	12	13
46	59	0	11	13
91	59	0	14	13
93	62	0	14	13
95	59	0	14	12
100	60	0	30	39
102	110	0	19	22
104	122	0	12	11
105	117	0	11	10
108	118	0	12	8
110	91	0	15	10
111	107	0	14	9
113	95	0	16	11
114	93	0	23	23
116	100	0	15	11
118	85	0	27	30
119	101	0	21	20

Table 1j. Great Australian Bight ALF MkII Survey Data Acquisition Summary (cont).

Line	Sections	Clipped	Avg Raman Peak	Avg Raman Variance
120	88	0	16	11
121	87	0	20	20
123	96	0	22	23
125	93	0	17	16
1	23	0	16	17
3	21	0	13	12
5	40	0	15	14
7	50	0	18	17
9	57	0	19	17
11	53	0	19	17
13	58	0	19	17
15	43	0	22	20
17	56	0	19	16
19	52	0	21	18
1	61	0	8	6
2	48	0	7	5
3	60	0	6	5
4	51	0	7	5
5	53	0	7	4
6	45	0	7	5
26	51	0	12	12
28	52	0	13	13
30	53	0	13	13
32	48	0	13	13
34	52	0	13	13
36	53	0	13	14
38	53	0	13	14
40	47	0	13	15
42	53	0	12	14
44	47	0	13	14
128	32	0	12	8
128	0	0	0	0
128	63	0	14	11
130	79	0	14	11
132	83	0	14	11
134	62	0	12	11
134	0	0	0	0
134	0	0	0	0
134	6	0	11	10

Table 1k. Great Australian Bight ALF MkII Survey Data Acquisition Summary (cont).

Table 1 shows the data acquisition QC parameters averaged for each line segment. The QC modules calculate values over 100 point intervals. The sections value indicates the number of 100 point intervals in the line segment.

Any Raman peak value greater than 32,000 is probably clipped. The number of sections containing clipped data is shown in the clipped column. The average Raman peak and averaged Raman variance are also shown in the table.

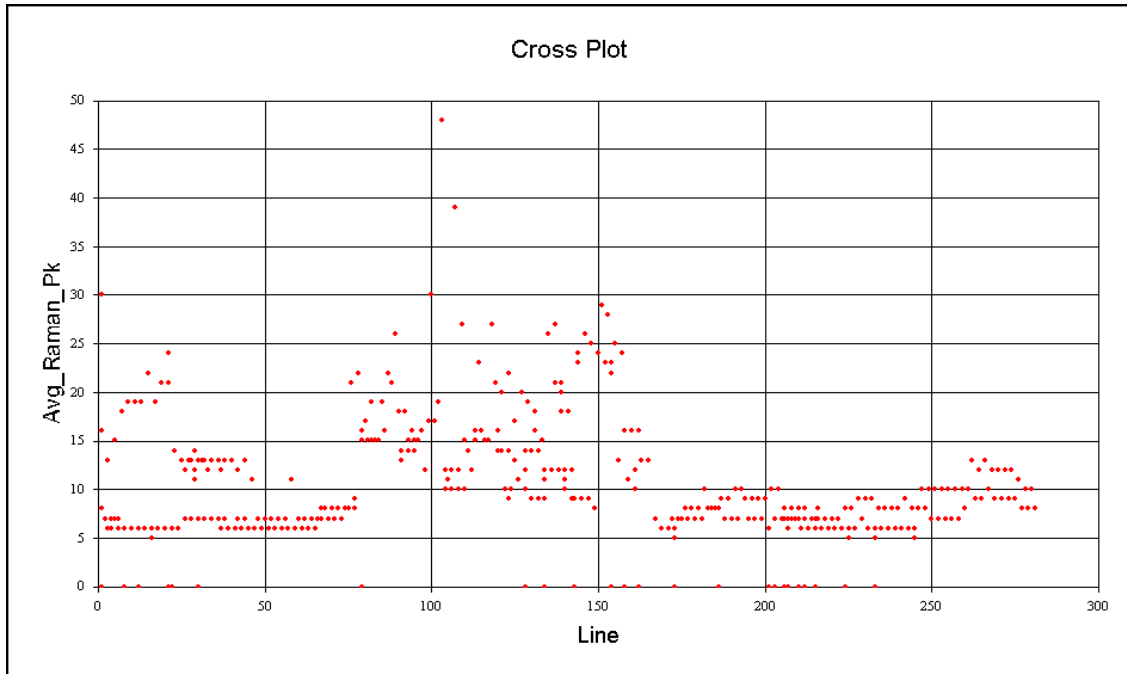


Figure 21. The Average Raman Peak Plotted for All Lines.

Figure 21 shows the average Raman peak plotted for all the lines in the survey. The average Raman peak levels, averaged over each line, was in the range from 5 to 10 for many lines. For other lines it ranged up to 30 or more.

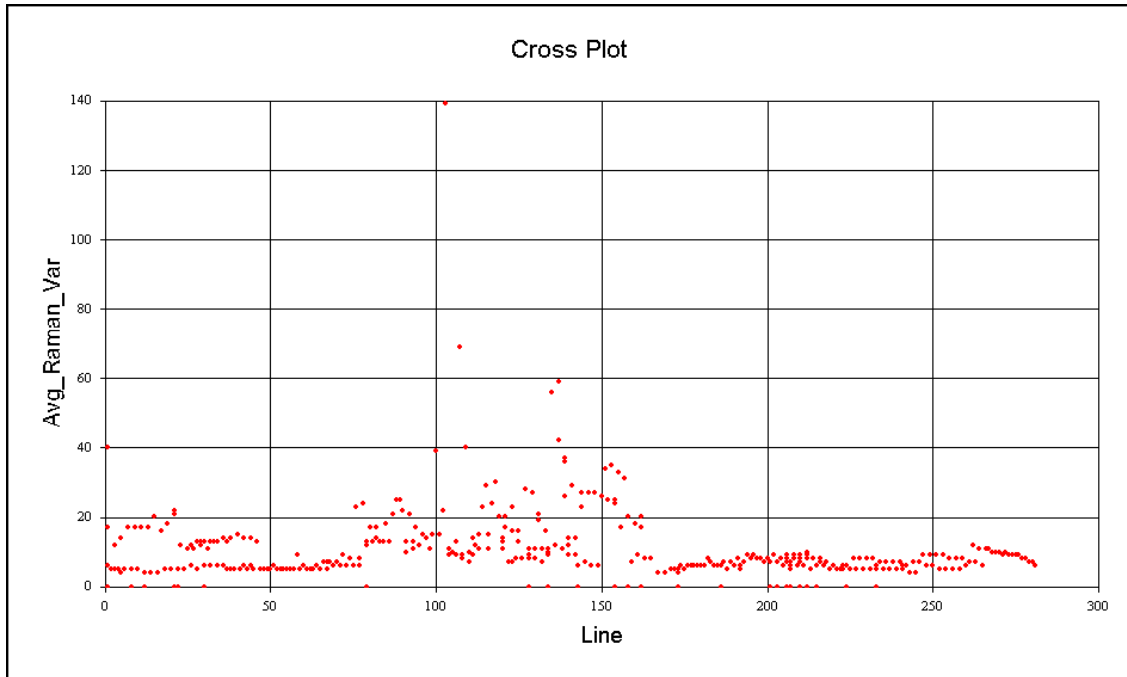


Figure 22. The Averaged Raman Variance Plotted for All Lines.

Figure 22 shows the averaged Raman variance plotted for all the lines in the survey. The Raman variance is calculated over 100 point windows and averaged over each line. This value often ranged from 5 to 10. The Raman variance usually increased with the Raman peak, sometimes exceeding a value of 40.

Figures 23 and 24 show the average Raman peak and variance calculated over 200 point intervals. The delectability of fluorescence anomalies in the data may be affected by the acquisition parameters that appear to change across the survey.

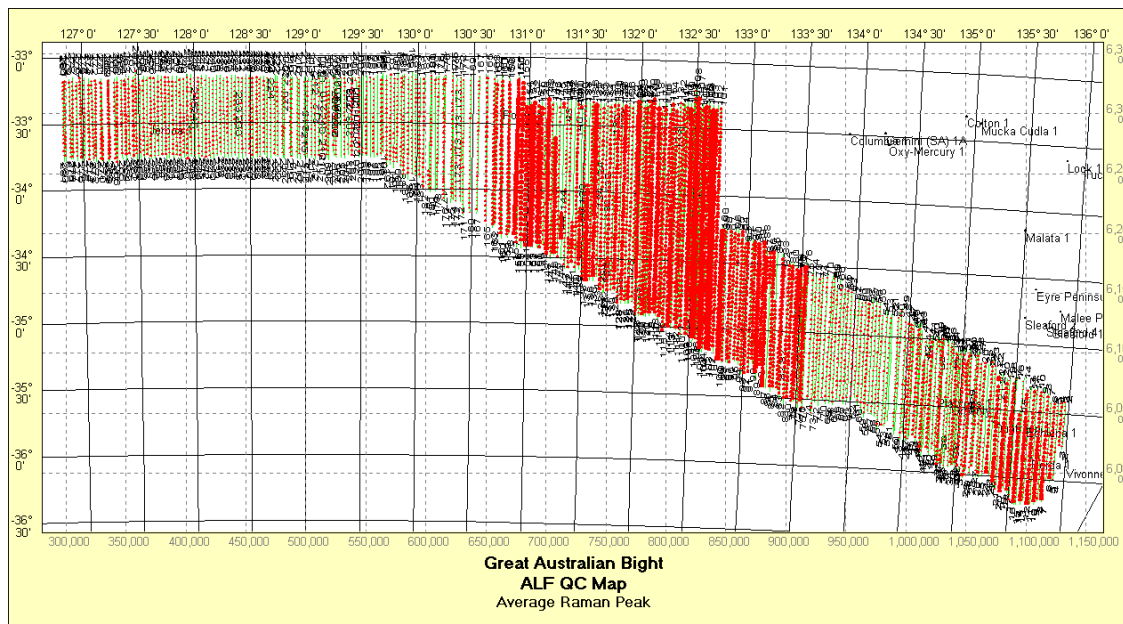


Figure 23. Average Raman Peak Map.

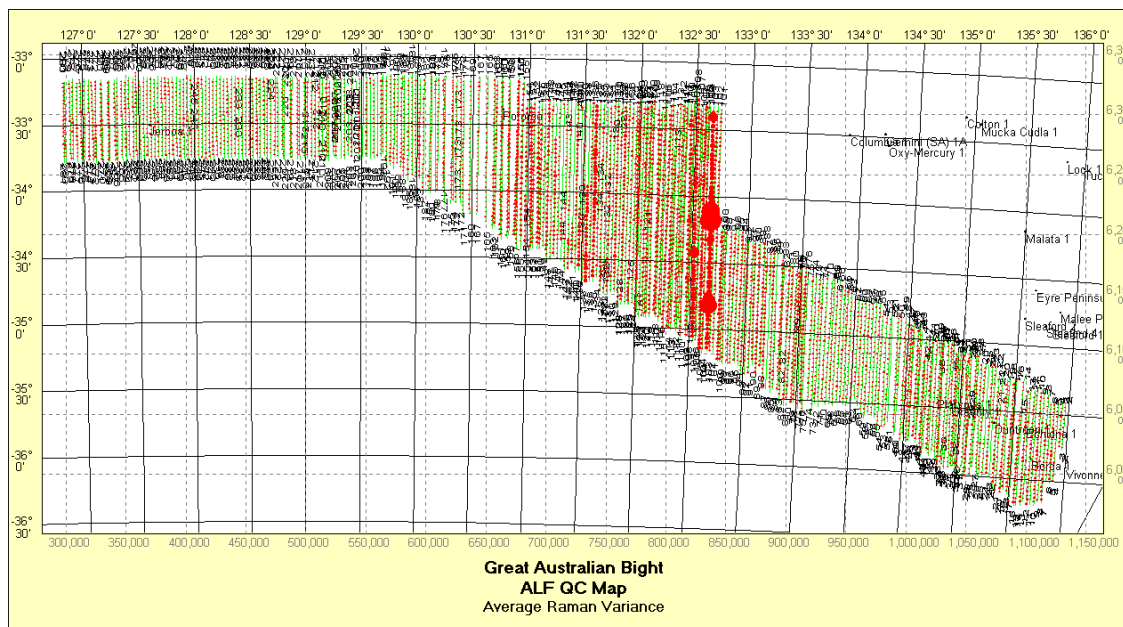


Figure 24. Raman Variance Map.

Figure 25 is a map of the averaged F/R ratio over the survey area. There are systematic variations in this ratio across the survey that require compensation during fluor picking.

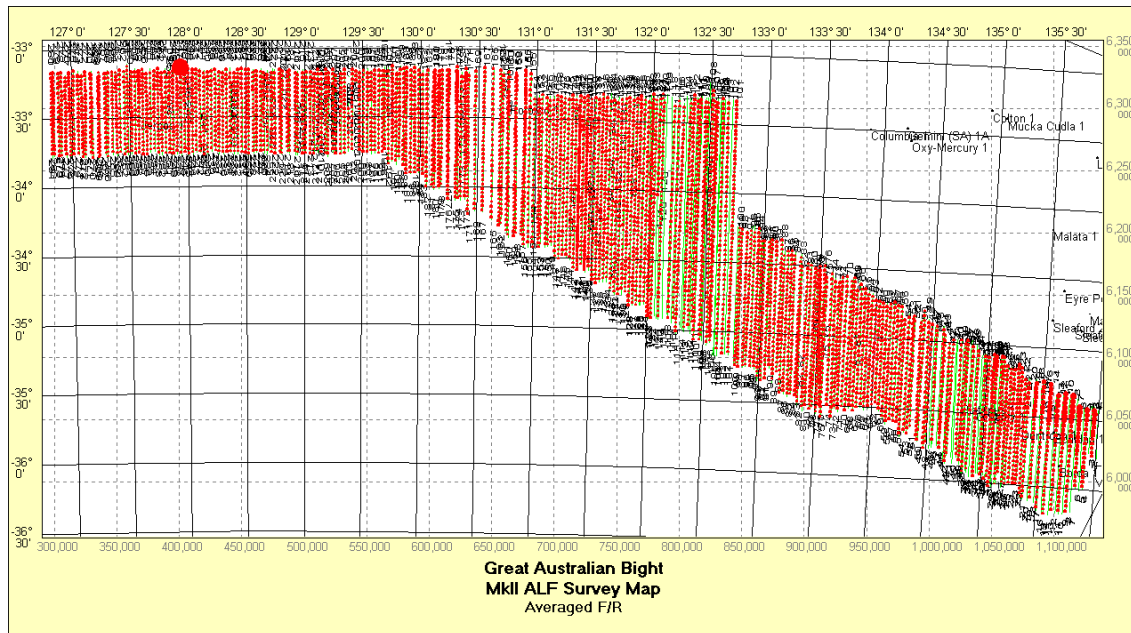


Figure 25. Averaged F/R Map.

Appendix 2. Data Navigation QC

Line	Heading (Deg)	Straight Line Distance (m)	Acquisition Time (seconds)	Avg Straight Line Velocity (km/hr)	Points	Flight Distance (m)	Avg Flying Velocity	Avg Point Spacing (m)
1	181.56	389.29	0	0	20	389.29	0	21.63
1	181.56	166.06	0	0	9	0.00	0	0.00
1	181.56	1,646.29	0	0	86	1,646.29	0	19.60
2	183.73	40,358.91	0	0	2,406	40,401.32	0	16.81
4	4.04	67,220.49	0	0	3,530	67,252.60	0	19.06
6	183.74	66,099.41	0	0	3,820	66,160.10	0	17.33
8	4.01	89.77	0	0	5	0.00	0	0.00
8	3.79	94,878.18	0	0	4,735	94,889.16	0	20.05
10	183.93	97,655.58	0	0	5,402	97,718.86	0	18.10
12	355.79	37.37	0	0	3	0.00	0	0.00
12	4.15	94,823.17	0	0	4,768	94,857.89	0	19.90
14	184.01	106,004.10	0	0	5,907	106,077.40	0	17.96
16	3.72	94,475.23	0	0	4,712	94,487.52	0	20.06
16	4.7	9,376.52	0	0	464	9,381.70	0	20.31
18	183.59	95,583.12	0	0	5,256	95,670.20	0	18.21
20	3.82	96,869.87	0	0	4,915	96,895.38	0	19.72
21	181.96	6,185.35	0	0	336	6,190.31	0	18.53
21	184.8	362.75	0	0	19	0.00	0	0.00
21	184.48	190.06	0	0	7	0.00	0	0.00
21	183.35	87,058.63	0	0	4,614	87,070.45	0	18.88
22	270	0.00	0	0	1	0.00	0	0.00
22	184.82	435.33	0	0	30	0.00	0	0.00
22	177.64	2,922.14	0	0	170	2,928.73	0	17.43
22	183.78	92,404.23	0	0	5,187	92,492.52	0	17.84
23	3.35	95,942.52	0	0	5,470	96,003.89	0	17.56
24	3.55	93,882.68	0	0	4,760	93,936.41	0	19.74
25	183.92	96,009.03	0	0	5,453	96,037.53	0	17.62
26	183.13	96,031.50	0	0	5,391	96,054.64	0	17.82
27	3.59	94,362.47	0	0	5,565	94,430.80	0	16.97
28	3.57	104,651.60	0	0	5,149	104,672.20	0	20.34
29	183.29	37,461.48	0	0	2,050	37,508.31	0	18.31
29	183.65	102,102.70	0	0	5,770	102,671.20	0	17.80
30	187.12	100,244.00	0	0	5,610	105,315.50	0	18.78
30	324.25	237.33	0	0	8	0.00	0	0.00
30	324.3	258.55	0	0	14	0.00	0	0.00
31	3.4	97,963.04	0	0	5,740	98,239.02	0	17.12
32	3.37	95,796.19	0	0	4,870	95,811.91	0	19.68

Table 2a. Great Australian Bight ALF MkII Survey Line Navigation Summary.

Line	Heading (Deg)	Straight Line Distance (m)	Acquisition Time (seconds)	Avg Straight Line Velocity (km/hr)	Points	Flight Distance (m)	Avg Flying Velocity	Avg Point Spacing (m)
34	182.87	103,102.00	0	0	5,766	103,159.30	0	17.90
36	3.72	104,596.90	0	0	5,360	104,615.80	0	19.53
37	183.14	105,054.80	0	0	5,606	105,100.70	0	18.75
38	183.8	97,437.31	0	0	5,425	97,458.93	0	17.97
39	3.15	96,136.63	0	0	4,861	96,237.66	0	19.81
41	183.98	95,311.69	0	0	5,266	95,343.58	0	18.11
42	182.76	96,242.55	0	0	5,115	96,293.42	0	18.83
43	2.58	94,592.17	0	0	4,999	94,633.97	0	18.94
44	3.55	93,025.47	0	0	4,551	93,047.30	0	20.45
45	182.94	95,456.41	0	0	5,056	95,478.33	0	18.89
47	3.6	96,673.77	0	0	4,950	96,742.84	0	19.55
48	2.72	103,464.20	0	0	5,150	103,493.60	0	20.10
49	183.92	105,882.10	0	0	5,550	105,968.80	0	19.10
50	182.93	95,525.66	0	0	5,514	95,543.14	0	17.33
51	2.63	93,505.53	0	0	4,684	93,551.53	0	19.98
52	3.66	94,270.66	0	0	4,517	94,295.79	0	20.89
53	3.06	96,186.68	0	0	4,710	96,265.46	0	20.45
54	183.2	95,879.20	0	0	5,290	95,893.81	0	18.13
55	183.02	95,996.85	0	0	5,003	96,006.30	0	19.20
56	2.82	94,310.71	0	0	4,508	94,354.43	0	20.94
57	2.89	94,690.03	0	0	4,658	94,781.56	0	20.36
58	183.02	96,295.60	0	0	5,349	96,315.21	0	18.01
59	182.67	94,310.80	0	0	4,955	94,358.23	0	19.05
60	183.02	86,344.97	0	0	5,101	86,415.45	0	16.95
61	2.8	82,630.20	0	0	4,302	82,666.57	0	19.22
62	2.88	85,219.77	0	0	4,515	85,274.24	0	18.90
63	182.77	93,195.24	0	0	5,106	93,223.52	0	18.26
64	182.93	95,410.56	0	0	5,560	95,562.45	0	17.19
65	3	95,961.86	0	0	5,010	96,034.31	0	19.18
66	1.77	101,715.40	0	0	5,410	102,107.50	0	18.88
67	182.77	43,560.63	0	0	2,275	43,607.87	0	19.19
67	182.47	52,492.48	0	0	2,727	52,547.92	0	19.28
68	182.85	105,212.80	0	0	6,190	105,294.10	0	17.02
69	3.64	107,364.50	0	0	5,205	107,374.80	0	20.64
70	2.64	105,386.90	0	0	5,250	105,456.80	0	20.09
71	182.56	107,794.20	0	0	6,146	107,871.10	0	17.56
72	182.77	103,904.30	0	0	5,700	104,022.30	0	18.26

Table 2b. Great Australian Bight ALF MkII Survey Line Navigation Summary (cont).

Line	Heading (Deg)	Straight Line Distance (m)	Acquisition Time (seconds)	Avg Straight Line Velocity (km/hr)	Points	Flight Distance (m)	Avg Flying Velocity	Avg Point Spacing (m)
73	2.2	113,767.30	0	0	5,907	113,837.80	0	19.28
74	2.57	107,786.80	0	0	5,345	107,817.20	0	20.18
75	2.69	63,951.87	0	0	3,326	63,966.34	0	19.24
75	3.11	49,222.65	0	0	2,564	49,232.74	0	19.22
76	2.84	116,227.40	0	0	6,904	116,263.70	0	16.84
77	180.56	113,563.50	0	0	6,748	113,590.70	0	16.84
77	181.83	116,442.30	0	0	6,853	116,481.70	0	17.00
78	183.15	111,286.30	0	0	6,350	111,311.60	0	17.53
79	2.76	75,300.42	0	0	4,283	75,335.43	0	17.60
79	3.29	487.82	0	0	25	487.82	0	21.21
79	3.33	262.64	0	0	15	0.00	0	0.00
79	3.25	36,425.82	0	0	2,093	36,453.05	0	17.43
80	3.01	113,509.60	0	0	6,708	113,543.00	0	16.93
81	182.71	118,746.50	0	0	6,445	118,771.40	0	18.43
82	182.35	80,797.48	0	0	4,673	80,803.43	0	17.30
82	181.76	31,312.33	0	0	1,776	31,316.37	0	17.65
83	2.83	114,016.70	0	0	6,405	114,071.70	0	17.82
84	2.06	113,995.20	0	0	6,794	114,043.60	0	16.79
85	182.11	117,404.20	0	0	6,355	117,432.20	0	18.48
86	182.3	114,248.70	0	0	6,754	114,273.50	0	16.92
87	2.27	113,066.00	0	0	6,395	113,170.20	0	17.70
88	2.59	107,862.30	0	0	5,950	107,882.50	0	18.14
89	182.04	113,151.90	0	0	6,198	113,175.80	0	18.27
90	181.78	103,580.80	0	0	6,247	103,643.20	0	16.60
91	2.32	111,065.30	0	0	6,150	111,199.50	0	18.09
92	1.8	113,622.40	0	0	6,350	113,695.50	0	17.91
93	182.36	110,690.90	0	0	6,593	110,715.30	0	16.80
94	182.43	112,909.50	0	0	6,760	112,945.80	0	16.71
95	2.16	110,128.30	0	0	6,205	110,200.60	0	17.77
96	2.59	113,085.30	0	0	6,350	113,099.50	0	17.82
97	182.12	110,678.40	0	0	6,695	110,705.50	0	16.54
98	182.02	111,475.70	0	0	6,694	111,546.40	0	16.67
99	2.16	110,115.20	0	0	6,250	110,155.70	0	17.63
101	182.14	203,753.00	0	0	12,155	203,759.00	0	16.77
103	1.59	204,667.20	0	0	10,420	204,735.80	0	19.65
104	1.68	203,213.20	0	0	10,369	203,228.40	0	19.60
106	2.05	196,510.40	0	0	10,125	196,544.10	0	19.42

Table 2c. Great Australian Bight ALF MkII Survey Line Navigation Summary (cont).

Line	Heading (Deg)	Straight Line Distance (m)	Acquisition Time (seconds)	Avg Straight Line Velocity (km/hr)	Points	Flight Distance (m)	Avg Flying Velocity	Avg Point Spacing (m)
106	181.67	190,525.30	0	0	10,326	190,545.70	0	18.46
107	181.8	204,477.90	0	0	10,565	204,531.50	0	19.36
108	1.77	129,583.50	0	0	6,663	129,673.10	0	19.47
108	2.01	63,583.84	0	0	3,301	63,608.00	0	19.28
109	1.63	194,308.00	0	0	9,805	194,345.30	0	19.83
110	181.89	193,157.20	0	0	10,825	193,196.60	0	17.85
111	1.81	179,065.80	0	0	8,534	179,113.20	0	20.99
112	181.63	187,802.00	0	0	9,770	187,838.90	0	19.23
113	181.92	184,019.40	0	0	10,062	184,160.90	0	18.31
115	2.29	186,000.30	0	0	10,556	186,227.30	0	17.65
116	1.67	177,223.60	0	0	8,575	177,252.10	0	20.68
117	182.08	171,894.40	0	0	8,120	171,950.40	0	21.18
120	180.93	79,049.38	0	0	4,446	79,260.59	0	17.84
120	181.76	101,768.60	0	0	5,517	101,871.00	0	18.47
121	181.82	79,331.72	0	0	3,715	79,357.95	0	21.37
122	181.8	175,902.00	0	0	9,670	176,000.20	0	18.20
123	1.68	174,232.80	0	0	10,020	174,418.00	0	17.41
123	1.74	181,259.30	0	0	9,220	181,456.70	0	19.69
124	1.67	165,715.70	0	0	8,530	165,824.50	0	19.44
125	181.65	164,790.10	0	0	8,376	164,857.60	0	19.69
126	181.63	167,927.00	0	0	9,822	168,046.90	0	17.11
127	181.66	165,711.80	0	0	9,723	165,768.50	0	17.05
128	181.65	165,520.40	0	0	9,288	165,750.50	0	17.85
129	1.46	158,486.60	0	0	9,185	158,500.00	0	17.26
130	1.5	156,812.80	0	0	8,043	156,980.80	0	19.52
131	181.09	20,772.18	0	0	1,090	20,789.03	0	19.11
131	181.54	137,421.00	0	0	7,030	137,468.70	0	19.56
132	181.5	73,431.03	0	0	3,892	73,500.55	0	18.89
132	181.53	76,623.99	0	0	4,060	76,722.05	0	18.91
132	178.63	6,008.19	0	0	323	6,012.87	0	18.73
133	1.5	155,865.40	0	0	8,089	155,898.40	0	19.28
134	1.5	301.81	0	0	16	0.00	0	0.00
134	1.5	28.45	0	0	3	0.00	0	0.00
134	1.38	79,767.24	0	0	4,065	79,832.26	0	19.65
134	1.46	65,228.20	0	0	3,328	65,300.87	0	19.63
135	181.58	147,908.80	0	0	8,384	148,111.10	0	17.67
136	181.5	150,327.20	0	0	9,121	150,374.50	0	16.49

Table 2d. Great Australian Bight ALF MkII Survey Line Navigation Summary (cont).

Line	Heading (Deg)	Straight Line Distance (m)	Acqui sition Time (seco nds)	Avg Strai ght Line Veloc ity (km/h r)	Points	Flight Distance (m)	Avg Flyin g Veloc ity	Avg Point Spacing (m)
137	1.26	48,898.30	0	0	2,903	48,957.21	0	16.88
137	1.5	100,763.50	0	0	5,625	100,851.50	0	17.94
138	1.4	148,240.60	0	0	7,538	148,240.60	0	19.67
139	181.54	83,582.66	0	0	4,987	83,663.30	0	16.78
139	179.91	4,609.72	0	0	259	4,614.83	0	17.96
139	181.22	50,042.59	0	0	2,820	50,075.08	0	17.77
140	181.35	9,422.94	0	0	491	9,422.94	0	19.27
140	181.3	132,464.60	0	0	7,322	132,508.50	0	18.10
140	181.43	137,928.40	0	0	7,545	137,991.70	0	18.29
141	1.36	134,877.80	0	0	7,479	135,041.70	0	18.06
142	1.27	138,109.20	0	0	6,998	138,127.00	0	19.74
142	1.46	141,071.70	0	0	7,281	141,151.70	0	19.39
143	181.29	1,595.73	0	0	96	1,595.73	0	16.98
143	181.31	137,450.20	0	0	7,568	137,462.80	0	18.17
144	181.28	90,624.52	0	0	5,528	90,698.88	0	16.41
144	181.31	40,896.84	0	0	2,406	40,939.95	0	17.03
145	1.21	128,855.30	0	0	6,645	128,914.50	0	19.41
146	1.05	128,114.80	0	0	6,753	128,228.90	0	18.99
147	181.17	131,071.60	0	0	7,295	131,135.70	0	17.98
148	181.15	131,595.40	0	0	7,193	131,697.20	0	18.31
149	1.2	120,272.10	0	0	6,145	120,362.20	0	19.59
150	1.18	121,633.50	0	0	5,900	121,657.20	0	20.63
151	180.88	119,803.90	0	0	5,743	119,872.40	0	20.88
152	181.22	122,553.70	0	0	6,600	122,607.50	0	18.58
153	0.35	122,086.90	0	0	7,656	122,151.60	0	15.96
154	0.62	17,296.46	0	0	833	17,301.50	0	20.82
154	270	0.00	0	0	1	0.00	0	0.00
154	1.11	103,948.00	0	0	5,108	103,948.00	0	20.36
155	181.24	139,479.90	0	0	6,395	139,554.60	0	21.83
156	180.96	142,000.40	0	0	7,533	142,055.00	0	18.86
157	1.91	132,118.80	0	0	8,315	132,152.90	0	15.90
158	0.44	86.93	0	0	6	0.00	0	0.00
158	0.57	130,001.40	0	0	7,043	130,030.30	0	18.47
159	181.01	131,230.80	0	0	7,640	131,295.40	0	17.19
160	180.54	132,652.10	0	0	6,938	132,749.60	0	19.14
161	0.91	121,275.50	0	0	5,943	121,279.40	0	20.41
161	0.96	10,953.06	0	0	548	10,953.06	0	20.06

Table 2e. Great Australian Bight ALF MkII Survey Line Navigation Summary (cont).

Line	Heading (Deg)	Straight Line Distance (m)	Acqui sition Time (seco nds)	Avg Strai ght Line Veloc ity (km/h r)	Points	Flight Distance (m)	Avg Flyin g Veloc ity	Avg Point Spacing (m)
162	1.27	117,833.50	0	0	6,399	117,854.20	0	18.42
162	358.26	252.89	0	0	13	0.00	0	0.00
162	357.76	4,076.16	0	0	224	4,076.24	0	18.36
163	180.94	126,422.10	0	0	7,132	126,441.30	0	17.73
165	0.83	121,971.70	0	0	5,956	121,986.30	0	20.49
167	181.19	115,432.90	0	0	6,690	115,465.10	0	17.26
169	0.57	112,378.60	0	0	5,718	112,400.60	0	19.66
171	180.48	114,069.00	0	0	6,606	114,103.50	0	17.28
172	180.66	105,129.70	0	0	6,388	105,142.30	0	16.46
173	0.76	36,278.43	0	0	1,845	36,282.02	0	19.69
173	0.75	37,762.58	0	0	1,892	37,768.30	0	19.98
173	1.02	2,878.67	0	0	145	2,878.67	0	20.13
173	0.12	3,608.17	0	0	174	3,608.26	0	20.98
173	0.73	22,088.34	0	0	1,092	22,089.92	0	20.27
174	0.06	103,205.30	0	0	5,300	103,220.00	0	19.48
175	181.07	107,717.70	0	0	6,206	107,813.30	0	17.38
176	180.87	105,951.30	0	0	6,804	105,971.50	0	15.58
177	359.91	94,866.42	0	0	4,697	94,897.41	0	20.21
178	0.99	93,731.99	0	0	5,142	93,752.43	0	18.24
179	180.32	95,588.95	0	0	5,595	95,620.88	0	17.10
180	180.62	97,924.62	0	0	6,273	97,960.22	0	15.62
181	1.43	95,293.31	0	0	4,850	95,313.86	0	19.66
182	180.85	94,034.55	0	0	4,850	94,069.16	0	19.40
183	0.44	84,111.45	0	0	4,460	84,137.48	0	18.87
184	0.23	85,302.80	0	0	4,470	85,310.31	0	19.09
185	359.81	85,981.53	0	0	4,715	85,993.13	0	18.25
186	180.42	84,414.76	0	0	4,351	84,434.70	0	19.41
186	180.16	2,066.99	0	0	108	2,067.00	0	19.50
187	180.59	86,135.95	0	0	5,103	86,153.82	0	16.89
188	0.65	77,947.13	0	0	4,067	77,949.40	0	19.18
189	0.68	75,805.62	0	0	4,162	75,824.25	0	18.23
190	180.61	75,732.58	0	0	3,943	75,767.05	0	19.23
191	180.46	76,740.35	0	0	4,547	76,765.05	0	16.89
192	359.87	61,486.96	0	0	3,164	61,503.13	0	19.45
192	0.18	15,087.00	0	0	778	15,087.19	0	19.44
193	359.94	66,756.45	0	0	3,653	66,772.70	0	18.29
194	0.37	66,872.24	0	0	3,521	66,872.24	0	19.00

Table 2f. Great Australian Bight ALF MkII Survey Line Navigation Summary (cont).

Line	Heading (Deg)	Straight Line Distance (m)	Acquisition Time (seconds)	Avg Straight Line Velocity (km/hr)	Points	Flight Distance (m)	Avg Flying Velocity	Avg Point Spacing (m)
195	0.35	68,166.09	0	0	3,525	68,185.40	0	19.35
196	180.34	66,876.58	0	0	3,770	66,889.35	0	17.75
197	180.32	67,615.82	0	0	3,715	67,627.73	0	18.21
198	0.17	67,060.75	0	0	3,620	67,078.82	0	18.54
199	0.28	67,428.20	0	0	3,520	67,443.17	0	19.17
200	180.26	66,874.48	0	0	3,715	66,875.30	0	18.01
201	179.32	9,600.03	0	0	518	9,605.32	0	18.61
201	180.24	20.57	0	0	2	0.00	0	0.00
109 deleted								
201	180.25	1,663.69	0	0	72	1,663.69	0	23.77
202	0.09	66,508.45	0	0	3,573	66,514.87	0	18.63
203	0.21	35,164.23	0	0	1,809	35,164.23	0	19.46
203	0.21	18.41	0	0	2	0.00	0	0.00
75 deleted								
203	0.21	55.76	0	0	3	0.00	0	0.00
204	180.19	67,984.32	0	0	3,870	68,003.03	0	17.58
205	180.17	67,057.10	0	0	3,570	67,058.97	0	18.79
206	0.08	46,035.50	0	0	2,420	46,039.66	0	19.04
206	358.17	1,285.93	0	0	66	1,285.93	0	20.09
206	0.81	6,470.01	0	0	319	6,470.34	0	20.41
206	0.18	4,918.33	0	0	248	4,918.61	0	19.99
206	0.88	3,211.46	0	0	160	3,211.47	0	20.33
206	359.42	354.87	0	0	19	0.00	0	0.00
206	0.63	3,764.83	0	0	193	3,764.92	0	19.71
207	0.14	23,984.66	0	0	1,219	23,996.92	0	19.72
207	0.14	4,053.98	0	0	201	4,053.98	0	20.37
207	0.14	3,856.09	0	0	189	3,856.09	0	20.62
207	0.14	4,856.21	0	0	246	4,856.21	0	19.90
207	0.14	1,146.85	0	0	61	1,146.85	0	19.44
207	0.14	29,755.78	0	0	1,509	29,755.78	0	19.75
208	180.45	24,585.58	0	0	1,380	24,597.20	0	17.85
208	180.49	43,245.71	0	0	2,450	43,262.06	0	17.67
209	180.1	67,389.79	0	0	3,618	67,415.89	0	18.64
210	359.92	5,121.73	0	0	266	5,121.81	0	19.40
210	359.73	12,319.13	0	0	643	12,319.95	0	19.22
210	359.67	32,118.50	0	0	1,672	32,120.53	0	19.23
210	359.88	10,649.78	0	0	532	10,650.67	0	20.10

Table 2g. Great Australian Bight ALF MkII Survey Line Navigation Summary (cont).

Line	Heading (Deg)	Straight Line Distance (m)	Acqui sition Time (seco nds)	Avg Strai ght Line Veloc ity (km/h r)	Points	Flight Distance (m)	Avg Flyin g Veloc ity	Avg Point Spacing (m)
210	359.43	3,036.79	0	0	153	3,036.91	0	20.11
210	1.11	556.85	0	0	29	0.00	0	0.00
210	0.4	3,059.91	0	0	158	3,059.91	0	19.61
211	0.21	67,625.31	0	0	3,615	67,636.76	0	18.72
212	180.04	17,518.62	0	0	1,017	17,526.81	0	17.27
212	179.82	36,178.17	0	0	2,017	36,194.46	0	17.96
212	180.26	12,774.34	0	0	739	12,784.58	0	17.35
212	180.62	543.57	0	0	30	0.00	0	0.00
213	179.98	66,409.02	0	0	3,700	66,454.74	0	17.97
214	0.39	66,830.27	0	0	3,330	66,834.46	0	20.08
215	0.15	20,990.60	0	0	1,118	20,994.09	0	18.81
215	359.27	645.62	0	0	32	0.00	0	0.00
215	358.46	135.12	0	0	8	0.00	0	0.00
215	359.97	44,732.76	0	0	2,378	44,735.95	0	18.83
216	179.64	48,509.60	0	0	2,689	48,523.17	0	18.06
216	179.58	19,121.96	0	0	1,042	19,133.03	0	18.40
217	180.06	67,245.55	0	0	3,700	67,278.60	0	18.19
218	0.04	67,123.75	0	0	3,345	67,128.94	0	20.08
219	359.84	67,069.57	0	0	3,592	67,079.38	0	18.69
220	180.83	7,222.30	0	0	404	7,222.88	0	17.97
220	180.3	59,898.05	0	0	3,317	59,912.36	0	18.07
221	179.64	67,184.23	0	0	3,705	67,214.61	0	18.15
222	359.64	67,471.74	0	0	3,350	67,474.38	0	20.15
223	0.03	28,251.31	0	0	1,551	28,253.88	0	18.24
223	0.26	39,097.93	0	0	2,095	39,104.05	0	18.68
224	178.79	655.66	0	0	37	655.66	0	18.73
224	179.97	67,097.95	0	0	3,758	67,107.17	0	17.87
225	179.59	32,096.03	0	0	1,805	32,106.22	0	17.81
225	179.65	34,637.05	0	0	1,880	34,642.57	0	18.45
226	359.79	66,485.05	0	0	3,374	66,488.27	0	19.72
227	359.82	66,982.61	0	0	3,805	66,986.09	0	17.61
228	179.76	67,796.94	0	0	3,910	67,807.81	0	17.35
229	179.7	68,334.59	0	0	3,861	68,378.13	0	17.72
230	359.72	67,800.05	0	0	3,475	67,800.05	0	19.52
231	359.7	67,617.89	0	0	3,470	67,629.55	0	19.50
232	179.69	68,084.30	0	0	3,961	68,139.62	0	17.21
233	179.39	31,493.90	0	0	1,735	31,509.10	0	18.18

Table 2h. Great Australian Bight ALF MkII Survey Line Navigation Summary (cont).

Line	Heading (Deg)	Straight Line Distance (m)	Acqui sition Time (seco nds)	Avg Straig ht Line Veloci ty (km/h r)	Points	Flight Distance (m)	Avg Flying Veloci ty	Avg Point Spacing (m)
233	179.67	1,108.73	0	0	62	1,108.73	0	18.48
233	179.67	11,040.82	0	0	596	11,041.55	0	18.59
233	179.67	23,484.40	0	0	1,282	23,484.40	0	18.35
234	359.65	67,795.14	0	0	3,470	67,798.41	0	19.55
235	359.63	67,966.81	0	0	3,524	67,976.03	0	19.30
236	179.35	67,436.03	0	0	3,875	67,460.36	0	17.42
237	179.6	67,431.88	0	0	3,815	67,463.92	0	17.69
238	359.45	66,693.52	0	0	3,525	66,699.68	0	18.93
239	359.56	67,264.91	0	0	3,516	67,275.37	0	19.14
240	179.67	67,802.12	0	0	3,820	67,816.01	0	17.76
241	179.52	58,266.34	0	0	3,246	58,271.56	0	17.96
241	179.52	9,259.31	0	0	511	9,259.31	0	18.19
242	359.51	68,037.37	0	0	3,617	68,037.37	0	18.82
243	359.36	67,629.48	0	0	3,575	67,653.67	0	18.93
244	179.47	68,164.43	0	0	4,089	68,164.43	0	16.68
245	179.45	26,222.56	0	0	1,490	26,222.56	0	17.62
245	179.22	38,524.50	0	0	2,180	38,528.21	0	17.69
246	359.43	68,710.20	0	0	3,974	68,710.20	0	17.30
247	359.42	70,928.13	0	0	3,535	70,944.04	0	20.08
248	179.53	67,076.45	0	0	4,171	67,114.34	0	16.10
249	179.38	67,807.21	0	0	3,920	67,838.13	0	17.31
250	359.36	53,154.12	0	0	3,013	53,159.07	0	17.65
250	0.65	13,826.65	0	0	776	13,857.42	0	17.90
251	358.95	68,555.64	0	0	3,425	68,581.86	0	20.04
252	179.19	67,628.77	0	0	4,111	67,658.67	0	16.47
253	178.93	69,845.04	0	0	4,160	69,864.85	0	16.80
254	359.29	66,697.24	0	0	3,670	66,713.52	0	18.19
255	359.4	67,623.63	0	0	3,325	67,626.54	0	20.35
256	178.98	66,335.50	0	0	3,720	66,384.00	0	17.85
257	179.23	69,663.66	0	0	4,316	69,715.82	0	16.16
258	359.35	66,520.51	0	0	3,720	66,528.41	0	17.89
259	359.19	68,464.30	0	0	3,575	68,482.36	0	19.17
260	179.18	65,779.42	0	0	3,775	65,792.47	0	17.44
261	179.04	73,551.84	0	0	4,513	73,581.79	0	16.31
262	359.06	67,819.13	0	0	3,287	67,826.41	0	20.65
263	358.73	66,687.76	0	0	3,469	66,711.66	0	19.24
264	178.27	68,094.73	0	0	4,245	68,149.74	0	16.06

Table 2i. Great Australian Bight ALF MkII Survey Line Navigation Summary (cont).

Line	Heading (Deg)	Straight Line Distance (m)	Acquisition Time (seconds)	Avg Straight Line Velocity (km/hr)	Points	Flight Distance (m)	Avg Flying Velocity	Avg Point Spacing (m)
265	178.95	66,695.34	0	0	4,169	66,729.35	0	16.01
266	359.58	71,493.73	0	0	3,865	71,503.78	0	18.51
267	358.84	67,337.80	0	0	3,398	67,354.41	0	19.83
268	178.84	67,621.59	0	0	4,310	67,666.88	0	15.71
269	179.12	67,569.66	0	0	4,058	67,598.30	0	16.67
270	358.58	69,019.46	0	0	3,753	69,030.96	0	18.40
271	359.38	65,841.70	0	0	3,348	65,849.48	0	19.68
272	179.64	68,868.12	0	0	4,405	68,895.55	0	15.65
273	178.29	68,087.12	0	0	4,050	68,124.23	0	16.83
274	359.02	67,652.13	0	0	3,710	67,654.23	0	18.25
275	359.23	67,107.22	0	0	3,458	67,112.01	0	19.42
276	178.42	68,841.70	0	0	4,405	68,860.94	0	15.64
277	179.32	66,179.00	0	0	3,900	66,222.67	0	16.99
278	359.25	68,442.41	0	0	3,720	68,451.52	0	18.41
279	358.35	66,731.56	0	0	3,453	66,758.06	0	19.34
280	179.13	66,943.45	0	0	4,353	66,965.10	0	15.39
281	179.21	67,628.37	0	0	3,999	67,699.48	0	16.94
1	181.75	208,684.80	0	0	12,566	208,754.10	0	16.62
29	3.46	104,627.00	0	0	5,765	104,677.90	0	18.16
33	183.46	95,337.76	0	0	5,908	95,427.00	0	16.16
37	3.38	105,877.50	0	0	5,860	105,915.70	0	18.08
46	183.2	97,884.59	0	0	6,051	97,952.21	0	16.19
91	2.48	114,317.00	0	0	6,008	114,326.40	0	19.04
93	182.06	113,630.60	0	0	6,291	113,678.10	0	18.08
95	2.06	114,592.80	0	0	6,058	114,611.20	0	18.93
100	2.07	110,979.60	0	0	6,105	111,006.00	0	18.19
102	1.96	205,111.50	0	0	11,106	205,144.00	0	18.47
104	181.92	206,455.80	0	0	12,312	206,529.80	0	16.78
105	182.17	204,918.90	0	0	11,753	205,003.20	0	17.45
108	182.07	207,240.50	0	0	11,934	207,293.60	0	17.37
110	2.12	189,891.20	0	0	9,207	189,912.50	0	20.63
111	182.1	189,406.30	0	0	10,833	189,451.90	0	17.49
113	2	186,411.30	0	0	9,571	186,454.60	0	19.49
114	1.7	186,529.00	0	0	9,365	186,670.20	0	19.94
116	182.04	179,132.80	0	0	10,103	179,188.20	0	17.74
118	1.52	174,423.70	0	0	8,596	174,478.10	0	20.30
119	181.48	180,431.30	0	0	10,165	180,479.80	0	17.76

Table 2j. Great Australian Bight ALF MkII Survey Line Navigation Summary (cont).

Line	Heading (Deg)	Straight Line Distance (m)	Acquisition Time (seconds)	Avg Straight Line Velocity (km/hr)	Points	Flight Distance (m)	Avg Flying Velocity	Avg Point Spacing (m)
120	2.17	176,643.90	0	0	8,910	176,672.30	0	19.83
121	1.54	175,555.90	0	0	8,805	175,603.60	0	19.95
123	181.06	176,927.80	0	0	9,755	176,978.50	0	18.15
125	181.7	167,389.60	0	0	9,486	167,421.80	0	17.65
1	182.66	39,252.39	0	0	2,455	39,282.60	0	16.01
3	4.1	38,236.66	0	0	2,151	38,268.15	0	17.81
5	183.9	66,500.96	0	0	4,099	66,550.98	0	16.24
7	4.02	91,493.16	0	0	5,155	91,510.95	0	17.76
9	184.24	94,265.13	0	0	5,819	94,372.38	0	16.22
11	4.07	95,524.73	0	0	5,348	95,541.09	0	17.87
13	184.33	96,131.30	0	0	5,889	96,293.82	0	16.36
15	4.07	79,433.11	0	0	4,403	79,449.00	0	18.05
17	184.15	94,034.98	0	0	5,744	94,099.88	0	16.39
19	3.87	94,910.16	0	0	5,300	94,924.26	0	17.92
1	182.96	105,391.70	0	0	6,255	105,422.30	0	16.86
2	3.44	95,614.55	0	0	4,910	95,629.66	0	19.48
3	184.15	106,380.90	0	0	6,053	106,473.20	0	17.60
4	3.38	104,221.70	0	0	5,208	104,237.50	0	20.02
5	182.86	95,534.57	0	0	5,405	95,609.13	0	17.70
6	3.29	94,182.30	0	0	4,650	94,202.51	0	20.27
26	183.61	95,733.67	0	0	5,216	95,758.96	0	18.37
28	3.48	102,219.80	0	0	5,368	102,242.10	0	19.05
30	183.52	95,715.14	0	0	5,363	95,806.09	0	17.87
32	3.21	94,759.07	0	0	4,917	94,803.76	0	19.29
34	183.54	96,072.40	0	0	5,315	96,161.48	0	18.10
36	3.57	104,782.10	0	0	5,383	104,806.10	0	19.48
38	183.54	94,763.23	0	0	5,415	94,830.34	0	17.52
40	3.23	95,119.27	0	0	4,772	95,171.91	0	19.95
42	183.47	95,116.13	0	0	5,390	95,178.66	0	17.66
44	3.15	95,291.26	0	0	4,798	95,365.20	0	19.88
128	181.57	57,860.43	0	0	3,374	57,888.96	0	17.17
128	181.58	131.13	0	0	8	0.00	0	0.00
128	181.6	110,242.20	0	0	6,330	110,309.30	0	17.43
130	1.61	159,962.60	0	0	8,031	160,003.10	0	19.93
132	181.63	158,107.00	0	0	8,378	158,198.40	0	18.89
134	1.54	136,358.30	0	0	6,302	136,372.80	0	21.65
134	1.46	60.13	0	0	2	0.00	0	0.00
134	1.46	141.40	0	0	4	0.00	0	0.00
134	2.04	15,133.14	0	0	707	15,146.49	0	21.48
Total		33,446,599.92			1,822,548	33,461,526.23		

Table 2k. Great Australian Bight ALF MkII Survey Line Navigation Summary (cont).

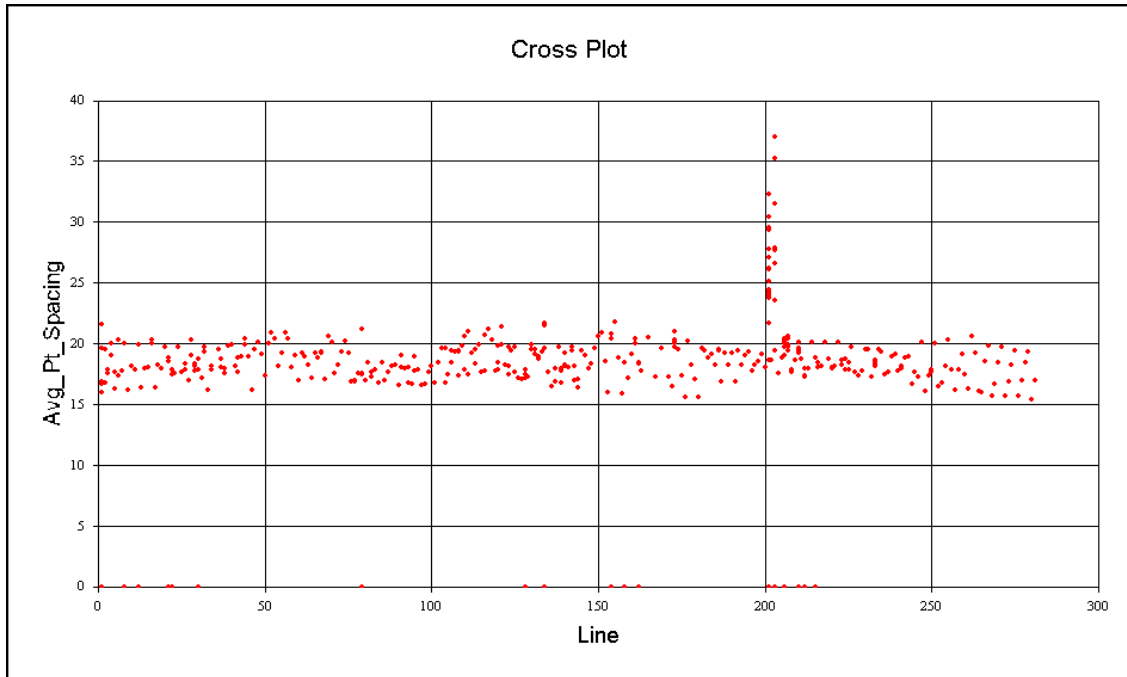


Figure 26. The Average Point Spacing Plotted for All Lines.

Figure 26 shows the average point spacing plotted for all lines. The spacing typically lies between 16 and 22m. Several short line segments have a calculated average point spacing of 0 because the navigation QC module requires at least 100 points for its calculations. The values calculated for lines 201 and 203 are probably affected by poor navigation data.

Appendix 3. CD Contents

The CD contains the following files:

Bight MkII ALF Project.zip

the *ALF Explorer*TM project

Bight MkII ALF Survey Interpretation Report.doc

the interpretation report document file

Bight MkII ALF Picked Fluors.txt

an ASCII data file of the fluors selected during the interpretation

Bight MkII ALF Survey Summary.xls

Excel spreadsheet containing the survey acquisition and navigation QC summaries

Figures

Directory containing figures used in the interpretation report