

Summary of collaborative photographic identification of gray whales from California to Alaska for 2006

Final Report for Purchase Order AB133F-05-SE-5570. Prepared by John Calambokidis, Cascadia Research, 218½ W 4th Ave., Olympia, WA 98501. July 2008

This report summarizes the results of photographic comparisons of gray whales taken as part of a collaborative research effort of gray whales that feed through the summer and fall in the Pacific Northwest in 2006. This group of whales has been referred to as “seasonal residents” or the Pacific Coast Feeding Aggregation. While there had been indications of the existence of such a group much earlier, photographic identification tracking individuals began in the 1970s off Vancouver Island (Darling 1984). A collaborative effort involving multiple research groups and examining their occurrence from California to SE Alaska began in 1998 with the support of the National Marine Mammal Laboratory and had been compiled through 2005 (Calambokidis et al. 2002, 2004, 2007). The purpose of this report is to summarize results of the matching of identification photographs for 2006 and compare these results with those reported previously.

Identification photographs of gray whales were taken by different research groups working from California to southeastern Alaska in 2006 (Table 1, Figure 1). Ten different groups contributed significant numbers identifications of gray whales during the period. Some of these were done with support from NMML but a lot of this effort was either conducted outside or beyond the level of effort contracted.

Table 1. Summary of photographic identifications of gray whales by region and contributor in 2006. Regions are generally organized from north to south (see Table 2 for more complete region names).

Research Group	SEAK	NBC	WVI	SVI	SJF	NPS	CPS	NWA	GH+	OR	SCA	Total
Brian Gisborne		2	52	472								526
Cascadia						48	1		13			62
Makah Tribe					59			83				142
NMML					37			55				92
Volker Deecke			50									50
Wendy Szaniszlo			44									44
CERF		42										42
Carrie Newell										14		14
Adrienne DeLiso						10						10
Channel Is. Nat. Corps											8	8
Other opportunistic	2				5	2		2		1		12
Total	2	44	146	472	101	60	1	140	13	15	8	1002

Effort was distributed over a broad area and time period overall (Table 2). Some effort was undertaken early in the season in several specific areas especially Puget Sound and Grays Harbor area of Washington (by Cascadia Research) and in Clayoquot Sound (by Brian Gisborne and Volker Deecke). These early season efforts were important for looking at the identity of some of

the animals that break off from the migration early in the season to feed in specific areas but would not be included in the overall mark-recapture estimates or other elements of the analysis of PCFA animals which have generally only included animals seen after 1 June to avoid overlap with the migration.

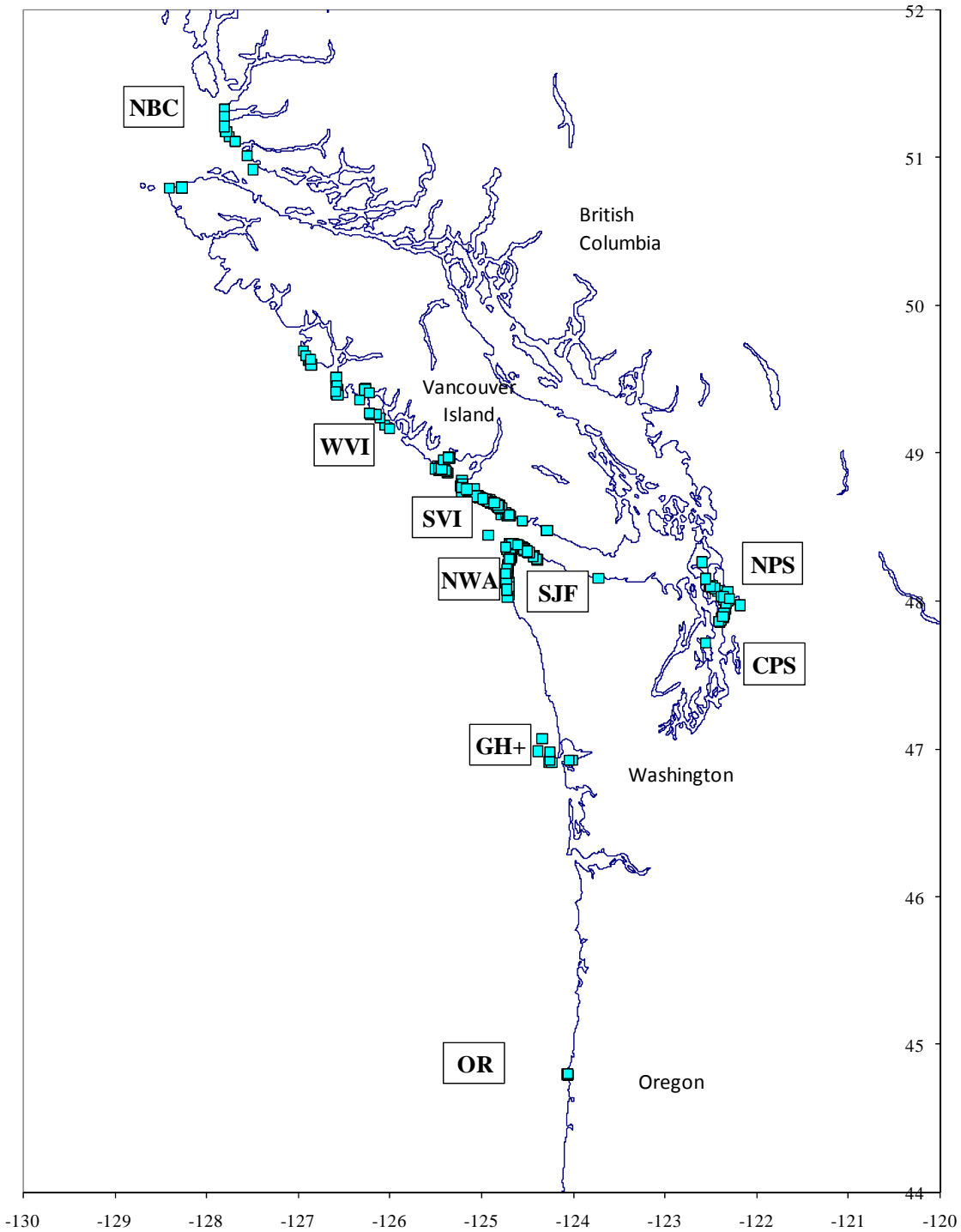


Figure 1. Map showing locations of gray whale identifications in 2006 and region identifiers used. Lines connect consecutive identifications of a whale during the season. Locations of identifications off California and SE Alaska are not shown.

Table 2. Summary of month and region for gray whales identifications made by contributors identified in Table 1.

Region	Month										Total
	3	4	5	6	7	8	9	10	11		
SE AK					1					1	2
N Brit Col.			2	1	8	30	3				44
W Vanc. Is.	59		2	9	67	4	5				146
S Vanc. Is.			3	130	219	77	42	1			472
Puget Sound	21	31	9								61
Str Juan de Fuca	1	3		3	1	8	60	24			100
N Wash.	5	1	14	4	12	51	48	5			140
Grays Harbor area	3	5	5								13
Oregon						6	9				15
N California									1		1
S California		5			3						8
Total	89	45	35	147	311	176	167	31	1		1002

A total of 1,002 identifications were made representing 180 unique individuals in 2006. A total of 833 of these identifications were made after 1 June representing 134 unique individuals. Of the 180 unique individuals identified, 40 were new to the Cascadia catalog and 140 (78%) were already known from past years although these new whales were primarily from whales seen only prior to 1 June. Of the whales identified after 1 June at some point in 2006, 125 of 134 (93%) had been identified previously. In contrast to this, for the whales seen only before 1 June and not after, only 15 of 46 (33%) were known from past years and most of these and for whales were from North Puget Sound (see below).

Movements among most regions within 2006 were fairly common with a few exceptions (Figure 1). As in past years, whales seen in northern Puget Sound were not seen elsewhere. Resightings of whales at either end of the range sampled, southern California and SE Alaska were also not made during 2006 although some of these whales had been seen in previous years in other areas. Details of some of identifications and movements for specific regions are provided below. Appendix 1 also provides a summary of the sighting history of the whales identified in 2006.

Sightings in northern Puget Sound

Sightings of gray whales in northern Puget Sound continued to reveal that this area is used as a spring-time feeding area for a small regular group of gray whales (Table 3). All 10 of the individuals identified in this region since 2001 have been seen in multiple years going back to the early 1990s when photo-ID work began in this region. Nine of ten of these were seen in 2006, all but one on multiple occasions and all between 11 March and 25 May 2006. There was an influx of animals into this area during the 1999 and 2000 mortality event and 3 of the 10 whales identified in 2006 had been first sighted in that period.

The 10 whales identified around Northern Puget Sound since 2001 appear to be distinct from the other members of the PCFA. Despite the continued effort through 2006, only 1 of 10 of these whales has been seen very far from Northern Puget Sound. ID#356, identified 5 years in N Puget Sound including in 2006, had also been seen in October 1999 off Oregon.

The N Puget Sound whales also appear to only use this area in the spring. None of the 10 regular whales have been seen in N Puget Sound or any other area after the end of May since 2001 (ID 356 was seen in Oregon in October 1999). This remains consistent with the conclusion that these individuals that come to N Puget Sound are stopping for a short period before continuing on the migration north and are not part of the PCFA whales that spend the spring through fall feeding in Pacific Northwest waters.

Table 3. Sighting histories of gray whales identified in northern Puget Sound including all individuals that have been sighted in this region since 2001. Numbers indicate times seen. Values for 2007 are minimums (additional opportunistic sightings) and for 2008 an X indicates animal has been sighted at least once through mid-May 2008.

ID	1990	1991	1992	1993	1994	1995	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
21	1	16	5	2		7	6	4	5			1	1	1	9	3	X
22	1	1	2	1		5	7	4	3			4		2	14		X
44		14	9	3		3		1	1	1		1	6	2		2	X
49		6	4	2	2	2	5	1	1	5	2	2	2	2	5	4	X
53		12		2	2	2		1	2		2	5	4	2	9		
56		2					1		5	2		1	3	2	7	2	X
356								1		1		1			1		X
383								2		1		1	4	1	7	6	X
531									2					2	3	6	X
723													6	3	5		

Identifications off Oregon

Eight whales were identified in the Depoe Bay area off central Oregon by Carrie Newell (Table 4). Of these eight, all but one was known in the Cascadia catalog. These whales had been identified as far back as 1993 in any area and 1998 off Oregon (when Cascadia began photo-ID effort in this area. At least three of these whales were identified and named in a recent catalog of gray whales of the Oregon coast (Newell 2005) and their name is shown as a contributor ID below.

Table 4. Summary of identifications and sighting histories of whales identified off central Oregon in 2006 by Carrie Newell. Sighting history data is from Cascadia database and does not include past effort conducted by Carrie Newell.

CRC#	Contributor ID	Date in OR	Other 2006 locs	Earliest year seen by region										
				CA	NCA	SOR	OR	NWASJF	SVI	WVI	NBC	Any		
94	1, 7a-b, 9a-b	21 Aug to 1 Sep	WVI 18 March			2002	1999	1993		1999	1998		1993	
107	Eagle Eye, 8a-b	1-Sep	SVI 24 June-14 July					1998	1994	1995	1997		1994	
297	Crescent, 2b-d	30 Aug-16 Sep				2001	2002	1998	2003				1998	
311	3a-d	29 Aug - 16 Sep				2003		2004			2003	1998	1998	
317	L Smudgely, 4a-c, 6a-e	29 Aug - 17 Sep	WVI 24 June - 7 July					2006			2001	1998	1998	
555	10a	1-Sep				2000	2002	2006					2000	
635	5a-b	16-Sep	WVI 1-14 July	2001				2006			2003	2005	2004	2001
970	2a	30-Aug						2006					2006	

Whales identified off Southern California

Two out of three gray whales identified off San Miguel Island on 27 July 2006 by the Channel Island Naturalist Corps turned out to be long-time known animals from the Pacific Northwest. While gray whales have been identified in summer months off southern and central California in the past these have generally not been animals that were known members of the PCFA. ID 718 had been seen 37 other times every year from 2001 to 2005 off southern and western Vancouver Island and in the Cape Caution area. It was not seen in those areas in 2006. Sightings in BC for 2001 to 2005 had been from June through September. ID 659, also seen on 27 July 2006, had been seen 7 other times, in September 2002 off southern Oregon and in June 2004 off southern Vancouver Island. The 3rd whale (ID 962) has not been seen elsewhere.

While whales have been identified in summer months off southern and central California, unlike whales identified off northern California, most of these have not matched to regular members of the PCFA. Whales have been reported in the past spending extended periods through the summer around San Miguel Island. A whale identified there on 25 July 2001 by Cascadia had been reported in the area for an extended period but this identification did not match any other area. Similarly, gray whales have been reported staying around the Farallon Islands for extended periods into the summer and fall. Four whales were identified there in July and August of 2004 but only one of these (ID#656) has been identified elsewhere (off S Oregon in 2002, 2003, and 2004). Whales seen just further north from the Farallons have been more likely to match those in the PCFA. Of four whales identified off Bodega Bay in August 2001, two (ID 635 and 637) were seen frequently in other years farther north.

Mark-recapture abundance estimates

The addition of 2006 identifications allowed updated estimates of abundance using Petersen mark-recapture estimates with adjacent years as samples. As in past years, only identifications from after 1 June and excluding Puget Sound area were used in the abundance estimates.

Summaries based on 2006 identifications and updated estimates for past years are provided below (Table 5, Figure 2). Estimates of abundance based on 2005 and 2006 were close to 200 and were at the low end of the estimates for other years going back to 1998 (Table 5). The consistency in the number of identifications, matches, and therefore the abundance estimates suggests the occurrence of PCFA whales was fairly typical in 2006 compared to previous years.

Table 5. Petersen mark-recapture estimates of abundance based on photo-IDs of gray whales identified after 1 June and excluding Puget Sound. Table is broken into estimates for N California to SE Alaska or the more limited range of Oregon to N British Columbia.

Sample periods	Unique Ids		Recapt.	Estimate	CV
	n1	n2			
N California - SE Alaska					
1998-1999	134	157	80	262	0.05
1990-2000	157	139	74	294	0.06
2000-2001	139	175	93	261	0.04
2001-2002	175	206	121	298	0.03
2002-2003	206	161	126	263	0.03
2003-2004	161	183	118	249	0.03
2004-2005	183	139	97	262	0.04
2005-2006	139	131	94	194	0.03
Oregon - N British Columbia					
1998-1999	115	120	70	197	0.05
1990-2000	120	114	66	207	0.05
2000-2001	114	151	84	205	0.04
2001-2002	151	180	106	256	0.03
2002-2003	180	154	119	233	0.03
2003-2004	154	181	117	238	0.03
2004-2005	181	139	97	259	0.04
2005-2006	139	129	92	195	0.03

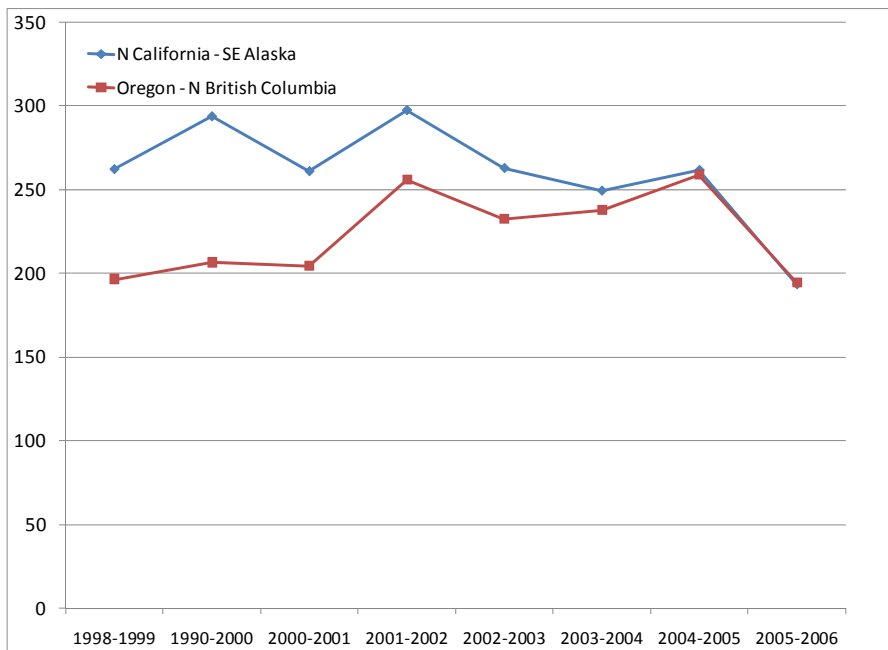


Figure 2. Plot of annual Petersen mark-recapture estimates as described in Table 5.

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Acknowledgements

This analysis would not have been possible without the collaborating organizations contributing identification photographs listed in Table 1. William McGill provided photographs collected by CERF off Cape Caution; Brian Gisborne and Volker Deecke collected extensive data and photographs from the south and west Vancouver Island; Nate Pamplin provided photographs collected as a part of the Makah surveys off northern Washington; Pat Gearin and Merrill Gosho provided photographs from the Washington coast; Wendy Szaniszlo provided photographs from Berkeley and Clayoquot Sound; Carrie Newell provided photographs from the Oregon Coast; Adrienne DeLiso provided photographs from the Mosquito Fleet whale trips; Channel Islands Naturalists Corps provided identification photographs of gray whales from the Santa Barbara Channel; Jan Straley and Janet Nilesen provided identification photographs from SE Alaska. Other contributors included Dawn Bailey, David Weeks, John Herman, and Brian and Sharon Holland. We thank the operators of the boats that provided photographs and allowed us to gather data from their boats in northern Puget Sound especially Island Adventures and Salish Sea Charters.

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A number of people assisted in the field effort and in the printing and matching of photographs at Cascadia Research. Amber Klimik conducted the majority of the matching of gray whale photographs. Erin Falcone and Lisa Schlender compiled the data from the different contributors. Cascadia field effort on gray whales in 2006 was conducted by a number of staff and interns at Cascadia including Erin Falcone, Greg Schorr, Dominique Camacho, Kwasi Addae, Alexis Rudd, and Jenn Hackett.

Appendix Table 1. Sighting histories of gray whales identified in 2006.

ID	Count	1st 2006	Last 2006	SCA	OR	GH+	NWA	SJF	CPS	NPS	SVI	WVI	NBC	SEAK	First yr
6	1	21-May	21-May			1									1986
15	4	28-Aug	15-Sep								4				1984
21	9	31-Mar	25-May							9					1990
22	14	12-Mar	22-May							14					1990
30	1	5-Jul	5-Jul									1			1983
37	1	26-Aug	26-Aug										1		1988
41	2	23-Aug	30-Aug				2								1990
42	15	24-Jun	15-Jul								15				1984
43	2	28-Jun	7-Jul								2				1984
49	5	11-Mar	10-May							5					1991
53	9	19-Mar	10-May							9					1991
56	7	11-Mar	12-Apr							7					1991
67	10	4-May	11-Oct				10								1992
76	1	18-Mar	18-Mar									1			1993
81	6	4-Jul	9-Oct					4				2			1993
84	12	24-Jun	1-Sep				3				9				1990
86	6	12-Aug	2-Sep								1	2	3		1977
87	10	24-Jun	30-Aug				2				8				1993
89	17	15-Jun	28-Jul								16	1			1993
92	26	18-Jun	1-Sep				1				25				1993
94	6	18-Mar	1-Sep		3							3			1993
101	15	7-Jun	4-Oct				1	3			10	1			1984
105	6	28-Jul	6-Sep					3			3				1994
107	10	24-Jun	1-Sep		1						9				1994
123	21	25-Jun	4-Aug								21				1998
130	3	16-Jul	15-Sep								2	1			1998
135	2	4-Jul	26-Aug									1	1		1998
136	1	4-Jul	4-Jul									1			1998
138	11	8-Jul	2-Sep								6	3	2		1998
140	4	30-Jun	16-Sep								4				1998

ID	Count	1st 2006	Last 2006	SCA	OR	GH+	NWA	SJF	CPS	NPS	SVI	WVI	NBC	SEAK	First yr
300	11	24-Jun	15-Jul								11				1998
302	15	24-Jun	8-Sep				3				12				1998
303	1	22-Aug	22-Aug				1								1998
306	2	4-Jul	7-Sep									2			1998
308	14	5-Jul	12-Oct					6			7	1			1998
309	3	7-Jul	12-Aug									1	2		1998
311	2	29-Aug	16-Sep		2										1998
315	4	5-Jul	12-Aug									1	3		1998
317	6	24-Jun	17-Sep		2							4			1998
319	3	4-Jul	1-Sep				1					2			1998
323	1	8-Sep	8-Sep										1		1998
325	3	18-Aug	29-Aug										3		1998
327	1	26-Aug	26-Aug										1		1998
328	10	11-Mar	8-Sep									8	2		1998
356	1	2-Apr	2-Apr							1					1999
372	6	3-Jul	8-Sep				5					1			1999
383	7	18-Mar	23-Apr							7					1999
393	1	4-Jul	4-Jul									1			1999
396	14	25-Jun	22-Aug				1				13				1999
510	2	4-Jul	5-Jul									2			2000
525	1	5-Jul	5-Jul									1			2000
531	3	24-Mar	7-Apr							3					2000
532	18	14-Jun	16-Jul				1				16	1			2000
554	1	7-Jun	7-Jun				1								2000
555	1	1-Sep	1-Sep		1										2000
561	7	12-Jul	8-Sep				3				4				2000
581	1	4-Jul	4-Jul									1			2001
583	2	5-Jul	5-Sep									2			2001
584	4	2-Jul	25-Aug								2	1	1		2001
594	7	24-Jun	12-Aug									3	4		1999
597	3	12-Aug	26-Aug										3		2000
601	2	12-Aug	12-Aug										2		2000

ID	Count	1st 2006	Last 2006	SCA	OR	GH+	NWA	SJF	CPS	NPS	SVI	WVI	NBC	SEAK	First yr
605	1	22-Apr	22-Apr				1								2001
612	1	5-Nov	5-Nov											1	2000
635	4	1-Jul	16-Sep		1							3			2001
637	9	25-Jun	23-Jul								9				2001
657	1	21-May	21-May			1									2002
659	1	27-Jul	27-Jul	1											2002
675	11	18-Mar	2-Aug									5	6		2002
682	10	4-May	12-Oct				6	2			1	1			2002
687	7	7-Sep	19-Sep					7							2002
688	11	30-Jun	8-Sep				3				8				2002
696	14	21-May	11-Sep				2	11			1				2002
698	9	14-May	8-Sep				5					4			2002
701	6	7-Apr	11-Oct			1	1				4				2002
712	1	4-Sep	4-Sep									1			2002
714	6	1-Jul	7-Sep					4				2			2002
716	8	24-Jun	11-Jul								8				2000
718	1	27-Jul	27-Jul	1											2001
719	5	3-Jun	26-Aug								4	1			2002
720	5	24-Jun	22-Aug				2				3				2002
723	5	15-Apr	19-May							5					2002
759	2	6-Jul	8-Jul										2		2002
761	1	12-Aug	12-Aug										1		2002
763	5	30-Jun	12-Aug								4		1		2000
782	1	31-Aug	31-Aug					1							2003
786	16	10-Jun	9-Aug				3				10	3			2003
787	1	14-Jun	14-Jun					1							2003
789	6	11-Mar	8-Sep				2				1	3			2003
797	18	4-Jul	8-Sep								17	1			2003
813	4	24-Jun	9-Aug				1				3				2004
818	4	14-Jul	11-Oct				3				1				2004
819	20	24-Jun	12-Oct				1	12			7				2004
820	10	12-Mar	18-Mar									10			2004

