Summary of collaborative photographic identification of gray whales from California to Alaska for 2004 and 2005

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A collaborative research effort studying the gray whales that feed through the summer and fall in the Pacific Northwest was continued through 2004 and 2005. 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 2003 (Calambokidis et al. 2002, 2004). The purpose of this report is to summarize results of the matching of identification photographs for 2004 and 2005 and compare these results with those reported previously.

Identification photographs of gray whales were taken by different research groups working from California to Kodiak, Alaska in 2004 and 2005 (Tables 1 and 2). Six different groups contributed significant numbers (>100) identifications of gray whales for the two-year period. Some of these were done under contracts of support from NMML for 2005 but a lot of this effort was either conducted outside or beyond the level of effort contracted especially for 2004.

Table 1. Number of identifications by contributor for 2004 and 2005 (no seasonal restriction, includes some animals from prior to 1 June).

Research Group/ Region	2004	2005
Brian Gisborne / S and W Vancouver Island	326	429
Coastal Ecosystem Research Found. / Cape Caution, BC	187	11
Cascadia Research / Cal., Oregon, Wa., BC	128	33
Makah Tribe (Nate Pamplin) / N Washington coast	44	60
National Marine Mammal Laboratory / Kodiak		129
Other opportunistic / SE Alaska		1
Wendy Szaniszlo / W Vancouver Island		127
Total all collectors	685	790
Total Unique	197	209

Total number of identifications (instances where a whale was identified) was 685 and 790 in 2004 and 2005 (respectively). About half the identifications each year came from Brian Gisborne's daily trips along the south coast of Vancouver Island from Pt. Renfro to Banfield. That made this region the best sampled of the entire study region. Overall there

was fairly consistent effort and identifications in the regions stretching from the northern Washington coast up to the Cape Caution area just north of Vancouver Island. Smaller numbers of identifications were obtained from California, Oregon, portions of Washington including Puget Sound and SE Alaska. Over 100 identifications were obtained off Kodiak, Alaska by NMML primarily in a 5-day period in 2005.

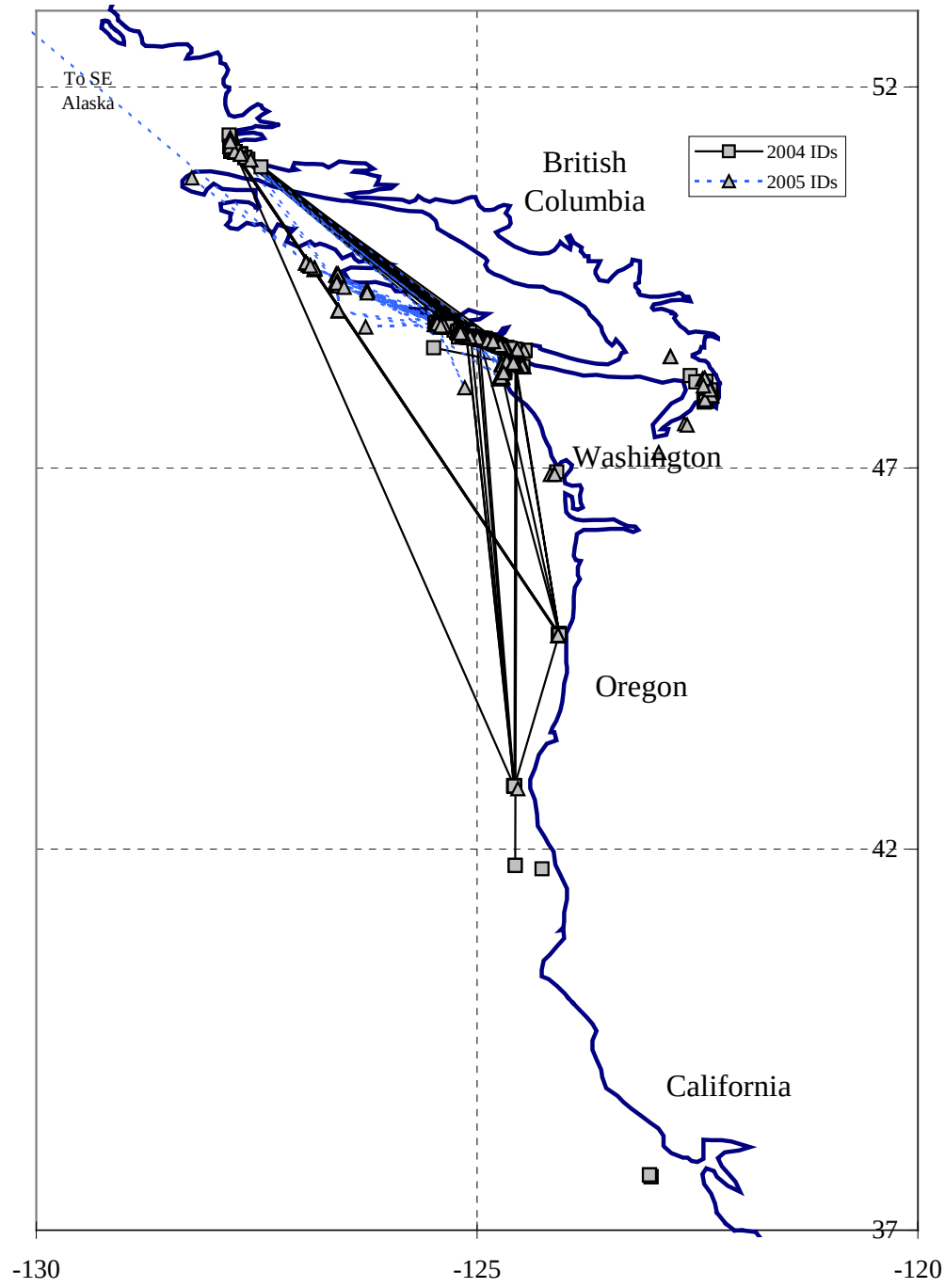

Figure 1. Locations of gray whale identifications in 2004 and 2005. Lines connect resightings of the same individual in the same year. Identifications in SE Alaska and Kodiak are not shown.

Table 2. Total identifications by different contributors by region (arranged from North to South) for 2004 and 2005 (all season).

Region	BG	CERF	CRC	MAKAH	NMML	Oth.	WS
14 - Kodiak					100		
13 – SE Alaska						1	
12 – N British Columbia		198	52				
11 – W Vancouver Is	122						98
10 - S Vancouver Is	633						29
9 – N Puget Sound			43				
8 – PS & Hood Canal			5				
7 – Str of Juan de Fuca			1	81	17		
6 – N Washington Coast				23	12		
5 – Grays Harbor area			4				
4 – N Oreon			21				
3 – S Oregon			28				
2 – N California			3				
1 – Cent. California			4				

Most of the whales identified in 2004 and 2005 had been seen in another year (Table 3). This included all whales even the early season whales (prior 1 June) that were identified in some regions. Whales identified in all three regions of British Columbia in 2004 and 2005 were very likely to have been seen in another year (84 to 100% were seen in another year). The small sample of whales identified in spring 2004 and 2005 in the waters of northern Puget Sound also had all been seen (100%) in another year. Whales seen off Oregon also had very high rates of having been seen in another year, Whales identified in the Strait of Juan de Fuca, Washington coast, and off northern California had somewhat lower incidence of having been seen in another year (mostly 70-80%). Only off Kodiak, southern Puget Sound, and central California were the proportion having been seen in another year under 50%.

These findings are consistent with past findings except these proportions of inter-year resightings are higher. Even the low inter-year resightings of Kodiak, central California, and southern Puget Sound are quite a bit higher than had been seen through 2003 (Calambokidis et al. 2004). This is likely due to the higher proportion of animals identified in the Cascadia catalog; the size of the catalog is now 809 individuals (through 2005) although this includes quite a few animals seen only once especially those from early in the season and from areas like Puget Sound.

Movements of animals within a season were extensive along the coast from northern California to British Columbia for both 2004 and 2005 (Figure 1). This was most apparent for the animals sighted in British Columbia waters. As had been the case in the past, there was little movement documented between the animals seen in Puget Sound and those elsewhere along the west coast.

Table 3. Summary of identifications by region and percent seen in another year

	Identifications		Unique IDs		No. seen >1 yr		% seen >1 yr	
Region	**2004**	**2005**	**2004**	**2005**	**2004**	**2005**	**2004**	**2005**
14 - Kodiak		100		46		12		26%
13 – SE Alaska		1		1		1		100%
12 – N British Columbia	238	12	92	12	84	12	91%	100%
11 – W Vancouver Is	20	200	15	74	14	67	93%	91%
10 - S Vancouver Is	306	356	86	83	75	70	87%	84%
9 – N Puget Sound	26	17	7	9	7	9	100%	100%
8 – PS & Hood Canal		5		4		1		25%
7 – Str of Juan de Fuca	44	55	22	23	18	17	82%	74%
6 – N Washington Coast		35		21		16		76%
5 – Grays Harbor area	1	3	1	3	1	2	100%	67%
4 – N Oregon	17	4	16	4	15	4	94%	100%
3 – S Oregon	26	2	13	1	12	0	92%	0%
2 – N California	3		3		2		67%	
1 – Cent. California	4		4		1		25%	
Total (w/ region matches)	685	790	259	281				
Total unique			197	209				

Data from 2004 and 2005 provided some additional insights into the movements and histories of some of the whales seen outside the area from N California to British Columbia that has been sampled in the past. A total of 46 different whales were identified in Kodiak 2005, substantially adding to the sample of whales from this region and allowing a better evaluation of the relation of these whales to those in other areas. In total 85 gray whales have been identified in Kodiak in three different years (2002, 2003, and 2005). Of these, 14 (16%) have been seen in another region. Other regions that Kodiak whales were seen ranged from as far south as North California (3) up to SE Alaska (1) and did not suggest any close relationship with any one area. Seven whales were identified in two different years off Kodiak (5 seen in 2002 and 2005 and 2 in 2003 and 2005).

A single gray whale identified in Icy Straight near Pt. Adolphus, SE Alaska on 20 July 2005 was an individual (ID#836) Cascadia had photographed in August 2004 in northern British Columbia. This same whale was seen about 6 weeks after being seen in SE Alaska on the S side of Vancouver Island. From the south end of the range, four whales were identified at SE Farallon Island on 2 August 2004and were reported to have been there most of the summer. One of these four, ID#656, is a whale that had been seen at Port Orford in Oregon in October 2002 and September 2003.

Data from 2004 and 2005 allow continuation of the mark-recapture estimates of abundance similar to those reported previously (Calambokidis et al. 2002, 2004). Mark-recapture estimates used identifications from consecutive years from 1998 to 2005

restricted to only animals seen after 1 June each year and excluding the Puget Sound area. Two sets of estimates were conducted using different geographic ranges (Table 4).

Table 4. Peterson capture-recapture abundance estimates for identified gray whales in the Pacific Northwest. Excludes identifications made before 1 June and those from the Puget Sound area. Methods and data are similar to those used previously for 1998 to 2003 (Calambokidis et al. 2004) with some updates to the identifications.

Sample 1		Sample 2				
Year	**n**	**Year**	**n**	**Match**	**Est.**	**CV**
Identifications from N California to SE Alaska						
1998	134	1999	157	80	**262**	0.05
1999	157	2000	139	74	**294**	0.06
2000	139	2001	175	92	**264**	0.04
2001	175	2002	206	121	**298**	0.03
2002	206	2003	158	126	**258**	0.02
2003	158	2004	182	118	**244**	0.03
2004	182	2005	142	97	**266**	0.04
Identifications from Oregon to Northern British Columbia only						
1998	115	1999	120	70	**197**	0.05
1999	120	2000	114	66	**207**	0.05
2000	114	2001	151	83	**207**	0.04
2001	151	2002	180	106	**256**	0.03
2002	180	2003	155	119	**234**	0.03
2003	155	2004	180	117	**238**	0.03
2004	180	2005	142	97	**263**	0.04

Estimates of abundance for 2003-2004 and 2004-2005 were very similar to those obtained in previous years (Table 4). There was little difference in the most recent estimates between those for the two geographic ranges (one includes N California and SE Alaska and the other one does not). In past years there were a substantial number of identifications from northern California, which were included in one range and not the other. In 2004 and 2005, there was little effort in northern California so there was little difference between the number of identifications and matches including or excluding that region. In both 2004 and 2005 identifications were obtained in southern Oregon near Port Orford and these are included in both estimates.

The similarity in the annual estimates of abundance from 1998 to 2005 is somewhat surprising given the dramatic changes that occurred in the overall gray whale population during that period. A major mortality event in 1999 and 2000 killed over a thousand whales and reduced the estimates of the overall population by close to one third. Since 1999, large numbers of gray whales began to be observed feeding year-round off Kodiak Island (Moore et al. 2007).

Early season identifications

Most of our analyses utilize identifications obtained after 1 June in order to minimize including potentially migrating animals in our sample. Knowing the degree to which whales identified prior to this date especially on the Washington outer coast include migrants or members of the Pacific feeding aggregation would be useful for evaluating the risk of taking these animals in a Makah hunt in the spring. Over the years identifications of 57 different whales were obtained off the northern Washington coast prior to 1 June. In total, 11 of the 57 (19%) have been identified again in a different year (Table 5). Most of these 11 had long sighting histories and are clearly part of the Pacific coast feeding aggregation. Two had only been seen one other year including one where the other sighting was off Kodiak Island.

Of the 57 early season whales identified off the northern Washington coast, the vast majority (45) were obtained on a single day (20 May 1999) when there were large numbers of whales primarily traveling north of La Push. There is some indication that the sample from 20 May 1999 was not representative. Even though this was fairly close to the 1 June cut-off we have been using, only 6 of these 45 (13%) have been resighted in a different year. In comparison, 5 of the 12 (42%) whales identified obtained prior to 1 June in 2000,2002 and 2005 have been resighted.

Regardless of whether the sample from 20 May 1999 is representative, these findings indicate that prior to 1 June there are large numbers of migrating whales present that are not typically part of the Pacific coast feeding aggregation. Despite the presence of these migrating whales, members of the feeding aggregation are also in the area at a higher rate than they represent in the overall population. This would makes sense if members of this feeding aggregation arrive with other migrating whales and because they are not moving on and are staying in the area are more likely to be captured in a sample.

Table 5. Summary information on the 11 of 57 whales identified off the northern Washington coast prior to 1 June that were resighted in other years.

ID	Julian day	Year	Times seen	Yrs seen	Comment
80	142	2002	198	12	
107	140	1999	93	11	
177	140	1999	80	4	
178	140	1999	40	9	
191	140	1999	28	6	
300	140	1999	70	4	
302	140	1999	36	7	
530	144	2000	2	2	Kodiak resighting only
573	116	2005	5	2	
682	142	2002	38	4	
696	116	2005	44	4	

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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 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 Kodiak, and Wendy Szaniszlo provided photographs from Barkeley Sound.

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