

SPLASH Steering Committee Progress Report on matching through the first four seasons of SPLASH (Winter 2004 to Summer 2005)

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SPLASH is an international collaborative study of humpback whales in the North Pacific. More than 50 research groups (see Table 1 for principal groups involved in Summer 2005 collection) and 300 researchers participated in SPLASH data collection, with the goal of documenting the population structure, abundance, trends, and the impact of human activities on this population. Fieldwork began in winter 2004 and continued through Winter 2006, encompassing three winter breeding seasons (2004, 2005, and 2006) and two summer feeding seasons (2004 and 2005). Support for SPLASH has come from a variety of sources. Principal support for the Winter 2004 and Summer 2004 and 2005 field seasons came from NOAA-Fisheries and the National Marine Sanctuaries Program (NMSP), while critical support for Winter 2005 and 2006 came from National Fish and Wildlife Foundation, Pacific Life Foundation, Marisla Foundation, Council for Environmental Cooperation, and NMSP as well as other regional contributors.

Comparison of SPLASH identification photographs collected in Winter 2004 and 2005 and Summer 2004 and 2005 has been completed. Matching of the fifth and final SPLASH season (Winter 2006) is scheduled to be completed at the end of 2007 with a report issued a few months after that. This report summarizes the results from the fourth season (Summer 2005) as well as an overall summary of the first four of the five SPLASH field seasons.

Table 1. Summary of organizations conducting SPLASH-dedicated surveys and compiling opportunistic data contributions at humpback whale feeding areas in summer 2005.

Research Group	Full Name	Summer 2005 Survey Regions
ASLC	Alaska Sealife Center	Russia
CRC	Cascadia Research Collective	U.S. West Coast, British Columbia, Bering Sea
DFOC	Department of Fisheries and Oceans, Canada	British Columbia
GBNP	Glacier Bay National Park	Southeast Alaska
NGOS	North Gulf Oceanic Society	Northern Gulf of Alaska, Bering Sea
NMML	U.S. National Marine Mammal Laboratory	Southeast Alaska, Northern Gulf of Alaska, Western Gulf of Alaska, Bering Sea
SWFSC	Southwest Fisheries Science Center	U.S. West Coast
UAFK	University of Alaska Fairbanks	N Gulf of Alaska, W Gulf of Alaska
UASE	University of Alaska Southeast	Southeast Alaska

Summary of effort, identifications, and samples in Summer 2005

The fourth season of SPLASH data collection was conducted on humpback whale feeding areas across the North Pacific. As with previous seasons, Summer 2005 data was collected by numerous organizations utilizing a variety of platforms (Table 1). Contributions of opportunistic data (fluke photographs with associated date and location) collected by whale watch companies and other research surveys not specifically targeting humpback whales supplemented SPLASH-dedicated surveys in a number of regions, most notably California, British Columbia, and the northern Gulf of Alaska. Most data were collected between the months of June and September; however in some data collection occurred throughout the year.

The total number of survey days in Summer 2005 was 1,051, slightly higher than summer 2004. Out of the 4,570 identification photographs submitted, 3,433 were judged to meet SPLASH quality criteria (Table 2). After internal reconciliation of resightings of animals seen multiple times within a region, 2,099 unique individuals were identified with high quality photographs. While slightly lower than the number of individuals identified in Summer 2004, this still exceeded the goal for the season (roughly 10% of the North Pacific population). The slight reduction from Summer 2004 was due in large part to limitations of SPLASH-dedicated ship surveys in Summer 2005, which was shorter and also restricted by mechanical issues and weather from surveying many difficult to reach offshore areas covered by the SWFSC SPLASH 2004 cruise. All sampling near the Aleutians in 2005 was north of the islands (treated as the Bering Sea region) and there was less sampling of offshore areas in the Gulf of Alaska (Figure 1). While there generally were fewer identifications in many areas of Alaska in Summer 2005 when compared to 2004, more identifications were obtained in Russia, N Washington to S British Columbia, and California-Oregon in 2005 compared to 2004. The collection of tissue samples (sloughed skin and biopsy samples of skin and blubber) was also successful in Summer 2005 with 756 samples collected (Table 2), 392 of these were matched to a good quality identification photograph.

Table 2. Summary of SPLASH Summer 2005 regional research effort, including survey days, sightings, fluke photos, unique individuals, and tissue samples. Overall total unique whales is less than the sum of regional unique whales to reflect matches between regions.

Region	First Date	Last Date	Total Surveys (incl. Opportunistic)	Total Sightings	Total Flukes	Flukes with SPLASH ID	Unique Whales*	Total Samples	Samples w/ SPLASH ID
Russia	22-Jun-05	14-Aug-05	44 (42/2)	51	102	99	72	43	36
Bering	25-Jun-05	07-Sep-05	35 (31/4)	178	681	463	301	157	60
WGOA	31-May-05	30-Aug-05	12 (10/2)	81	254	200	111	81	45
NGOA	09-Jan-05	03-Oct-05	168 (75/93)	592	970	733	428	284	134
SEAK	09-Jan-05	11-Jan-06	166 (150/16)	902	1414	1098	494	145	89
NBC	24-Jan-05	26-Jan-06	236 (129/107)	694	827	610	236	56	43
NWA-SBC	25-Feb-05	27-Dec-05	169 (44/125)	421	424	329	153	33	21
CA-OR	08-Mar-05	05-Dec-05	221 (45/176)	708	855	686	319	72	48
TOTALS			1051	2868	4570	3433	2099	756	392

*Total unique whales is less than sum regional unique whales as some whales were sighted in more than one region

In addition to the collection of fluke photographs and tissue samples, collection of flank and tailstock photos continued in summer 2005. Flank and tailstock photos from SPLASH-dedicated surveys are being used to document the frequency of human impacts on this population, such as entanglement and vessel collision, as evidenced by characteristic scarring on these parts of the body. The total number of flank and tailstock photos collected in summer 2005 is summarized in Table 3. Although not an initial goal of the SPLASH project, a system for visually assessing the health of whales from flank photographs is under development and shows promise.

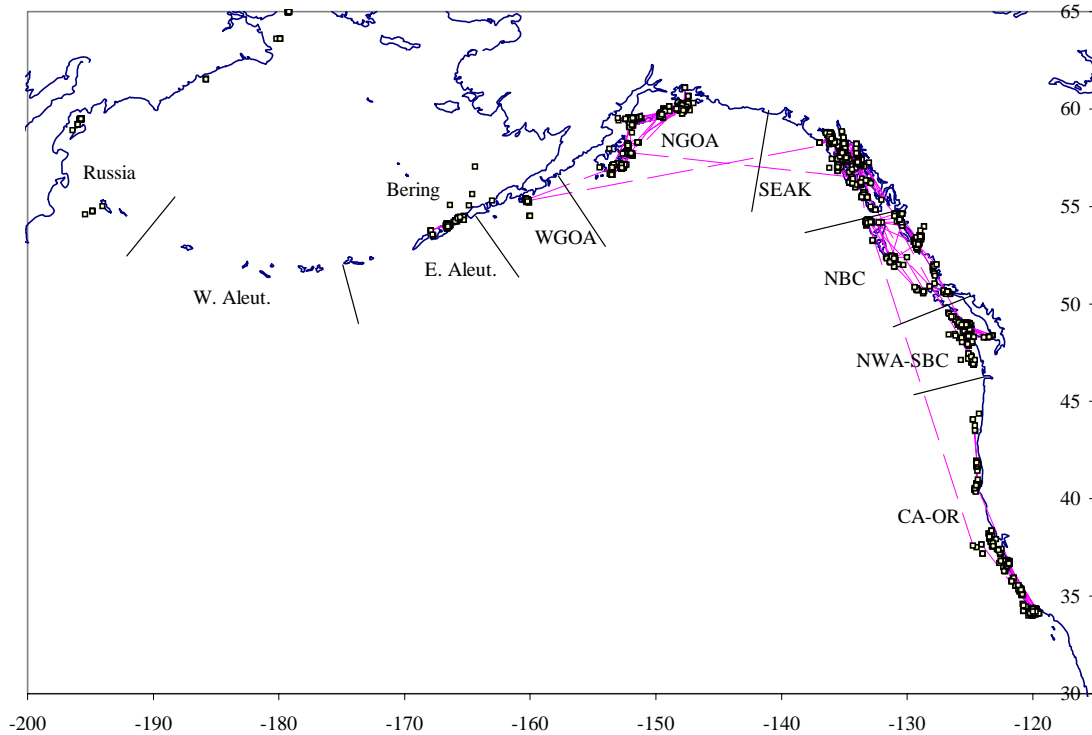


Figure 1. Locations of all humpback whale identifications, summer 2005. Dashed lines connect resightings of the same individual.

Table 3. Summary of flank and tailstock photos collected during summer 2005. These numbers do not reflect any reductions as a result of quality screening.

Region	Tailstocks	Tailstocks with ID	Flanks	Flanks with ID
Russia	29	27	166	145
Bering	164	77	413	171
NGOA	128	74	787	422
WGOA	52	34	238	164
SEAK	173	117	1288	717
NBC	101	39	462	142
NWA-SBC	49	31	369	150
CA-OR	216	171	634	374
TOTALS	912	570	4357	2285

Movements within Summer 2005

Most humpback whales were identified within only a single region (Table 4, Figure 1). From 3,809 sightings of 2,099 unique whales in Summer 2005, only 15 individuals were seen in more than one feeding region. All but three of these 15 were resighted in adjacent regions. Movement between two regions all consisted of one or two individuals with the exception of N British Columbia and SE Alaska where eight animals were seen in both regions. While unusual, the three whales that were seen farther than an adjacent region are instructive and were:

- 1) SPLASH ID # 420310 was seen in SE Alaska on 13 June 2005 and then resighted off northern Washington on 20 October 2005. This is an animal that has also been matched to the mainland Mexico winter breeding area.
- 2) SPLASH ID # 550016 was seen three times from 12 June to 15 September 2005 off northern BC and then was resighted late in the season on 19 November 2005 well offshore of central California by the SWFSC CSCAPE cruise.
- 3) SPLASH ID # 474316 was seen on 10 June 2005 south of the Alaska Peninsula in the Western Gulf of Alaska and then on 20 July and 9 August 2005 in SE Alaska.

The first two of these resightings involve identifications made in the fall in an area south of where the animal was seen during the summer. Both likely represent late-season sightings of whales in a feeding area that lies along the migratory route to its winter breeding destination.

Table 4. Interchange of humpback whales among feeding regions within Summer 2005 season.

Region	Russia	Bering	WGOA	NGOA	SE AK	N BC	SBC/NWA	CA-OR
Russia	72							
Bering	0	301						
WGOA	0	0	111					
NGOA	0	0	1	428				
SE AK	0	0	1	1	494			
N BC	0	0	0	0	8	236		
S BC/ N WA	0	0	0	0	1	2	153	
CA-OR	0	0	0	0	0	1	0	319

Matches between Summer 2004 and 2005

Comparison of Summer 2004 and 2005 provided the first indication from SPLASH of site fidelity to some of the feeding regions assigned for the SPLASH project. Interchange between feeding regions was relatively uncommon; most individuals that were sighted in Summer 2004 and 2005 were sighted in the same region in both years (Table 5, Figure 2). Most cross-regional resightings of whales occurred between adjacent areas. The highest rates of adjacent region resightings occurred between SE Alaska and northern BC, however even here cross-regional resightings were much less frequent than resightings within each region. There were only three examples of interchange beyond the nearest adjacent region: 1) one whale seen in N BC in 2004 and resighted in N Gulf of Alaska in

Migratory destinations of Summer 2005 whales

Comparisons of whales identified in Summer 2005 against those from winter breeding areas in 2004 and 2005 provided new information on migratory movements. A total of 146 and 168 matches were found between whales seen in Summer 2005 and Winter 2004 and 2005, respectively (Table 6). Humpback whales seen off California-Oregon were primarily documented in mainland Mexico and Central America. Those from British Columbia continued to show a wide range of migratory destinations, with a distinct difference between those that feed off southern and northern BC. A higher proportion of Southern BC whales were sighted in Mexico (Baja and mainland), whereas Northern BC whales were most often seen in Hawaii, as were whales from SE Alaska. Whales feeding in the Gulf of Alaska were primarily resighted in Hawaii and the offshore Revillagigedos Islands of Mexico. Whales feeding in Russia were seen in all three subareas of Asia and in Hawaii. For the first time, a whale identified off Russia in Summer 2005 was documented as having come from the Revillagigedos.

The overall match rates to winter breeding areas for Summer 2005 were similar to those observed in Summer 2004, with a lower percentage of animals from Gulf of Alaska and Bering Sea feeding areas matching to any wintering area (Figure 2). This pattern continues to suggest that there is a wintering area that is a migratory destination for animals feeding in the Bering Sea, Aleutians, and, to a lesser degree, the Gulf of Alaska that was not sampled in SPLASH, and has not otherwise been documented.

Table 6. Summary of migratory interchange between humpback whales identified in Summer 2005 on feeding grounds and wintering areas for both 2004 and 2005.

	Russia	Bering	WGOA	NGOA	SE AK	NBC	SBC/NWA	CA-OR	Total
IDs	72	301	111	428	494	236	153	319	2,099
Winter 2004 to Summer 2005									
Phil.	27	1	0	0	0	0	0	0	1
Okin.	43	2	0	0	0	0	0	0	2
Ogas.	114	1	0	0	0	0	0	0	1
Hawaii	697	0	6	6	14	30	21	2	79
MX-Rev	317	0	6	4	7	2	1	0	20
Mx-Baja	182	0	2	1	3	1	2	1	6
Mx-Mnld	223	0	0	0	1	1	1	3	17
Cent Am.	18	0	0	0	0	0	0	1	3
Total matching	1621	4	14	11	25	34	25	7	26
Winter 2005 to Summer 2005									
Phil.	35	3	0	0	0	0	0	0	3
Okin.	55	3	0	0	0	0	0	0	3
Ogas.	123	1	0	0	0	0	0	0	1
Hawaii	846	1	6	0	15	36	19	4	0
MX-Rev	193	1	2	2	5	1	2	1	0
Mx-Baja	157	0	1	1	6	1	1	4	6
Mx-Mnld	266	0	1	0	1	1	1	7	27
Cent Am.	48	0	0	0	0	0	0	2	6
Total matching	1723	9	10	3	27	39	23	18	39
Total for 04 and 05	13	24	14	52	73	48	25	65	314

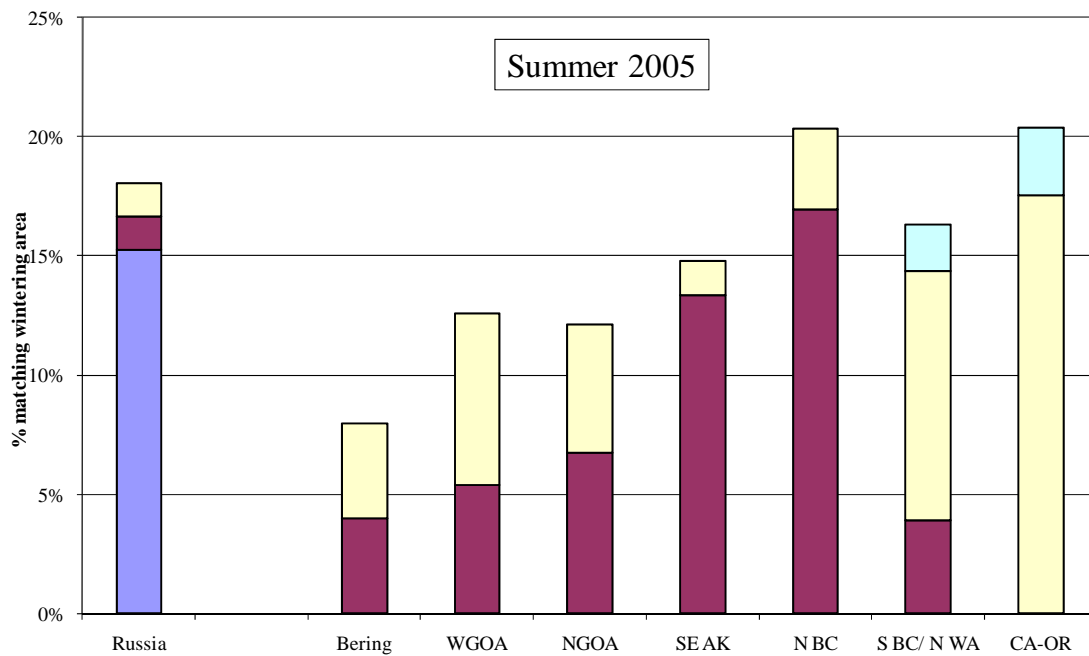
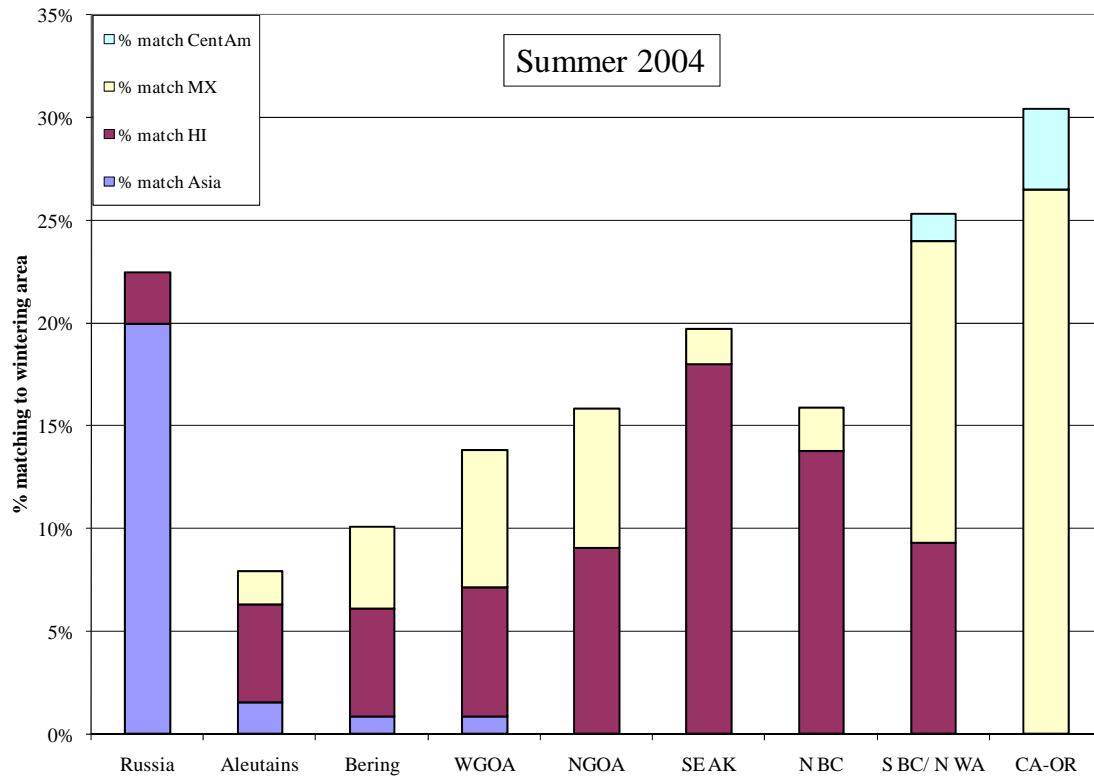


Figure 3. Percent of animals from feeding areas that matched to a wintering area showing results from Summer 2004 on top and Summer 2005 on bottom. In both cases the percent matching includes the total matches to either Winter 2004 or 2005.