

## EQUIPMENT AND PROCEDURES

### Acoustics

The goal of the acoustics program for the CSCAPE 2005 was to record vocalizations of killer whales, beaked whales, and baleen whales, especially those photographed and/or biopsied for genetic studies. Recordings were made using Navy surplus sonobuoys and a hull-mounted hydrophone.

Navy surplus sonobuoys were typically deployed within  $\frac{1}{2}$  nmi of a cetacean that had been sighted by the visual team. Type-53 and type-77 'Direction Fixing And Ranging' (DIFAR) sonobuoys had a frequency response of 10 Hz to 2.5 kHz and were deployed on baleen whales. High-frequency type-57 sonobuoys had a frequency response of 10 Hz to 20 kHz and were occasionally deployed in the proximity of killer whales or other small cetaceans. Signals from the sonobuoys were transmitted to the ship via radio frequency and were picked up by a modified ICOM radio receiver in the acoustics lab. Sonobuoy recordings were made using a portable Sony digital audio tape (DAT) recorder (Sony TCD-8).

A small array of three hydrophones was installed on the bow hydrophone of the *Jordan*; this unit consisted of three closely spaced hydrophones. The bow hydrophones had a small range and were occasionally monitored when animals were near the bow. Recordings were made using a portable Sony DAT recorder (Sony TCD-8).

## RESULTS AND DISCUSSION

### Acoustics

Recordings from killer whales (4), Baird's beaked whales (1), and a mixed school of northern right whale dolphins with Pacific white-sided dolphins (1) were obtained from the high-frequency type-57 sonobuoys (6 functional sonobuoys of a total 6 deployed). Preliminary examination of the recordings found vocalizations from one of the killer whale sightings and from the Baird's beaked whales. Recordings of minke, fin, blue and sei whales were obtained from the low-frequency sonobuoys (19 functional sonobuoys of a total 26 deployed). Preliminary examination of the recordings found vocalizations from two of the minke whale sightings and one of the blue whale sightings.

Additionally, a sonobuoy was deployed on a blue whale (S#1165), but there was no recording made. No vocals were detected during real-time monitoring of signal.

Forty-one recordings of cetaceans were made from the bow hydrophone. Vocalizations from Baird's beaked whales, killer whales, common dolphins, and northern-right whale dolphins were detected during preliminary examination of the recordings. Recordings of mixed species schools with recordings (from one or more of the species present) include Northern right whale dolphin and Pacific white-sided dolphins and a mixed group of common dolphins and striped dolphins. Vocalizations were not detected in a recording of a group of pilot whales as well as a mixed group of Risso's dolphins with Dall's porpoise.

## **RESULTS AND DISCUSSION**

Thanks to Liz Zele and Laura Morse for the assistance in the field with sonobuoy and bow hydrophone recordings. Sonobuoys were provided by Bill Gaines, John Hildebrand, and Erin Oleson of Scripps Institution of Oceanography.

Table X. Date, location, species and sighting number for which sonobuoys were deployed during CSCAPE 2005 aboard NOAA Ship *David Starr Jordan*. Not all recordings contained vocalizations; preliminary detection of the presence of vocalizations is noted.

Sighting #	Date	Latitude	Longitude	Species	Vocalizations
1049	8/12/2005	43.0797	-129.886	<i>Baleanoptera musculus</i>	None
1060	8/16/2005	45.3253	126.2038	<i>Baleanoptera musculus</i>	None
1100	8/22/2005	43.5802	124.9493	<i>Orcinus orca</i>	None
1112	8/23/2005	43.7238	-128.388	<i>Berardius bairdii</i>	Yes
1119	8/26/2005	43.4588	130.1502	<i>Baleanoptera musculus</i>	None
1121	8/27/2005	40.71	130.9795	<i>Baleanoptera musculus</i>	None
1160	9/4/2005	36.4743	-125.874	<i>Baleanoptera musculus</i>	None
1214	9/17/2005	41.1282	-129.258	<i>Baleanoptera musculus</i> , <i>Balaenoptera physalus</i>	None
1257	9/22/2005	36.1095	-124.295	<i>Orcinus orca</i> , <i>Balaenoptera physalus</i>	None
1258	9/29/2005	31.7733	-119.218	<i>Balaenoptera musculus</i> , <i>Balaenoptera physalus</i>	None
1273	9/29/2005	32.2153	-119.149	<i>Balaenoptera acutorostrata</i>	Yes
1284	9/30/2005	33.0618	-118.226	<i>Balaenoptera acutorostrata</i>	None
1309	10/9/2005	34.3558	-123.26	<i>Balaenoptera musculus</i>	Yes
1316	10/10/2005	35.5057	-122.948	<i>Balaenoptera musculus</i>	None
1430	10/21/2005	43.5115	-126.683	<i>Balaenoptera borealis</i>	None
1433	10/21/2005	43.6008	-126.668	<i>Balaenoptera borealis</i>	None
1442	10/23/2005	45.6738	-124.426	<i>Balaenoptera musculus</i>	Yes
1451	10/29/2005			<i>Orcinus orca</i>	Yes
1503	11/10/2005	32.935	120.465	<i>Balaenoptera musculus</i>	Yes
1513	11/11/2005	33.8293	121.925	<i>Orcinus orca</i>	None
1528	11/19/2005	37.3972	123.9237	<i>Balaenoptera acutorostrata</i>	Yes
1560	11/22/2005	35.5743	122.9187	<i>Lissodelphis borealis</i> , <i>Lagenorhynchus obliquidens</i>	None
1579	11/27/2005	34.1408	124.993	<i>Balaenoptera physalus</i>	None

Table X. Date, species and sighting number for which bow hydrophone recordings were made during CSCAPE 2005 aboard NOAA Ship *David Starr Jordan*. Not all recordings contained vocalizations; preliminary detection of the presence of vocalizations is noted.

Sighting #	Date	Species	Vocalizations
1058	8/15/2005	<i>Berardius bairdii</i>	Yes
1065	8/16/2005	<i>Lagenorhynchus obliquidens</i> , <i>Lissodelphis borealis</i>	Yes
1068	8/17/2005	<i>Grampus griseus</i> , <i>Phocoenoides dalli</i>	No
1100	8/22/2005	<i>Orcinus orca</i>	No
1112	8/23/2005	<i>Berardius bairdii</i>	Yes
1132	8/29/2005	<i>Delphinus delphis</i>	Yes
1133	8/30/2005	<i>Delphinus delphis</i>	Yes
1136	9/2/2005	<i>Delphinus delphis</i>	Yes
1144	9/2/2005	<i>Delphinus delphis</i> , <i>Stenella coeruleoabla</i>	Yes
1150	9/3/2005	<i>Delphinus delphis</i> , <i>Stenella coeruleoabla</i>	Yes
1159	9/4/2005	<i>Delphinus delphis</i>	Yes
1184	9/7/2005	<i>Delphinus delphis</i>	Yes
1211	9/16/2005	<i>Delphinus delphis</i>	Yes
1222	9/17/2005	<i>Delphinus delphis</i> , <i>Stenella coeruleoabla</i>	Yes
1228	9/18/2005	<i>Delphinus delphis</i> , <i>Stenella coeruleoabla</i>	Yes
1234	9/18/2005	<i>Delphinus delphis</i>	Yes
1263	9/26/2005	<i>Globicephala macrorhynchus</i>	No
1267	9/29/2005	<i>Berardius bairdii</i>	Yes
1272	9/29/2005	<i>Delphinus delphis</i>	Yes
1296	10/6/2005	<i>Delphinus delphis</i>	Yes
1298	10/6/2005	<i>Delphinus delphis</i>	Yes
1307	10/6/2005	<i>Delphinus delphis</i>	Yes
1449	10/23/2005	<i>Orcinus orca</i>	Yes
1451	10/29/2005	<i>Orcinus orca</i>	Yes
1479	11/4/2005	<i>Orcinus orca</i>	Yes
1481	11/4/2005	<i>Delphinus delphis</i> , <i>Stenella coeruleoabla</i>	Yes
1485	11/4/2005	<i>Delphinus delphis</i>	Yes
1526	11/18/2005	<i>Grampus griseus</i>	Yes
1530	11/19/2005	<i>Berardius bairdii</i>	No
1537	11/20/2005	<i>Delphinus delphis</i>	Yes
1539	11/20/2005	<i>Delphinus delphis</i>	Yes
1551	11/22/2005	<i>Delphinus delphis</i>	Yes
1554	11/22/2005	<i>Delphinus delphis</i>	Yes
1559	11/22/2005	<i>Lissodelphis borealis</i>	Yes
1560	11/22/2005	<i>Lissodelphis borealis</i> , <i>Lagenorhynchus obliquidens</i>	No

1568	11/24/2005	<i>Delphinus delphis, Stenella coeruleoabla</i>	Yes
1569	11/24/2005	<i>Delphinus delphis, Stenella coeruleoabla</i>	Yes
1571	11/24/2005	<i>Grampus griseus</i>	Yes
1580	11/27/2005	<i>Delphinus delphis</i>	Yes
1582	11/27/2005	<i>Delphinus delphis</i>	Yes