

USA PROGRESS REPORT ON CETACEAN RESEARCH, MAY 2003 TO APRIL 2004, WITH STATISTICAL DATA FOR THE CALENDAR YEAR 2001

Compiled by Beth Josephson
NOAA-NMFS-NEFSC
166 Water Street
Woods Hole, MA 02543
USA

The following information summarizes cetacean research conducted or supported by the U.S. National Marine Fisheries Service at Silver Spring, Maryland (NMFS HQ), and by the five NMFS Science Centers; Alaska Fisheries Science Center (AFSC) and Northwest Fisheries Science Center (NWFSC) in Seattle, Washington; Southwest Fisheries Science Center (SWFSC), La Jolla, California, Northeast Fisheries Science Center (NEFSC), Woods Hole, Massachusetts; and the Southeast Fisheries Science Center (SEFSC), Miami, Florida. Information was also contributed by the Alaska Department of Fish and Game (ADFG), Anchorage, Alaska, the Alaska Beluga Whale Committee (ABWC), and the North Slope Borough (NSB), Barrow, Alaska, and the National Museum of Natural History (NMNH), Smithsonian Institution, Washington, DC. The following information was compiled in consultation with the above agencies.

USA Atlantic and Gulf of Mexico Waters

1. Species and stocks studied

Common name	Scientific name	Area/stock(s)	Items referred to
Atlantic spotted dolphin	<i>Stenella frontalis</i>	North Atlantic	2.1, 4.1, 4.3
Atlantic white-sided dolphin	<i>Lagenorhynchus acutus</i>	Western N. Atlantic	2.1, 4.2
Beaked whale	<i>Mesoplodon sp.</i>	North Atlantic	11.2
Bottlenose dolphin	<i>Tursiops truncatus</i>	Western N. Atl. Coastal and Offshore, Gulf of Mexico	2.1, 3.1.1, 3.1.3, 4.1, 4.2, 4.3, 7.1, 9, 11.1, 11.2
Clymene dolphin	<i>S. clymene</i>	Gulf of Mexico	4.1
Common dolphin	<i>Delphinus delphis</i>	Western N. Atlantic	2.1, 3.1.1, 4.1, 4.2, 7.1
False killer whale	<i>Pseudorca crassidens</i>	Gulf of Mexico	4.1
Fin whale	<i>B. physalus</i>	Western N. Atlantic	2.1, 3.1.1, 4.1, 6.2
Harbor porpoise	<i>Phocoena phocoena</i>	Western N. Atlantic	4.2, 4.3, 7.1, 11.2
Humpback whale	<i>Megaptera novaeangliae</i>	Gulf of Maine	2.1, 4.1, 4.3, 11.1
Killer whale	<i>Orcinus orca</i>	Gulf of Mexico	2.1
Minke whale	<i>Balaenoptera acutorostrata</i>	Canadian East Coast	2.1, 3.1.1, 4.1, 4.3, 6.2
Pantropical spotted dolphin	<i>Stenella attenuata</i>	Gulf of Mexico	2.1, 4.1, 11.1
Pilot whale	<i>Globicephala melas and G. macrorhynchus</i>	W. N. Atlantic, Gulf of Mexico	2.1, 3.1.1, 3.1.3, 4.1, 4.2, 7.1
Pygmy Sperm Whale	<i>Kogia breviceps</i>	Western N. Atlantic	4.3
No. Right whale	<i>Eubalaena glacialis</i>	Western N. Atlantic	2.1, 3.1.1, 3.2, 11.1
Risso's dolphin	<i>Grampus griseus</i>	Western N. Atlantic, Gulf of Mexico	2.1, 4.1, 7.1
Rough-toothed dolphin	<i>Steno bredanensis</i>	Gulf of Mexico	2.1, 4.1
Sperm whale	<i>Physeter macrocephalus</i>	North Atlantic	2.1, 3.1.1, 3.1.3, 4.1, 9, 11.2
Spinner dolphin	<i>Stenella longirostris</i>	Gulf of Mexico	4.1
Striped dolphin	<i>Stenella coeruleoalba</i>	Gulf of Mexico	4.3

2. Sightings data

2.1 Field work

2.1.1 SYSTEMATIC

Shipboard surveys

NEFSC

NOAA R/V Delaware II – Cetacean Tagging Survey conducted from 07 July to 01 August, 2003

Operations were conducted in waters south of Woods Hole, MA to Virginia. The primary goal of this cruise was to conduct sperm whale dive studies in the Atlantic Ocean. The dive studies were achieved by simultaneously conducting line-transect marine mammal visual, passive acoustic, oceanographic, and plankton surveys, while

collecting satellite data on ocean color and sea surface temperature. A total of 12 tags were delivered in the 9 days when the tagging boat could operate safely; on 8 of these days sperm whales were targeted, and on one day pilot whales were targeted. During tracking mode 205 surfacings of 292 animals were recorded. Note, these animals were not identified to individuals or individual groups; many of the individual groups were recorded multiple times. No biopsies were attempted from the tag boat, however, a high percentage of D-tags yielded skin samples. Fecal samples were collected from 2 animals that were tagged. (Contact: D. Palka, NEFSC)

NOAA R/V Delaware II – Large Whale Survey conducted from 05 to 28 August, 2003

The survey area included waters from the northern edge of Georges Bank to the Laurentian Channel, out to the shelf break. Major concentrations of humpbacks were found on the northern edge of Banquereau Bank and the southwest corner of Middle Bank. On leg one, right whales, fin whales, and sei whales were sighted in fairly large numbers along the Northern Edge, Northeast Channel, and the Northeast Peak of Georges Bank. On the second leg, fin and humpback whales were the most abundant species on Baccaro Bank. Other species of cetacean observed during the cruise included bottlenose dolphin (*Tursiops truncatus*), common dolphin (*Delphinus delphis*), long-finned pilot whale (*Globicephala melas*), sperm whale (*Physeter macrocephalus*), Minke whale (*Balaenoptera acutorostrata*) and Atlantic white-sided dolphin (*Lagenorhynchus acutus*). A total of 64 distinct fluke photographs and 41 biopsy samples were obtained during the survey. (Contact: P. Clapham, NEFSC)

NOAA R/V Delaware II – Pilot Whale and Common Dolphin Survey conducted from 01 to 12 March, 2004

The survey area included waters along the edge of the continental shelf east of New Jersey and Delaware. The survey was conducted during daylight hours at a speed of 10 knots along non-random track lines that were determined based on prior sightings information, bathymetric and oceanographic data. Species encountered included Risso's dolphin (*Grampus griseus*), pilot whale (*Globicephala*), and common dolphin (*Delphinus delphis*). Several unsuccessful biopsy attempts were made on bow-riding common dolphins. (Contact: G. Waring, NEFSC)

NOAA R/V Gordon Gunter – Monah Project Humpback Whale Survey, Silver Bank, 14 January – 12 March 2004

A joint NEFSC and SEFSC survey of Silver Bank, Dominican Republic was conducted as part of an assessment of North Atlantic humpback whales. The principal objectives were to obtain skin biopsies as well as tail fluke photographs of as many humpback whales as possible for the purposes of identification, estimation of abundance, and refining existing knowledge of population structure and migratory timing. A total of 623 groups of humpback whales were worked, involving a minimum of 1510 whales (not accounting for duplication). A total of 659 samples (604 biopsies, 55 sloughed skin) were obtained on the cruise. Good quality fluke photographs of approximately 524 individuals, and 72 of questionable quality were obtained. In addition to humpbacks, sightings of Atlantic spotted dolphin (*Stenella frontalis*), pantropical spotted dolphin (*S. attenuata*), and bottlenose dolphin (*Tursiops truncatus*) were recorded. (Contact: P. Clapham, NEFSC)

SEFSC

From 15 November 2003 to 30 March 2004, the southeast early warning system surveys were conducted between Savannah, Georgia and St. Augustine, Florida. These surveys monitor the presence of Northern Right Whales, *Balaena glacialis*, in their southeast U.S. calving grounds. The survey provided daily coverage, where operational conditions allowed, of the region along transect lines perpendicular to the shoreline spaced 3 nautical miles apart and extending to 35-45 nautical miles from shore. Upon sighting whales, the aircraft circled to take photographs for use in identifying individual animals. Sighting information was relayed to commercial and military vessels in the area to notify mariners of the presence of right whales in the area and reduce the likelihood of mortality due to ship strikes. Surveys of this type have now been flown in each calving season since 1995. (Contact: B. Zoodma, SER)

From 13 April to 11 June, 2003, a vessel based line transect survey was conducted in the Gulf of Mexico aboard the R/V Gordon Gunter. Systematic line transects covered the entire U.S. EEZ within the Gulf of Mexico in oceanic waters greater than 100m depth. The primary focus species for the survey was the sperm whale, *Physeter macrocephalus*. Upon encountering sperm whale groups 90-minute counts were conducted to improve estimates of group size by allowing observation of animals that were under water during the initial sighting period. In addition to sperm whales, there were numerous sightings of pantropical spotted dolphins, *Stenella attenuata*, bottlenose dolphins, *Tursiops truncatus*, rough-toothed dolphins, *Steno bredanensis*, and short-fin pilot whales, *Globicephala macrorhynchus*. Other sightings of note included several pods of killer whales, *Orcinus orca*. Biopsy samples were collected from delphinds at the vessel bow, and a small boat was occasionally deployed to collect samples from sperm whales and pilot whales. In addition to visual line transect effort, a hydroacoustic array was towed behind the vessel throughout the survey to detect marine mammals and record vocalizations. (Contact, K. Mullin, SEFSC)

Aerial Surveys**NESFC***NOAA DeHavilland Twin Otter Right Whale Sighting Surveys*

The North Atlantic Right Whale Sightings Survey (NARWSS) is an ongoing NOAA Fisheries program dedicated to locating and recording the seasonal distribution of right whales off the northeastern United States. There were three primary types of surveys flown: broadscale surveys, focused surveys in the Great South Channel region, and focused surveys over potential and realized Dynamic Area Management closure zones. From May 2003 through April 2004 68 broadscale flights, 42 focused flights, and 2 additional flights were made, totalling 542 flight hours. Photographs are catalogued and archived at the New England Aquarium. (Contact: T. Cole, NESFC)

Right Whale Photogrammetry

This study was conducted from 4 August to 2 September 2003 in the Bay of Fundy. The goals were to examine the physiological condition of the North Atlantic right whale population by monitoring growth rates and body condition of identified individuals. The morphometric data is derived from high resolution photographic images taken from a high wing aircraft. A total of 1300 photographs were taken of right whales in the Bay of Fundy in 2003. Complete data sets and photographs collected during this project are archived at the Northeast Fisheries Science Center, Woods Hole Laboratory. (Contact: T. Cole, NEFSC)

2.1.2 OPPORTUNISTIC, PLATFORMS OF OPPORTUNITY

None reported.

2.2 Analyses/development of techniques

The sperm whale dive-time data collected during the July 2003 survey (see 2.1.1 and 3.1.3) is currently being used to augment standard line-transect sighting data to develop methods to estimate abundance that include a dive-time correction. Results are not currently available.

3. Marking data*3.1 Field work- Natural Marking Data for Calendar Year 2003.***3.1.1 NATURAL MARKING DATA****NEFSC**

Species	Feature	Area/stock	Calendar year/season no. photographed	Catalogued (Y/N)	Catalogue total	Contact person/institute
Humpback whale	animal	Gulf of Maine	101	Y	NA	P. Clapham/NEFSC
Sperm whale	fluke	N. Atlantic	27	Y	NA	D. Palka/NEFSC
Pilot whale	animal	W.N. Atlantic	50	Y	NA	D. Palka/NEFSC
Right whale	animal	W.N. Atlantic	4	Y	NA	P. Clapham/NEFSC
Fin whale	animal	W.N. Atlantic	4	Y	NA	P. Clapham/NEFSC
Minke whale	animal	Canadian East Coast	1	Y	NA	P. Clapham/NEFSC
Common dolphin	animal	W.N. Atlantic	1 group	Y	NA	P. Clapham/NEFSC

SEFSC

Species	Feature	Area/stock	Calendar year/season no. photographed	Catalogued (Y/N)	Catalogue total	Contact person/institute
Sperm Whale	Fluke	Gulf of Mexico	NA	Y	NA	K. Mullin, SEFSC
Bottlenose Dolphin	Dorsal Fin	Gulf of Mexico	NA	Y	NA	K. Mullin, SEFSC
Bottlenose Dolphin	Dorsal Fin	NW Atlantic	NA	Y	NA	A. Hohn, SEFSC

3.1.2. ARTIFICIAL MARKING DATA

None reported.

3.1.3 TELEMETRY DATA**NEFSC**

Species	Tag type	No. successfully deployed	Maximum time transmitting	Contact person/institute
Sperm whale	D-tag	12	6.4 hours	D. Palka, NEFSC

SEFSC

Species	Tag type	No. successfully deployed	Maximum time transmitting	Contact person/institute
Bottlenose Dolphin	Satellite	NA	NA	A. Hohn, SEFSC
Shortfin Pilot Whale	Satellite	3	~3 months	B. Mase, SEFSC

3.2 Analyses/development of techniques

Using simulated data that mimic the structure of Gulf of Maine humpback and North Atlantic right whale sightings and scarring databases, two methodological approaches to assessment of scarring rates were evaluated – multistate recapture models and multiple event duration models. (Pace, Richard. Dec. 2003 *Two New Methodological Approaches Useful for Estimating Scarring Rates of Cetaceans from Mark-Recapture Data*. Presented at the 15th Biennial Conference on the Biology of Marine Mammals, Greensboro, NC, USA 14-19 December 2003.)

4. Tissue/biological samples collected**4.1 Biopsy samples for Calendar Year 2003****NEFSC**

Species	Area/stock	Calendar year/season no. collected	Archived (Y/N)	No. analysed	Total holdings	Contact person/institute
Humpback whale	Gulf of Maine	37	Y	NA	NA	Frederick Wenzel/NEFC
Fin whale	W.N. Atlantic	2	Y	NA	NA	Frederick Wenzel/NEFC
Minke whale	Canadian East Coast	1	Y	NA	NA	Frederick Wenzel/NEFC
Common dolphin	W.N. Atlantic	1	Y	NA	NA	Frederick Wenzel/NEFC

SEFSC

Species	Area/stock	Calendar year/season no. collected	Archived (Y/N)	No. analysed	Total holdings	Contact person/institute
Fin Whale	North Atlantic	1	Y	0	NA	K. Mullin, SEFSC
Sperm Whale	Gulf of Mexico	3	Y	0	NA	K. Mullin, SEFSC
Melon-headed Whale	Gulf of Mexico	1	Y	0	NA	K. Mullin, SEFSC
False Killer Whale	Gulf of Mexico	6	Y	0	NA	K. Mullin, SEFSC
Short-finned Pilot Whale	Gulf of Mexico	13	Y	0	NA	K. Mullin, SEFSC
Rough-toothed Dolphin	Gulf of Mexico	1	Y	0	NA	K. Mullin, SEFSC
Risso's Dolphin	Gulf of Mexico	1	Y	0	NA	K. Mullin, SEFSC
Bottlenose Dolphin	Gulf of Mexico, North Atlantic	157	Y	0	NA	K. Mullin, SEFSC, P. Rosel, SEFSC
Atlantic spotted dolphin	North Atlantic	25	Y	0	NA	P Rosel, SEFSC
Pantropical Spotted Dolphin	Gulf of Mexico	13	Y	0	NA	K. Mullin, SEFSC
Spinner Dolphin	Gulf of Mexico	2	Y	0	NA	K. Mullin, SEFSC
Clymene Dolphin	Gulf of Mexico	1	Y	0	NA	K. Mullin, SEFSC

4.2 Samples from directed catches or bycatches for Calendar Year 2001

Species	Area/stock	Calendar year/season total*	Archived (Y/N)	Tissue type(s)	Contact person/institute
Atlantic white-sided dolphin	W.N. Atlantic	11	Y	blubber, jaw, finclip, stomach	Frederick Wenzel/NEFC

bottlenose dolphin	W.N. Atlantic	1	Y	skin	Frederick Wenzel/NEFC
common dolphin	W.N. Atlantic	3	Y	blubber, muscle, fin	Frederick Wenzel/NEFC
harbor porpoise	W.N. Atlantic	1	Y	whole animal	Frederick Wenzel/NEFC
pilot whale, nk	W.N. Atlantic	14	Y	finclip, blubber, muscle, repro. tract, kidney, liver	Frederick Wenzel/NEFC

*number of samples does not represent number of takes

4.3 Samples from stranded animals for Calendar Year 2003

NEFSC

Species	NW Atlantic	Mid-Atlantic	Archived (Y/N)	Tissue type(s)	Contact person/institute
Atlantic Spotted Dolphin	12	0	Y	*	Dana Hartley, NER Stranding Network
Bottlenose Dolphin	12	144	Y	*	Dana Hartley, NER Stranding Network
Common/Saddleback Dolphin	36	11	Y	*	Dana Hartley, NER Stranding Network
Gray Grampus (Risso's Dolphin)	24	8	Y	*	Dana Hartley, NER Stranding Network
Harbor Porpoise	55	37	Y	*	Dana Hartley, NER Stranding Network
Humpback Whale	21	3	Y	*	Dana Hartley, NER Stranding Network
Minke Whale	11	7	Y	*	Dana Hartley, NER Stranding Network
Pilot Whale (Long-finned)	17	1	Y	*	Dana Hartley, NER Stranding Network
Pygmy Sperm Whale	1	0	Y	skull	Dana Hartley, NER Stranding Network
Sei Whale	0	13	Y	*	Dana Hartley, NER Stranding Network
Striped Dolphin	1	11	Y	*	Dana Hartley, NER Stranding Network
Unidentified Balaenopterid	2	2	Y	skin, muscle, bone	Dana Hartley, NER Stranding Network
Unidentified Dolphin/Porpoise	1	0	Y	*	Dana Hartley, NER Stranding Network
Unidentified Stenella	0	3	Y	teeth, muscle, skull	Dana Hartley, NER Stranding Network
Unidentified Toothed Whale	0	2	Y	skin, teeth	Dana Hartley, NER Stranding Network
Unidentified Whale	4	0	Y	skin, bone	Dana Hartley, NER Stranding Network
White-sided Dolphin	96	0	Y	*	Dana Hartley, NER Stranding Network

*Samples include some or all of the following: hard parts (i.e. teeth, jaw, skull, baleen, entire skeleton, etc) and/or soft parts (i.e. skin, gonads, muscle, blubber, blood, organs, etc).

Data are entered as represented by the NOAA Fisheries NER Stranding Network and have not been formally reviewed by NOAA Fisheries.

SEFSC

None reported.

4.4 Analyses/development of techniques

None reported.

5. Pollution studies

None reported.

6. Statistics for large cetaceans

6.1 Direct catches (commercial, aboriginal and scientific permits) for the calendar year 2003.

None reported.

6.2 Other non-natural mortality for the calendar year 2001

Species	Area/stock	Male	Females	Total	Cause	Methodology
Northern right	Eastern USA	1	1	2	ship strike	*Review of NMFS records
Northern right	Magdalen Islands, CANADA	1	0	1	entanglement	*Review of NMFS records
Humpback	North Atlantic	NA	NA	1	ship strike	*Review of NMFS records
Humpback	North Atlantic	0	2	2	ship strike	*Review of NMFS records
Humpback	North Atlantic	2	1	3	entanglement	*Review of NMFS records
Fin whale	Western N. Atlantic	0	2	2	ship strike	*Review of NMFS records
Fin whale	Western N. Atlantic	NA	NA	1	entanglement	*Review of NMFS records
Minke whale	Canadian East Coast Stock	NA	1	3	entanglement	*Review of NMFS records
Sei Whale	Nova Scotia Stock	NA	NA	1	ship strike	*Review of NMFS records

* Subsequent review of NMFS/NER stranding records found sufficient information to confirm the cause of death as collision with vessel or fishery interaction/entanglement.

6.3 Earlier years' statistics

None reported.

7. Statistics for small cetaceans

7.1 For the calendar year 2001

Species	Area/stock	Directed catch		Incidental mortality			Live-capture
		Reported	Est. total	Reported	Est. total	Source	Reported
Bottlenose dolphin	Coastal stock	0	0	Yes*	Yes*	Coastal gillnet and S. Atlantic shark gillnet	0
Bottlenose dolphin	Offshore stock	0	0	Yes*	Yes*	Northeast sink gillnet	0
Common dolphin	NW and mid-Atlantic	0	0	2	126	So. New England Loligo Squid trawl	0
Harbor porpoise	Gulf of Maine/ Bay of Fundy and Mid-Atlantic	0	0	4	53	Northeast sink gillnet	0
				1	26	Mid-Atlantic coastal gillnet	0
Pilot whale	NW and mid-Atlantic	0	0	Yes*	Yes*	Ilex squid trawl	0
				11	11	Herring trawl	0
				1	29	Pelagic longline	0
White-sided dolphin	NW Atlantic	0	0	1	26	Northeast sink gillnet	0
				2	2	Herring trawl	0

*2001 data not available

SEFSC

Species	Area/stock	Directed catch		Incidental mortality			Live-capture
		Reported	Est. total	Reported	Est. total	Source*	Reported
Pilot whale	Atlantic	0	0	4	54	Pelagic Longline	6
Risso's dolphin	Atlantic	0	0	4	26	Pelagic Longline	6

*e.g. fishery type

Note: Mortality for pelagic longline includes serious injury.

7.2 Earlier years' statistics

None reported.

8. Strandings

Dana Hartley, Northeast Region Stranding Network, NEFS Regional Office, Gloucester. MA USA tel:(978)-281-9328 x 6514.

Blair Mase, NMFS, 75 Virginia Beach Dr. Miami, FL USA 33149-1003 tel:(305) 361-4586 x 586

9. Other studies and analyses

NEFSC

East Coast Lightship Meteorological Data

This ongoing project was funded in 2001 as a component of the History of Marine Animal Populations (HMAP) project under the Census of Marine Life. Atmospheric and oceanographic data collected at lightships along the east coast is being rescued, converted into standard units of measurement, and archived. The data will be used in determining past environmental conditions to better interpret historic records of marine mammal and fish populations (Contact: T. Smith NEFSC).

Sperm Whale Catch History

This ongoing research program is designed to provide annual regional estimates of catches of sperm whales by all fisheries from the mid-18th century to the early 20th century. This program was designed to make use of voyage logbooks to determine the changing spatial distribution of sperm whaling over time, as well as oil yields per whale caught and numbers of sighted vessels. The largest costs will be reading a representative sample of the roughly 5,000 extant logbooks from the US fishery. Subsequent to that workshop, a complete database of information about each of the US voyages was assembled. Secondary sources on 19th century whaling voyages were compared to determine consistency, and preliminary comparisons to original whaling logbooks were begun. The voyage database will be augmented with information from a sample of logbooks, and information on numbers and distribution of sperm whale catches for those voyages are planned to be used to estimate regional annual catches (Contact T. Smith and E. Josephson, NEFSC).

SEFSC

Gulf of Mexico:

A photo-identification study of bottlenose dolphins in Mississippi Sound (north-central Gulf of Mexico) was conducted. Mississippi Sound is a 1600 km² marine area with as many as 2000 bottlenose dolphins. These photo-identification surveys built on previous photo-id work but focused on three small discreet habitat areas to test hypotheses about ranging patterns and site-fidelity of dolphins. The results of this work are part of an overall study of bottlenose dolphin stock structure in inshore waters of the Gulf of Mexico. Systematic surveys were conducted from a 7-m boat in each area on 18 survey days and dolphin groups photographed. (Contact: K. Mullin, SEFSC).

Sperm whale photo-identification studies were continued in a 53,000 km² region south of the Mississippi River delta in the north-central Gulf of Mexico. The objectives of this ongoing study are to collect photo-identification data to test hypotheses concerning the site-fidelity and association patterns of sperm whales. Surveys were conducted from an 18-m vessel during July, September, October and November 2003 and April 2004. Systematic surveys were conducted in a zig-zag pattern along the 1000-m isobath for 3 to 5 days each month. A two-element passive acoustic array was used to track and locate sperm whales for photo-identification. (Contact: K. Mullin, SEFSC).

Southwest Atlantic:

The ongoing photo-identification study of bottlenose dolphins in Biscayne Bay, FL was continued during 2003 and 2004. Surveys are undertaken on three days each month throughout the year. A small vessel systematically surveys a selected region of Biscayne bay, photographing all bottlenose dolphins encountered. In addition, targeted biopsy sample collections were undertaken during the fall and spring to for this population to determine sex ratios, evaluate potential population structure, and explore contaminant loading in this population. The photo-identification component of this survey and the associated photographic catalogue has been ongoing for 10 years. (Contact: L. Garrison, SEFSC).

10. Literature cited

Waring et al. 2003. U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments – 2003 NOAA, NMFS. (in press)

11. Publications

11.1 Published or 'In Press' papers only

NEFSC

Baker, C.S. and Clapham, P.J. 2004. The ethics of scientific whaling: issues and alternatives. In *Proceedings of the ANZCCART Conference* (ed. G. Sutherland) (in press).

- Baker, C.S. and Clapham, P.J. 2004. Modeling the past and future of whales and whaling. *Trends in Ecology and Evolution* (in press).
- Baumgartner, M.F., Cole, T.V.N., Clapham, P.J. and Mate. B.R. 2003. North Atlantic right whale habitat in the lower Bay of Fundy and on the SW Scotian Shelf during 1999-2001. *Marine Ecology Progress Series* 264: 137-154.
- Clapham, P.J., Barlow, J., Bessinger, M., Cole, T., Mattila, D., Pace, R., Palka, D., Robbins, J. & Seton, R. 2003. Abundance and demographic parameters of humpback whales from the Gulf of Maine, and stock definition relative to the Scotian Shelf. *Journal of Cetacean Research and Management* 5: 13-22.
- Clapham, P.J., Berggren, P., Childerhouse, S., Friday, N.A., Kasuya, T., Kell, L., Kock, K-H., Manzanilla, S., di Sciara, G., Perrin, W.F., Read, A.J., Reeves, R.R., Rogan, E., Rojas-Bracho, L., Smith, T.D., Stachowitsch, M., Taylor, B.L., Thiele, D., Wade, P.R. & Brownell, R.L. Jr. 2003. Whaling as science. *Bioscience* 53: 210-212.
- Clapham, P., Good, C., Quinn, S., Reeves, R.R., Scarff, J.E. & Brownell, R.L. Jr. 2004. Distribution of North Pacific right whales (*Eubalaena japonica*) as shown by 19th and 20th century whaling catch and sighting records. *Journal of Cetacean Research and Management* 6 (in press).
- Clark, C.W. and Clapham, P.J. 2004. Acoustic monitoring on a humpback whale (*Megaptera novaeangliae*) feeding ground shows continual singing into late spring. *Proceedings of the Royal Society of London B* 271: 1051-1057.
- Cole, T., Houle, K., Duley, P., Wenzel, F., Pomfret-Wiley, L., and Stimpert, A., 2003. Probability of disturbance: Right whales and ships off the northeastern United States. 15th Biennial Conference on the Biology of Marine Mammals, Greensboro, North Carolina, Dec. 2003.
- Jann, B., J. Allen, M. Carrillo, S. Hanquet, S.K. Katona, A.R. Martin, Reeves, R.R., R. Seton, P.T. Stevick, and F. W. Wenzel. 2003. Migration of a humpback whale between the Cape Verde Islands and Iceland. *Journal of Cetacean Research and Management*, Sept. 2003.
- Morete, M.E., Freitas, A., Engel, M.H., Pace, R. III, & Clapham, P.J. 2003. A novel behavior observed in humpback whales on wintering grounds at Abrolhos Bank (Brazil). *Marine Mammal Science* 19: 694-707.
- Reeves, R.R., E. Josephson and T.D. Smith. 2004 Putative historical occurrence of North Atlantic right whales in mid-latitude offshore waters: 'Maury's Smear' is likely apocryphal. *Marine Ecology Progress Series*, in press.
- Reeves, R., T.D. Smith, R.L. Webb, J. Robbins, and P. J. Clapham. 2003. Humpback and Fin Whaling in the Gulf of Maine from 1800 to 1918. *Marine Fisheries Review* 64(1)
- Reeves, R. and T.D. Smith. 2003. A Taxonomy of World Whaling Operations, Eras, and Data Sources. Northeast Fisheries Science Center Reference Document 03-12
- Reeves, R.R., Smith, T.D., Josephson, E., Clapham, P. and Woolmer, G. 2004. Historical observations of humpback and blue whales in the North Atlantic Ocean: clues to migratory routes and possibly additional feeding grounds. *Marine Mammal Science* 20 (in press).
- Seton, R., Allen, J.A., Todd, S.K., and F.W. Wenzel. 2003. Flukes R Us: Status of the North Atlantic Humpback Whale Catalogue 2003. 15th Biennial Conference on the Biology of Marine Mammals, Greensboro, North Carolina, Dec. 2003.
- Smith T.D. and R. Reeves. 2003. Estimating American 19th Century Catches of Humpback Whales in the West Indies and Cape Verde Islands. *Caribbean Journal of Science*, vol 39, no 3, 286-297
- Stevick, P.T., Allen, J., Clapham, P.J., Friday, N., Katona, S.K., Larsen, F., Lien, J., Mattila, D.K., Palsbøll, P.J., Sigurjónsson, J., Smith, T.D., Øien, N. and Hammond, P.S. 2003. North Atlantic humpback whale abundance and rate of increase four decades after protection from whaling. *Marine Ecology Progress Series* 258: 263-273.
- Stevick, P.T., Allen, J., Bérubé, M., Clapham, P.J., Katona, S.K., Larsen, F., Lien, J., Mattila, D.K., Palsbøll, P.J., Robbins, J., Sigurjónsson, J., Smith, T.D. & Øien, N. 2003. Segregation of migration by feeding ground origin in North Atlantic humpback whales (*Megaptera novaeangliae*). *Journal of Zoology, London*. 259: 231-237.
- Swartz, S.L., Cole, T., McDonald, M.A., Hildebrand, J.A., Oleson, E.M., Martinez, A., Clapham, P.J., Barlow, J. & Jones, M.L. 2003. Acoustic and visual survey of humpback whales (*Megaptera novaeangliae*) distribution in the eastern and southeastern Caribbean Sea. *Caribbean Journal of Marine Science* (in press).
- Trippel, E.A., Holy, N.L., Palka, D.L., Shepard, T.D., Melvin, G.D., and Terhune, J.M. 2003. Nylon Barium Sulphate Gillnet Reduces Porpoise and Seabird Mortality. *Marine Mammal Science* 19 (1): 240-243

SEFSC

- Fulling, G. L., K. D. Mullin, and C. W. Hubard. 2003. Abundance and distribution of cetaceans in outer continental shelf waters of the U.S. Gulf of Mexico. *Fishery Bulletin* 101:923-932.
- Garrison, L. P. 2003. Estimated bycatch of marine mammals and turtles in the U.S. Atlantic pelagic longline fleet during 2001-2002. NOAA Technical Memorandum NOAA FISHERIES-SEFSC-515. 52 pp.

- Garrison, L. P., S. L. Swartz, A. Martinez, C. Burks, and J. Stamates. 2003. A marine mammal assessment survey of the southeast US continental shelf: February-April 2002. NOAA Technical Memorandum NMFS-SEFSC-492. 50 pp.
- Griffin, R. B. and N. J. Griffin. 2003. Distribution, habitat partitioning and abundance of *Stenella frontalis*, *Tursiops truncatus*, and *Caretta caretta* on the Eastern Gulf of Mexico Continental Shelf. *Gulf of Mexico Science* 21:23-34.
- Gubbins, C. M., M. Caldwell, S. Barco, K. Rittmaster, N. Bowles, and V. Thayer. 2003. Abundance and sighting patterns of bottlenose dolphins (*Tursiops truncatus*) at four northwest Atlantic coastal sites. *Journal of Cetacean Research and Management* 5(2).
- Hansen, L. J., L. H. Schwacke, G. B. Mitchum, A. A. Hohn, R. S. Wells, E. S. Zolman, P. E. Rosel, and P. A. Fair. 2004. Geographic variation in polychlorinated biphenyl and organochlorine pesticide concentrations in the blubber of bottlenose dolphins from the U.S. Atlantic coast. *Science of the Total Environment* 319:147-172.
- Hubard, C. W., K. Maze-Foley, K. D. Mullin, and W. W. Schroeder. In press. Seasonal abundance and site fidelity of bottlenose dolphins (*Tursiops truncatus*) in Mississippi Sound. *Aquatic Mammals* 30(2).
- Kingston, S. E., and P. E. Rosel. 2004. Genetic differentiation among recently diverged delphinid taxa determined using AFLP markers. *Journal of Heredity* 95:1-10.
- Mignucci-Giannoni, A. A., S. L. Swartz, A. Martinez, C. M. Burks, and W. A. Watkins. 2003. First records of the pantropical spotted dolphin (*Stenella attenuata*) for the Puerto Rican Bank, with a review of the species in the Caribbean. *Caribbean Journal of Science* 39:381-392.
- Mullin, K. D. and G. L. Fulling. 2003. Abundance of cetaceans in the southern U.S. North Atlantic Ocean during summer 1998. *Fishery Bulletin* 101:603-613.
- Mullin, K. D. and G. L. Fulling. In press. Abundance of cetaceans in the oceanic northern Gulf of Mexico, 1996-2001. *Marine Mammal Science*.
- Mullin, K. D., W. Hoggard, and L. J. Hansen. 2004. Abundance and seasonal occurrence of cetaceans in outer continental shelf and slope waters of the north-central and northwestern Gulf of Mexico. *Gulf of Mexico Science* 22(1).
- Pitman, R. L., S. O'Sullivan, and B. Mase. 2003. Killer whale (*Orcinus orca*) attack a school of pantropical spotted dolphins (*Stenella attenuata*) in the Gulf of Mexico. *Aquatic Mammals* 29:321-324.
- Rosel, P. E. 2003. PCR-based sex determination in Odontocete cetaceans. *Conservation Genetics* 4:647-649.
- Thayer, V. G., A. J. Read, A. S. Friedlaender, D. R. Colby, A. A. Hohn, W. A. McLellan, D. A. Pabst, J. L. Dearolf, N. I. Bowles, J. R. Russell, and K. A. Rittmaster. 2003. Reproductive seasonality of western Atlantic bottlenose dolphins off North Carolina, U.S.A. *Marine Mammal Science* 19:617-629.
- Torres, L. G. T., P. E. Rosel, C. D'Agrosa, and A. J. Read. 2003. Improving management of overlapping bottlenose dolphin ecotypes through spatial analysis and genetics. *Marine Mammal Science* 19:502-514.

11.2 Unpublished literature

NEFSC

- Palka, D. and Marjorie Rossman. March 11, 2003. Document ID#4-1-03g. *Effects of Alternative Mitigation Measures on Mortality of Coastal Bottlenose Dolphins in Gillnet Fisheries*. Presented at the Sixth Meeting of the Bottlenose Dolphin Take Reduction Team. April 1-3, 2003, Virginia Beach, VA.
- Bisack, K. and Jon Sutinen, Dec. 2003. *Reducing Harbor Porpoise Bycatch: ITQs or Time Area Closures? An Empirical Analysis of Harbor Porpoise in the New England Multi-Species Sink Gillnet Fishery*. Presented at the 15th Biennial Conference on the Biology of Marine Mammals, Greensboro, NC, USA 14-19 December 2003.
- Clapham, P. Dec. 2003. *Managing Leviathan: Conservation Challenges for the 21st Century*. Presented at the 15th Biennial Conference on the Biology of Marine Mammals, Greensboro, NC, USA 14-19 December 2003.
- Stimpert, A., T. Cole, R. Pace, and P. Clapham, Dec. 2003. *Distributions of Four Baleen Whale Species in the Northwest Atlantic Ocean Based on Large-Scale Aerial Survey Data*. Presented at the 15th Biennial Conference on the Biology of Marine Mammals, Greensboro, NC, USA 14-19 December 2003.
- Cole, T. et al., Dec. 2003. *Probability of Disturbance: Right Whales and Ships off the Northeastern United States*. Presented at the 15th Biennial Conference on the Biology of Marine Mammals, Greensboro, NC, USA 14-19 December 2003.
- Wenzel, F., T. Cole, and J. Nicholas. Dec. 2003. *Biopsy Collection and Behavioral Analysis of Western North Atlantic Cetaceans*. Presented at the 15th Biennial Conference on the Biology of Marine Mammals, Greensboro, NC, USA 14-19 December 2003.
- Pace, Richard. Dec. 2003 *Two New Methodological Approaches Useful for Estimating Scarring Rates of Cetaceans from Mark-Recapture Data*. Presented at the 15th Biennial Conference on the Biology of Marine Mammals, Greensboro, NC, USA 14-19 December 2003.

- Palka, Debra. Dec 2003 *A New Way to Estimate $g(0)$ from Arial Abundance Line-Transsect Surveys*. Presented at the 15th Biennial Conference on the Biology of Marine Mammals, Greensboro, NC, USA 14-19 December 2003.
- Waring, Gordon, et al. Dec. 2003. *Mid-Water Prey in 11.2 and Sperm Whale Deep-Water Habitat South of Georges Bank*. Presented at the 15th Biennial Conference on the Biology of Marine Mammals, Greensboro, NC, USA 14-19 December 2003.
- Seton, Rosemary E, Judith M. Allen, Sean K. Todd, and Frederick Wenzel, Dec 2003. *Flukes 'R Us : Status of the North Atlantic Humpback Whale Catalogue*. Presented at the 15th Biennial Conference on the Biology of Marine Mammals, Greensboro, NC, USA 14-19 December 2003.

SEFSC

- Fair, P., L. Schwacke, E. Zolman, W. McFee, and L. Engelby. 2003. Assessment of contaminant concentrations in tissues of bottlenose dolphins in Florida Bay. Report to RFP-PWD 2001. Proposal 2001-23. pp. 1-18.
- Garrison, L. P. 2003. Summary of target species and protected resource catch rates by hook and bait type in the pelagic longline fishery in the Gulf of Mexico 1992-2002. Southeast Fisheries Science Center Document No. PRD-02/03-08.
- Garrison L. P., P. E. Rosel, A. Hohn, R. Baird, and W. Hoggard. 2003. Abundance of the coastal morphotype of bottlenose dolphin, *Tursiops truncatus*, in U.S. continental shelf waters between New Jersey and Florida during winter and summer 2002. Bottlenose Dolphin Take Reduction Team Document #4-01-03h. 1 April 2003.
- Garrison, L. P., S. L. Swartz, A. Martinez, C. Burks, and J. Stamates. 2003. A marine mammal assessment survey in mid-Atlantic waters of the US continental shelf: February – April 2001. Report for Environmental RDT & E Program, Chief of Naval Operations, Code N45.
- Mullin, K. D., D. Engelhaupt, C. E. Cates, and N. B. Barros. 2003. Sperm whale research in the Gulf of Mexico. International Whaling Commission Working Paper SC/55/O15.

**USA PROGRESS REPORT ON CETACEAN RESEARCH, MAY 2003 TO APRIL 2004, WITH
STATISTICAL DATA FOR THE CALENDAR YEAR 2001**

USA Pacific Waters

1. Species and stocks studied

Common name	Scientific name	Area/stock(s)	Items referred to
Baird's beaked whale	<i>Berardius bairdii</i>	Alaska, Southeast Bering Sea	2.1, 3.1.1, 4.1
Beluga	<i>Delphinapterus leucas</i>	Cook Inlet	2.1, 3.1.2, 4.1, 4.2
Blainville's beaked whale	<i>Mesoplodon densirostris</i>	Hawaii	4.1
Blue whale	<i>Balaenoptera musculus</i>	California, Eastern Tropical Pacific, Hawaii	4.1
Bottlenose dolphin	<i>Tursiops truncatus</i>	New Jersey (Western Atlantic), California, Eastern Tropical Pacific, Hawaii	4.1, 4.3
Bowhead whale	<i>Balaena mysticetus</i>	Bering-Chukchi-Beaufort Seas	2.1
Bryde's whale	<i>Balaenoptera edeni</i>	Eastern Tropical Pacific	4.1
Central American spinner dolphin	<i>Stenella longirostris centroamericana</i>	Eastern Tropical Pacific	4.1
Cntrl Amer./Eastern spinner dolphin	<i>Stenella orientalis/centroamericana</i>	Eastern Tropical Pacific	4.1
Coastal spotted dolphin	<i>Stenella attenuata graffmani</i>	Eastern Tropical Pacific	4.1
Common dolphin	<i>Delphinus delphis</i>	Massachusetts (Western North Atlantic), California, Eastern Tropical Pacific	4.1, 4.3, 5.0, 11.2
Common dolphin sp.	<i>Delphinus sp.</i>	California, Eastern Tropical Pacific	4.1, 7.1
Cuvier's beaked whale	<i>Ziphius cavirostris</i>	Alaska	2.1
Dall's porpoise	<i>Phocoenoides dalli</i>	Alaska	2.1, 7.1
Dusky dolphin	<i>Lagenorhynchus obscurus</i>	Eastern Tropical Pacific	4.1
Eastern spinner dolphin	<i>Stenella longirostris orientalis</i>	Eastern Tropical Pacific	4.1
False killer whale	<i>Pseudorca crassidens</i>	Eastern Tropical Pacific, Hawaii	4.1
Fin whale	<i>Balaenoptera physalus</i>	Washington State (Eastern North Pacific); Southeast Bering Sea (Eastern North Pacific), California, Eastern Tropical Pacific	2.1, 3.1.1, 4.1, 4.3, 6.2
Gray whale	<i>Eschrichtius robustus</i>	Alaska, Washington, Southeast Bering Sea (Eastern North Pacific); Russia (Eastern North Pacific), California/Eastern North Pacific	2.1, 3.1.1, 4.1, 4.3, 11.2
Harbor porpoise	<i>Phocoena phocoena</i>	Alaska, Washington State (Eastern North Pacific), California	2.1, 7.1, 4.3, 5.0, 7.1
Humpback whale	<i>Megaptera novaeangliae</i>	Alaska, Southeast Bering Sea (Eastern North Pacific), Eastern Tropical Pacific, Hawaii, Southeast Alaska	2.1, 3.1.1, 3.2, 4.1, 4.3
Killer whale	<i>Orcinus orca</i>	Alaska; Puget Sound, Washington; Prince William Sound/Kenai Fjords, Alaska; Southeast Bering Sea; Russia; (Western Pacific); France; Gulf of California; Mexico; Eastern Tropical Pacific; Hawaii	2.1, 2.1.1, 2.1.2, 3.1.1, 4.1, 4.3, 5.0, 7.1, 9.0, 11.1, 11.2
Melon-headed whale	<i>Peponocephala electra</i>	Hawaii	4.1
Minke whale	<i>Balaenoptera acutorostrata</i>	Alaska	2.1
North Atlantic right whale	<i>Eubalaena glacialis</i>	Florida (Western North Atlantic)	4.3
Northern right whale dolphin	<i>Lissodelphis borealis</i>	California	7.1

SC/56/ProgRep USA

Pacific white-sided dolphin	<i>Lagenorhynchus obliquidens</i>	Alaska, California, Eastern Tropical Pacific	2.1, 4.1, 7.1
Pilot whale	<i>Globicephala melaena</i>	Massachusetts (Western North Atlantic)	4.3, 5.0, 11.2
Pygmy killer whale	<i>Feresa attenuata</i>	Hawaii	4.1
Pygmy sperm whale	<i>Kogia breviceps</i>	Southeast Alaska (Eastern North Pacific)	4.3
Risso's dolphin	<i>Grampus griseus</i>	Eastern Tropical Pacific	4.1
Rough-toothed dolphin	<i>Steno bredanensis</i>	Eastern Tropical Pacific, Hawaii	4.1
Short-beaked common dolphin	<i>Delphinus capensis</i>	California, Eastern Tropical Pacific	4.1, 4.3, 7.1
Short-finned pilot whale	<i>Globicephala macrorhynchus</i>	Eastern Tropical Pacific, Hawaii	4.1
Sperm whale	<i>Physeter macrocephalus</i>	Alaska, Southeast Bering Sea (Eastern North Pacific), Eastern Tropical Pacific, Hawaii	2.1, 3.1.1, 4.1
Spinner dolphin	<i>Stenella longirostris longirostris</i>	Hawaii	4.1
Spinner dolphin subsp.	<i>Stenella longirostris subsp.</i>	Eastern Tropical Pacific	4.1
Spotted dolphin	<i>Stenella attenuata</i>	Eastern Tropical Pacific, Hawaii	4.1
Spotted dolphin subsp.	<i>Stenella attenuata subsp.</i>	Eastern Tropical Pacific	4.1
Striped dolphin	<i>Stenella coeruleoalba</i>	Eastern Tropical Pacific	4.1
White whale	<i>Delphinapterus leucas</i>	Alaska	4.2, 11.1

2. Sightings data

2.1 Field work

2.1.1 SYSTEMATIC

AFSC

Southeast Alaska cetacean surveys

Two cetacean cruises were completed in Southeast Alaska in July and September 2003. The main focus of the July survey was to obtain photographs of humpback whales in the southern areas of Southeast Alaska. Opportunistic photographs of killer whales were also collected. The main focus of the September survey was to estimate the abundance and movement patterns of killer whales using photo-identification techniques. A total of 12 killer whale encounters occurred representing whales from both the transient, offshore, and resident groups. In addition to the photo-identification research, biopsy sampling was also conducted. Genetic and contaminant studies are currently being completed using these tissue samples. Long-term studies conducted on Southeast Alaskan transient killer whales (1989 through 2003) are being used to help develop a framework for photographic analysis of other killer whale populations and are being used to provide baseline data on killer whale survival. (Contact: M. Dahlheim, AFSC).

Gulf of Alaska cetacean survey

A cetacean line-transect survey was conducted in conjunction with an acoustic-trawl survey for walleye pollock on the Bering Sea shelf from 26 June to 15 July 2003 aboard the NOAA ship *Miller Freeman*. The objective was to examine the abundance and distribution of cetacean species across the continental shelf of the Gulf of Alaska. The survey included 2,242 km of effort during which 310 cetacean sightings were made. A total of 10 species were identified in the following numbers: harbor porpoise (1 sighting), Dall's porpoise (196 sightings), Pacific white-sided dolphin (2 sightings), killer whales (8 sightings), Cuvier's beaked whale (1 sighting), Baird's beaked whale (1 sighting), sperm whales (2 sightings), minke whales (3 sightings), humpback whales (41 sightings), and fin whales (55 sightings). (Contact: J. Waite, AFSC).

Central Alaska and Aleutians killer whale survey

From 3 July to 14 August, 2003, the third year of a three-year vessel survey was conducted from approximately Seward in central Alaska to Tanaga Pass in the Aleutian Islands. The main focus of the survey was to estimate the abundance of killer whales using both line-transect and mark-recapture methods. A total of 2,173 nm were surveyed on effort. There were 24 encounters (~381 individuals) of killer whale groups. Killer whale groups were provisionally classified by type (based on behavior, external morphology and group size) as 17 groups of resident-type (~287 individuals), 4 groups of transient-type (16 individuals), 1 group of offshore-type (~60 individuals) and 2 groups of unknown type (18 individuals). Overall, a total of 477 sightings of cetaceans were made, including harbor porpoise (7 sightings), Dall's porpoise (223 sightings), Pacific white-sided dolphin (1 sighting), Baird's beaked whale (4 sightings), sperm whale (18 sightings), minke whale (28 sightings), humpback whale (124 sightings), and fin whale (48 sightings). (Contact: P. Wade, AFSC)

Aerial Surveys of Beluga Whales in Cook Inlet, Alaska

The National Marine Fisheries Service (NMFS) conducted an aerial survey of the beluga population in Cook Inlet, Alaska, during 31 May -12 June 2003. The 61 hr survey was flown in a manner consistent with NMFS' surveys conducted each year since 1993 (Rugh *et al.*, 2000). The flights included one or more surveys of coastal areas (flown 1.4 km offshore) around the entire Inlet and 1,145 km of transects across the Inlet, effectively searching 25% of Cook Inlet but nearly 100% of the coastal areas. After finding beluga groups, a series of aerial passes were made with two pairs of primary observers each making four or more independent counts of each group. Whale distribution was highly stratified, with almost all sightings occurring near a few river mouths or along shallow mud flats. This sighting distribution has been consistent in June or July most years since 1996. The sum of the median aerial estimates (a very rough but quick index of relative abundance, not corrected for estimates of whales missed) for June 2003 is 174 belugas. This is below index counts for years prior to 1998 (305 in 1993, 281 in 1994, 324 in 1995, 307 in 1996, and 264 in 1997), but it is similar to counts made during the past four years (193 in 1998, 217 in 1999, 184 in 2000, 211 in 2001, and 192 in 2002). (Contact D. Rugh, AFSC).

Aerial Photographic Survey for Bowhead Whales near Barrow, Alaska

Aerial surveys were conducted 11 April to 6 June 2003 near Barrow, Alaska, to collect photographs throughout the spring migration into the Beaufort Sea. Most of the funding for this study was provided through the North Slope Borough (NSB), supplemented by support from the National Marine Mammal Laboratory (NMML). The project is a continuation of photographic surveys conducted by NMML and LGL between 1984 and 1994. The survey in 2003 was carried out in an Aero Commander, a twin-engine, high-wing aircraft generally flown at altitudes of 130-170 m (400-500 ft) and a speed of 185 km/hr (100 kt). Flights were made almost every day (total of 174 hr in 55 days) with very little time lost due to weather. The non-systematic search effort was conducted along open water areas north and east of Point Barrow, avoiding whaling camps to the west. After

finding bowheads, a series of aerial passes were made to obtain vertical photographs through a port in the floor of the aircraft. A handheld, medium format camera was used to collect 1,150 photographs. The whale images will be studied to identify individual animals (Rugh *et al.*, 1992). Re-identifications made between years will help answer questions about abundance, survival rates, and calving intervals. (Contact: D. Rugh, AFSC).

Gray Whales off Washington Coast

From May 21 to November 5, 2003, vessel surveys were conducted along the northwestern Washington coast and western Strait of Juan de Fuca. The surveys covered 975 nautical miles and represented 82 hours of survey effort. During these surveys, 79 gray whales were sighted and 66 were photographed for identification. Approximately 42% of the sightings were made in the Strait of Juan de Fuca and 58% on the northwest coast of Washington. The southwest coast of Vancouver Island was not surveyed by NMML in 2003. (Contact: M. Gosho, AFSC)

Gray Whales off Kodiak Island, Alaska

The east coast of Kodiak Island, Alaska from Cape Chiniak to Ugak Bay was surveyed for gray whales on August 9 to 11, 2003. Ten gray whales were sighted and photographed, of which four have been identified. (Contact: M. Gosho, AFSC)

NWFSC

We conducted a marine mammal survey from Seattle, Washington to Monterey Bay, California, USA from February 25 through March 15, 2004. Marine mammal locations were determined by conducting visual and acoustic (using a towed array) observations. The focus of the cruise was to gain more information on the winter distribution of killer whales, particularly Southern Resident killer whales. During the cruise oceanographic data including sea surface temperatures; sea surface chlorophyll concentrations; temperature profiles from XBT casts; and temperature, salinity, nutrient, and chlorophyll profiles from CTD casts were also collected (contact L. Jones, NWFSC).

SWFSC

Stenella Abundance Research (STAR) ship and aerial survey

The *Stenella* Abundance Research (STAR 03) line transect survey was conducted from July to December 2004. It was a continuation and complimentary to past surveys by SWFSC from which abundances were estimated for eastern tropical Pacific (ETP) dolphin stocks that were historically depleted by the tuna purse seine fishery. The primary goal of STAR 03 was to estimate abundance for these depleted stocks and to compare these with estimates from past cruises in order to determine if stocks are recovering from their depleted status. A total of 1,732 marine mammal sightings were made between two NOAA research vessels in the 216 days at sea. In addition to the line transect portion of the survey, there were auxiliary projects to aid in estimating abundance of the dolphin stocks and assess their overall status. Photographs of dolphin schools were taken from a helicopter to help obtain accurate school size estimates to calibrate the line transect estimates. Helicopter photographs also indicate proportion of calves and school structure. Photographs were taken from the research vessel and from small boats as well for stock identity and documenting geographic variation in dolphins. Skin biopsy samples were collected from cetaceans to provide a database for investigations of stock structure and phylogenetic relationships. Cetacean acoustic data were collected to supplement sighting effort by using a towed hydrophone array and by deploying sonobuoys. Additionally, physical and biological oceanographic data were collected as well to investigate potential regime shifts affecting recovery of the depleted dolphin stocks.

(Contact: L. Ballance, SWFSC)

Gray Whale northbound cow/calf shore-based and aerial survey

For the ninth consecutive year, shore based and aerial sighting surveys were conducted during the northbound migration of the eastern North Pacific gray whales to investigate their status. The shore-based sighting survey was conducted from March to June, 2003 with the primary objective to determine the proportion of calves in the population (indexed as the number of calves passing the research site divided by the population size estimated from the most recent southbound survey). Aerial photographic surveys were conducted to assess reproductive condition of females, the overall condition of the population, and to examine the temporal segregation of the migrating whales. In addition to the surveys, the distribution of seasonal ice in the Arctic was monitored to investigate the impacts of weather on gray whale calf production.

A shore-based survey is currently underway for the 2004 field season, although at reduced effort due to budget cuts. Also due to budget cuts, an aerial survey is not being conducted for this field season. We continue to monitor the distribution of seasonal ice in the Arctic. (Contact: W. Perryman, SWFSC)

2.1.2 OPPORTUNISTIC, PLATFORMS OF OPPORTUNITY

AFSC

The Platforms of Opportunity Program, coordinated by the National Marine Mammal Laboratory in collaboration with the University of Washington, has been expanded its coverage to additional vessels. The

sightings database currently contains over 88,600 marine mammal sightings records, dating from 1958 through 1998. Data collection is continuing and new will be entered as time and budgets permits.

NWFSC

We posted a marine mammal observer on the joint United States-Canadian Pacific hake survey program conducted by the Canadian Department of Fisheries and Oceans and the United States National Oceanic and Atmospheric Administration Northwest Fisheries Science Center's Fishery Resource Analysis and Monitoring Division. The observer opportunistically collected marine mammal sighting data during the cruise leg from Newport, Oregon, USA to Nanaimo, British Columbia, Canada during July 23 through August 5, 2003 (contact L. Jones, NWFSC).

SWFSC

None Reported

2.2 Analyses/development of techniques

None Reported

3. Marking data

3.1 Field work- Natural Marking Data for Calendar Year 2003.

3.1.1 NATURAL MARKING DATA

AFSC

Species	Feature	Area/stock	Calendar year/season/ no. photographed	Catalogued (Y/N)	Catalogue total	Contact person/institute
Gray whale	Sides	NW WA, Vancouver Is/E. N. Pacific, Kodiak Is., AK	5	Y	245	M. Goshu, AFSC
Killer whale	Dorsal fin, saddle patch	SE Alaska, Central AK & Aleutians, AK	12 groups 22 groups	Y Y	NA NA	M. Dahlheim, AFSC P. Wade, AFSC
Humpback whale	Fluke	SE Alaska Central AK & Aleutians, AK	NA 41	NA N	NA NA	M. Dahlheim, AFSC P. Wade, AFSC
Humpback	Fluke	North Pacific	1982-2003/22,000	N		Mizroch, NMML
Sperm whale	Fluke	Aleutians, AK	5	N	NA	M. Dahlheim, AFSC P. Wade, AFSC
Fin whale	Dorsal fin	Central AK & Aleutians, AK	75	N	NA	P. Wade, AFSC
Baird's beaked whale	Dorsal fin	Aleutians	23	N	NA	P. Wade, AFSC

Humpback whale tail flukes photos have been submitted to the National Marine Mammal Lab by research groups working throughout the North Pacific, from humpback whale wintering areas in the Philippines, Japan, Hawaii, Mexico and Central America, and feeding areas along the US West Coast (CA/OR/WA), Canada and Alaska. Over 20 major research groups and about 15 opportunistic contributors have submitted photos. Three of these research groups sent in photos taken in more than one region. There are 22,000 newly submitted photos. Some date back to 1982, but most of the photos were taken during field seasons conducted from 1996 through 2002. The majority of the incoming photos came from Hawaii, with researchers submitting over 9,000 photos taken from 1995-2003. Researchers working in Alaskan waters submitted over 5,000 photos with 4,780 of those taken from 1993-2003. Researchers working off the US West Coast submitted over 3,000 photos from 1995-2002. Researchers working in Mexican waters submitted over 1,900 photos taken from 1982-2003. Researchers working in Japanese waters submitted nearly 1,000 photos from 1990-2001. Researchers working in Canada submitted over 200 photos taken from 1991-2002. Researchers working in Central America submitted 64 taken from 1986-1998. Researchers working in the Philippines submitted 34 photos taken from 2001-2003.

NWFSC

Species	Feature	Area/stock	Calendar year/season no. photographed	Catalogued (Y/N)	Catalogue total	Contact person/institute
Killer Whale	Dorsal Fin and Saddle Patch	N. Pacific	Not totalled	Y	83 for Southern Resident killer whales	Ken Balcomb/Center for Whale Research

SWFSC

None reported.

3.1.2. ARTIFICIAL MARKING DATA

None reported.

3.1.3 TELEMETRY DATA (2003)**AFSC**

Species	Tag type	No. successfully deployed	Maximum time transmitting	Contact person/institute
Beluga whale	Bristol Bay, Alaska	5	110 days	L. Quakenbush, ADFG

Beluga tagging in Bristol Bay

In May 2003, five beluga whales were captured with a large mesh gillnet from several small vessels in the Kvichak River, near, Levelock, Alaska. All five adult whales were released unharmed with a satellite-linked TDR tag pinned to their dorsal ridge for long-term monitoring. One tag failed immediately the remaining tags transmitted for periods ranging from 30 to 110 days. All whales remained in the Kvichak and Nushagak Rivers and Bays. (Contact, L. Quakenbush ADFG)

NWFSC

None reported.

SWFSC

None reported.

*3.2 Analyses/development of techniques***AFSC**

Estimates of annual survival of adult humpback whales (*Megaptera novaeangliae*) were computed for the central North Pacific stock that winters in Hawai'i and migrates to discrete feeding areas in Alaska for the summer and fall. The dataset spanned the years 1979 to 1996 and included 10,567 photographs of 2,400 individuals (Mizroch et al., in press).

With regard to photo-identification techniques, NMML tested and compared resolution of film and digital photographic formats (Mizroch 2003), developed a high resolution film scanning protocol that produces images as good as traditional darkroom methods (Santos Tieder and Mizroch 2003;

nmml.afsc.noaa.gov/pdf/NMMLScanningProtocol.pdf), developed a method for exporting digital photo EXIF metadata into a database (Sims and Mizroch: nmml.afsc.noaa.gov/pdf/NMMLMetadataProtocol.pdf) and developed a procedure for editing digital photo-identification photos (Mizroch and Sims:

nmml.afsc.noaa.gov/pdf/NMMLEditingProtocol.pdf). We also developed methods to integrate digital still photographs, GPS and whale biopsy data into a digital database (Mizroch and González Peral) in collaboration with researchers from Universidad Autónoma de Baja California Sur, La Paz, BCS, México

NWFSC

None reported.

SWFSC

None reported.

4. Tissue/biological samples collected**4.1 Biopsy samples****AFSC**

Species	Area/stock	Calendar year/ season no. collected	Archived (Y/N)	No. analysed	Total holdings	Contact person/institute
Humpback whale	Bering Sea, Gulf of Alaska	2003/10	Y	0	Archived with SWFSC	Paul Wade, AFSC
Fin whale	Gulf of Alaska	2003/8	Y	0	Archived with SWFSC	Paul Wade, AFSC
Sperm whale	Aleutian Islands	2003/3	Y	0	Archived with SWFSC	Paul Wade, AFSC
Baird's beaked whale	Aleutian Islands	2003/9	Y	0	Archived with SWFSC	Paul Wade, AFSC
Killer whale	Bering Sea, Gulf of Alaska	2003/33	Y	33	Archived with SWFSC	Paul Wade, AFSC
Gray whale	Eastern No. Pacific	2003/3	Y	NA	NA	M. Goshu, AFSC
Beluga, <i>Delphinapterus leucas</i>	Chukchi Sea, Gulf of Alaska	2003/2	NA	NA	NA	G.O'Corry-Crowe, SWFSC

NWFSC

Species	Area/stock	Calendar year/ season no. collected	Archived (Y/N)	No. analysed	Total holdings	Contact person/institute
Baird's beaked whale	Southeast Bering Sea	2003/Summer n=8	Y	0	8	Paul Wade AKFSC
Bottlenose dolphin	New Jersey (Western North Pacific)	2003/Summer n=4	Y	0	4	Colleen Bryan NIST
Fin whale	Southeast Bering Sea	2003/Summer n=7	Y	0	7	Paul Wade NMML/AKFSC
Humpback whale	Southeast Bering Sea	2003/Summer n=9	Y	0	9	Paul Wade NMML/AKFSC
Killer whale	Prince William Sound/SE Bering Sea	2003/Summer n=38	Y	0	38	Craig Matkin North Gulf Oceanic Society
Killer whale	Southeast Bering Sea	2003/Summer n=29	Y	29	NA	Paul Wade NMML/AKFSC
Killer whale	Russia (Western North Pacific)	2003/Summer n=1	N	1	0	Vladimir Burkanov AKFSC
Killer whale	Russia (Western North Pacific)	2003 n=6	N	6	6	Shannon Atkinson Alaska SeaLife Center
Killer whale	France	1998/Fall n=4	Y	4	4	Susan Chivers SWFSC
Killer whale	Gulf of California	1995/Fall n=3	Y	3	3	Susan Chivers SWFSC
Killer whale	Bering Sea	1997/Summer n=1	Y	1	1	Susan Chivers SWFSC
Killer whale	Mexico	2000/Summer n=3	Y	3	3	Susan Chivers SWFSC
Sperm whale	Southeast Bering Sea	2003/Summer n=2	Y	0	2	Paul Wade AKFSC

SWFSC

The following is a list of all biopsy samples collected by the Southwest Fisheries Science Center. All tissues are archived at the SWFSC. To date, molecular genetic analyses has been completed for 27 killer whale (*Orcinus orca*) samples collected in the ETP and 10 sperm whale (*Physeter macrocephalus*) samples collected in southeast Alaska. The 'total holdings' number is the total number of samples archived at the SWFSC for molecular genetic analyses for each species listed. Samples of many different tissue types from many different sources (e.g. strandings, fishery takes, museum specimens) and for most species, includes samples collected throughout their range. (Contact: S. Chivers, SWFSC)

Species Name	REGION				Total Collected	Total Holdings
	Hawaii	California, Off San Diego	Eastern Tropical Pacific	Southeast Alaska		
Bryde's whale			11		11	110
Blue whale	1	8	16		25	624
Fin whale		3	1		4	267
Short-beaked common dolphin			32		32	314
Common dolphin		54	10		64	1282
Common dolphin sp.			1		1	61
Gray whale		4			4	533
Pygmy killer whale	2				2	24
Short-finned pilot whale	48		48		96	362
Risso's dolphin			17		17	98
Dusky dolphin			4		4	7
Pacific white-sided dolphin		6	2		8	219
Humpback whale	10		2	6	18	680
Blainville's beaked whale	5				5	11
Killer whale	1		30	6	37	367
Melon-headed whale	40				40	43
Sperm whale	1		4	10	15	1557
False killer whale	22		7		29	105
Spotted dolphin	87		63		150	1311
Coastal spotted dolphin			102		102	367
Spotted dolphin subsp.			11		11	187
Striped dolphin			6		6	559
Central American spinner dolphin			7		7	26
Spinner dolphin	39				39	100
Eastern spinner dolphin			35		35	321
Spinner dolphin subsp.			24		24	222
Cntrl Amer./Eastern spinner dolphin			12		12	18
Rough-toothed dolphin	39		13		52	103
Bottlenose dolphin	83		113		196	1820
TOTAL	368	75	571	22	1046	11698

4.2 Samples from directed catches or bycatches for Calendar Year 2003

AFSC

Species	Area/stock	Calendar year/season total	Archived (Y/N)	Tissue type(s)	Contact person/institute
Beluga, <i>Delphinapterus leucas</i>	Bristol bay, Alaska Chukchi Sea	2003/~20	NA	NA	L. Quakenbush R. Suydam

NWFSC

Species	Area/stock	Calendar year/season total	Archived (Y/N)	Tissue type(s)*	Contact person/institute
White whale	Alaska	2003	Y	Skin, blubber, muscle, liver, heart	Barb Mahoney AKFSC/Peggy Krahn NWFSC
White whale	Alaska	2003	Y	Skin	Larry Mercurief AKNSC/Peggy Krahn NWFSC
White whale	Alaska	2003	N	Blood, red blood cells	Shannon Atkinson AK SeaLife Center/Gina Ylitalo NWFSC

SWFSC

None reported.

4.3 Samples from stranded animals for Calendar Year 2003

AFSC

Species	Area/stock	Calendar year/ season total	Archived (Y/N)	Tissue type(s)*	Contact person/institute
Beluga	Alaska	2003 n=15	Y	NA	Barbara Mahoney, NMFS Alaska Region

NWFSC

Species	Area/stock	Calendar year/ season total	Archived (Y/N)	Tissue type(s)*	Contact person/institute
Common dolphin	Massachusetts (Western North Atlantic)	2003 n=1	Y	NA	Joseph Green NOAA Fisheries Office of Enforcement (Scituate, MA)
Fin whale	Washington State (Eastern North Pacific)	2003 n=2	Y	Skin, blubber	Brent Norberg NOAA Fisheries NWR
Harbor porpoise	Washington State (Eastern North Pacific)	2003 n=8	Y	Skin, blubber, muscle, kidney, liver, tooth	Brad Hanson NWFSC
Humpback whale	Alaska (Eastern North Pacific)	2003 n=1	Y	Skin, blubber	Barb Mahoney AKFSC
Killer whale	Prince William Sound, AK	2003 n=1	Y	Skin, blubber	Barb Mahoney AKFSC
Killer whale	Oregon (West Coast Transient)	2004 n=1	Y	Skin, blubber, muscle, heart, blood, kidney, lymph node, liver, spleen, mammary gland, lung, brain	Barb Mahoney AKFSC/Peggy Krahn NWFSC
North Atlantic right whale	Florida (Western North Atlantic)	2004 n=1	Y	Skin, blubber	Teri Rowles OPR
Pilot whale	Massachusetts (Western North Atlantic)	2003 n=1	Y	Skin, blubber, lung, bronchi, bile, liver, stomach, stomach contents (partial)	Joseph Green NOAA Fisheries Office of Enforcement (Scituate, MA)
Pygmy sperm whale	Southeast Alaska (Eastern North Pacific)	2003 n=1	Y	Skin, blubber	Barb Mahoney AKFSC

SWFSC

Summary of stranded cetacean specimens found along the beaches of San Diego County, California during calendar year 2003. Complete work-ups were completed for each stranded cetacean except for the fin whale and one decomposed long-beaked common dolphin. A tissue sample for molecular genetic analyses and a blubber sample for contaminant, isotope and hormone analyses were collected from each specimen. (Contact: S. Chivers)

Species name	Males	Females	Total
Fin whale	2		2
Short-beaked common dolphin	2	3	5
Common dolphin	4	2	6
Gray whale	1		1
Bottlenose dolphin	1	2	3
Totals	10	7	17

4.4 Analyses/development of techniques

None reported.

5. Pollution studies

AFSC

None Reported.

NWFSC

Buzzards Bay Oil Spill 2003. Tissue samples of a common dolphin and a pilot whale, and two seals were collected by NOAA Enforcement personnel after more than 90,000 gallons of #6 fuel oil (Bunker C) was spilled into Buzzards Bay, MA on April 27, 2003. These samples were analyzed for polycyclic aromatic hydrocarbon (PAHs) at the NWFSC. PAHs are a group of pollutants that are prevalent in coastal waters, especially in urban embayments, and can alter normal physiological function in marine biota (Varanasi *et al.* 1989; Stein *et al.* 1992).

In general, the levels of PAH metabolites in bile samples of the common dolphin and pilot whale were low and are similar to the levels measured in bile of uniled California sea lions that stranded along the Central California coast (G. Ylitalo, pers. commun.). Similarly, the concentrations of parent and alkyl-substituted PAHs in other tissues (e.g., liver, lung) of the common dolphin and pilot whale were near background levels. The levels of PAHs measured in the stomach contents of the common dolphin and pilot whale were comparable to or lower than the concentrations in corresponding liver samples of these animals. From these limited data, it did not appear that these animals had been exposed to high levels of petroleum or petroleum-related products (contact G. Ylitalo and P. Krahn, NWFSC).

Harbor porpoise. Blubber samples collected from eight harbor porpoise (*Phocoena phocoena*) that stranded in Washington State from May - June 2003 were analyzed for lipid content and organochlorines at the NWFSC. Percent lipid values determined in the blubber of harbor porpoises that stranded in 2003 ranged from 44 to 83%. These concentrations are similar to those reported previously for blubber of harbor porpoise that stranded off the west coast of the U.S. (Calambokidis and Barlow 1991)

Concentrations of OCs measured in the harbor porpoise blubber samples are comparable to levels reported previously in blubber of harbor porpoises that stranded off the west coast of the US (Calambokidis and Barlow 1991; Jarman *et al.*, 1996). However, the OC levels in the blubber of the stranded harbor porpoise were lower than those measured in the blubber of another fish-eating cetacean that occurs in waters of Washington state — a Southern Resident killer whale (L60) that stranded on Long Beach, WA in April 2002. These differences in contaminant concentrations are probably related to differences in life spans between these two species of cetaceans, as well as to differences in prey preferences.

All the harbor porpoise blubber samples analyzed contained levels of Σ PCBs that were substantially below benchmark concentrations that were linked to reproductive dysfunction in seals (AMAP, 1998). In addition to the contaminant analyses of blubber, a complete necropsy and other biological analyses were done to evaluate cause of death of the harbor porpoise in relation to a sonar event in the area of the strandings. (contact G. Ylitalo and P. Krahn, NWFSC).

Killer whales. Biopsy blubber samples (n = 90) of free-ranging killer whales from the Eastern North Pacific collected by Dr. Marilyn Dahlheim and Dr. Paul Wade from the National Marine Mammal Laboratory and Craig Matkin from the North Gulf Oceanic Society were analyzed for OCs and lipids in a study partially funded by the NMFS's Office of Protected Resources. Toxic PCB congeners were measured, as well as additional OCs (e.g., β -HCH, chlordane) to provide information on the profiles and levels of toxic environmental contaminants. The contaminant data and biological information were reviewed in CY03 and will be incorporated into a draft

manuscript in CY04 that will report OC levels in blubber biopsy samples of killer whales from the North Pacific (contact G. Ylitalo, NWFSC).

Killer whales. High concentrations of toxic, persistent, lipophilic contaminants (e.g., PCBs, DDTs) are expected to accumulate in the tissues of killer whales because they are top-level predators in the marine environment. Recent contaminant studies on free-ranging ENP killer whales indicate that these animals are exposed to relatively high levels of contaminants compared to other species of marine mammals from the same region. In particular, transient whales had much higher contaminant concentrations than did resident whales because they feed at a higher trophic level than do residents. However, limited data are available about the feeding habits of killer whales. A new technique is under development in which fatty acid signatures are used to help identify the particular prey being consumed by a marine mammal. In addition, use of naturally occurring carbon and nitrogen stable isotopes has become a powerful tool in tracing predator-prey relationships and marine ecosystem dynamics.

Recently, blubber samples of stranded (full-thickness) and free-ranging (blubber biopsy) resident, transient and offshore killer whales from the NP have been analyzed for levels and profiles of toxic chemical contaminants and fatty acid determinations. When available, skin samples have been analyzed for stable isotopes. Results from these analyses together with biological information can help describe contaminant exposure and feeding ecology of killer whales from various populations of NP killer whales (contact P. Krahn, NWFSC).

SWFSC

None reported.

6. Statistics for large cetaceans

6.1 Direct catches (commercial, aboriginal and scientific permits) for the calendar year 2003.

None reported.

6.2 Other non-natural mortality for the calendar year 2001

AFSC

Species	Area/stock	Males	Females	Total	Cause	Methodology
Baleen whale	Bering Sea	NA	NA	1	Entangled in trawl fishing net	Bycatch
Presumed baleen whale	Bering Sea	NA	NA	1	Cut loose with trailing trawl fishing gear	Bycatch

From Perez, 2003.

NWFSC

None reported.

SWFSC

Species	Area/stock	Males	Females	Total	Cause	Methodology
Fin Whale	CA/OR/WA	NA	NA	1	Ship strike	Post mortem

Information from Carretta, J.V. (Pers. Comm.).

6.3 Earlier years' statistics

None reported.

7. Statistics for small cetaceans

7.1 For the calendar year 2001

AFSC

Species	Area/stock	Directed catch		Incidental mortality			Live-capture
		Reported	Est. total	Reported	Est. total	Source*	Reported
Harbor porpoise	Bering Sea	0	0	1	2	Trawl	0
Dall's porpoise	Bering Sea	0	0	2	3	Trawl	0
Killer whale	Bering Sea	0	0	2	2	Hit trawl vessel propeller	0

From Perez, 2003.

NWFSC

None reported.

SWFSC

The California halibut/angel shark set gillnet and swordfish/thresher shark drift gillnet fisheries are both classified as Category I fisheries under the U.S. Marine Mammal Protection Act (MMPA). NMFS observer programs for both the halibut/angel shark set gillnet and thresher shark/swordfish drift gillnet fisheries were initiated in 1990. Observers are placed on fishing vessels to record catch, bycatch and other gear and environmental variables. Cetacean mortality is estimated for the California halibut/angel shark set gillnet and swordfish/thresher shark drift gillnet fisheries for calendar year 2001 (Carretta, J.V., 2002). Observed bycatch in the drift gillnet fishery is documented by NMFS biological technicians that accompany ~25% of all fishing trips. The set gillnet fishery was not observed in Monterey Bay in 2001, due to an area closure that reduced fishing effort to negligible levels (26 fishing days). The remainder of the set gillnet fishery (Morro Bay, Ventura, Channel Islands, and Southern California strata) has not been observed since 1994, and therefore, kill rates from these geographic strata are estimated from 1991-94 observer data and mortalities are estimated using 2001 fishing effort estimates. (Contact: J. Carretta, SWFSC)

Species	Area/stock	Directed catch		Incidental mortality			Live-capture Report
		Reported	Est. total	Reported	Est. total	Source	
Harbour porpoise	CA	0	0	0	3	CA Halibut/angel shark Set Gillnet	0 0
Unid common dolphin	CA	0	0	0	3	CA Halibut/angel shark Set Gillnet	0
Short-beaked common dolphin	CA	0	0	7	22	Swordfish/thresher shark drift gillnet fishery	0
Northern right whale dolphin	CA	0	0	5	9	Swordfish/thresher shark drift gillnet fishery	0 0
Pacific white-sided dolphin	CA	0	0	2	6	Swordfish/thresher shark drift gillnet fishery	0

*7.2 Earlier years' statistics***AFSC**

Reported and estimated totals of incidental mortality by trawl, longline, pot and jig groundfish fishery vessels in Alaska and off the coasts of Washington, Oregon and California during 1989-2001 were compiled by Perez (2003)

8. Strandings**AFSC**

None reported.

NWFSC

We completed contaminant and lipid analyses of tissues of harbor porpoise that stranded in CY2003. These data were incorporated into a report submitted to NOAA Fisheries Northwest Regional Office in January 2004. (Contact: G. Ylitalo, NWFSC).

We completed contaminant analyses of tissues of common dolphin, pilot whale, harbor seal and grey seal collected after an oil spill into Buzzards Bay, MA on April 27, 2003. These data were incorporated into a report submitted to NOAA Fisheries Office of Law Enforcement (Scituate, MA) in July 2003 (Contact: G. Ylitalo, NWFSC).

SWFSC

None reported.

9. Other studies and analyses**AFSC***Acoustic Recording*

Four Acoustic Recording Packages (ARPs) were deployed in the Bering Sea in order to record large whale vocalizations. Three were deployed in deep water along the Bering Sea slope and one on the shelf in an area where North Pacific right whales (E j) have been seen regularly. (Contact: S. Moore, AFSC).

Arctic Issues

AFSC/NMML collaborated with researchers conducting the NSF-sponsored Shelf Basin Interaction (SBI) study to deploy three autonomous acoustic recorders in the western Beaufort Sea in early October 2003 (SC/56/E10). The recorders will be recovered during the September 2004 SBI mooring recovery cruise (<http://sbi.utk.edu/>) and

should provide a nearly year-long record of bowhead whale (and other marine mammal) seasonal occurrence, as sampled by passive acoustics. In addition, AFSC/NMML participated in the International Shelf-Basin Exchange planning meeting in Cadiz, Spain in October 2003; one step in an on-going effort to coordinate a pan-Arctic multi-disciplinary study of climate variability and change (<http://www.aosb.org/SBE.html>). (Contact: S. Moore, AFSC).

Ecosystem studies

K. Aydin of the Alaska Fisheries Science Center's Resource Ecology and Fisheries Management division has implemented the Ecopath and Ecosim algorithms independently of the published EwE software package; as a Visual Basic interface for routines written with C++ with the AD-MODEL BUILDER statistical library. They've also included sensitivity and Bayesian Synthesis routines. This new software allows for the development of Ecosim like models with increased flexibility to explore model assumptions and alternative hypotheses. The Eastern Bering Sea EwE model, previously described in SC/54/E1, has been converted to this new framework, expanded to include more individual species and fewer species groupings, and linked to two additional Ecosim like models; one of the Gulf of Alaska continental shelf region from 144°W to 170°W and one of the Aleutian Islands west of 170°. Linking these three models allows migratory species, such as cetaceans, to be more accurately modeled. In addition, sub-regions have been designed to examine the different oceanographic regions within the individual models, e.g., within the Eastern Bering Sea model the Coastal, Middle Shelf, and Outer Shelf hydrographic domains are modeled. Sensitivity analyses are being performed to explore the effects of different parameter values (e.g., the vulnerability parameter), uncertainty in the input data (e.g., biomass estimates and diet composition), and the effect of different model assumptions (e.g., how competition between different species groupings is modeled). (Contact: N. Friday, AFSC).

NWFSC

The NWFSC funded five research projects investigating vessel noise and vessel effects on Southern Resident killer whales (SRKW).

Project Title: Baseline Acoustics: Measurements of Boats and Background Noise in the Puget Sound

Investigators: Dr. John Hildebrand, Scripps Institution of Oceanography; John Calambokidis, Cascadia Research; Ken Balcomb, Center for Whale Research

This study will provide baseline data to characterize the dynamic environmental acoustic levels killer whales are exposed to in Haro Strait, WA, USA. Investigators conducted a survey of environmental noise at different depths using a calibrated vertical hydrophone array in August 2003. Acoustic source level data will also be collected from a representative sample of major vessel classes under typical operating conditions in May 2004.

Project Title: Boat-based Behavioral Monitoring of Vessel Impacts on Whale. Investigators: Jennifer Marsh and Dr. James Ha, University of Washington

This study will ultimately examine how variables such as sea surface temperature, tides, time of day, location, and number of vessels influence the social behavior of SRKW. Social behaviors examined include "percussive" behaviors (tail slap, pectoral fin slap, breach), as well as spy hops and synchronous surfacing. Boat-based behavior surveys were conducted during the summer of 2003, resulting in the collection of 3320 minutes of behavioral data. In addition, the behavior of killer whales and surrounding boats were characterized using a scan sampling approach. Further data collection is scheduled for June through September 2004.

Project Title: Southern Resident killer whale behavior and energetic costs in response to vessel interactions using a focal follow and modelling approach. Investigators: Dr. Dawn Noren, NOAA NMFS NWFSC; Dr. James Ha, University of Washington; Jennifer Marsh, University of Washington

A pilot study was successfully conducted for 2 weeks during September 2003. The objective of the study is to determine if adult Southern Resident killer whales demonstrate avoidance behaviors in response to vessels off San Juan Island, WA, USA. Furthermore, energetic costs to whales both associated and not associated with boats will be calculated to determine if any behavioral change(s) linked to vessel presence is(are) likely to have long-term effects in adult Southern Resident killer whale prey resource requirements and/or survival of the whales. Focal follows were conducted on adult Southern Resident killer whales to collect data on swim speeds, dive durations, surface durations, respiration rates, and the rates of occurrence for surface behaviors (spy hop, porpoise, breach, tail slap, and pec slap). A more extensive study will be conducted from June 2004 through September 2004. Data from Ms. Marsh and Dr. Ha's study will be included in the focal follow analyses so that all possible influences on behavior and energetics can be evaluated.

Project Title: Land Based Behavioral Monitoring of Vessel Impacts on SRKWs. Investigators: Dr. David Bain, University of Washington; Dr. Rob Williams; Jodi Smith

The study will provide data to characterize the effects of vessel traffic on killer whale behavior off San Juan Island, WA, USA. Land-based behavioral surveys of killer whales were conducted at two sites by the research team in the summer of 2003 using an electronic theodolite in conjunction with video cameras, a spotting scope, and binoculars. Small group behaviors and focal individual behaviors were classified and recorded in the

presence and absence of vessel activity. The behavioral data will also be used to estimate energetic costs to SRKWs associated with vessels. This study is being continued from May 2004 through August 2004.

Project Title: Comparison of past and current levels of vessel activity in Southern Resident killer whale habitat in the San Juan Islands. Investigator: Dr. Richard Osborne, Whale Museum

The objective of this study is to determine how the daily, seasonal, and yearly trends in vessel activities have changed around the Southern Resident killer whales from 1990 to 2003. Data were compiled from shoreline and on water observations of vessel activities around Southern Resident killer whales off San Juan Island, WA, USA. Data are being analyzed to determine how the vessel dynamics change over the course of each day and between months in Southern Resident killer whale habitat. Analyses to determine changes in these patterns over the past thirteen years will also be conducted.

In addition to funding analyses of time-depth recorder data to better understand foraging behaviour in killer whales, the NWFSC funded four additional research projects investigating Southern Resident killer whale foraging and prey.

Project Title: Relationships between fluctuations in the Southern Resident killer whale population and behavior to salmonid population dynamics. Investigators: Dr. Glenn VanBlaricom, University of Washington; Dr. Richard Osborne, Whale Museum; Shannon McCluskey, University of Washington

The objective of this study is to determine if linkages exist between the occurrence and abundance of salmonids with the occurrence of Southern Resident killer whales. Investigators are using GIS-based analytical techniques to overlay salmon abundance data and killer whale sightings within inland Washington waters, and the data will be analyzed and compared for significant relationships.

Project Title: Correlation analysis of Southern Resident killer whale movements and salmon presence.

Investigator: Dr. Richard Osborne, Whale Museum

The investigators are currently conducting correlation analyses of killer whale movement data in their summer range and relevant salmon run data to determine if there are particular species/runs of salmon that are targeted by different pods/subpods of Southern Resident killer whales. Appropriate correlation analyses will be based on timing and movement patterns of the whale pod/subpods and salmon from the time they arrive in the spring until their fall departure.

Project Title: Killer whale captive feeding study. Investigators: Dr. Terrie Williams, University of California, Santa Cruz; Daniel Monson, University of California, Santa Cruz

The killer whale captive feeding study is a preliminary study designed to gain information that will be used to assess the validity of using skin biopsies to determine information on killer whale prey. Skin biopsies will be obtained to determine stable-isotopes of carbon, nitrogen and sulfur. Potential diet of Southern Resident killer whales, including salmon and squid, will be fed to the whales in specific proportions to elicit changes in stable isotope ratios in the skin. How prey quality affects killer whale body condition (mass and blubber thickness) will also be addressed.

Project Title: Killer Whale Prey Quality Analyses: Dr. Peggy Krahn, Gina Ylitalo, NOAA NMFS NWFSC; Sandie O'Neill WDFW

This study will investigate killer whale prey species by measuring contaminant concentrations and ratios, caloric content, proximate composition and lipid content and classes to determine whether the quality of their food items has changed. The focus of this study is to determine if elevated contaminant concentrations in southern resident killer whales compared to northern residents may be attributed to regional differences in the organochlorine concentrations of their prey. The investigators will assess whether prey quality may be contributing to the decline of southern residents. Ratios of stable isotope and OCs will help elucidate prey preferences of southern resident killer whales.

In addition to providing fund to maintain the Southern Resident killer whale identification catalogue, the NWFSC funded two other research projects investigating killer whale health and population dynamics.

Project Title: Historical analysis of growth rates and condition of Southern Resident killer whales.

Investigators: Dr. Eli Holmes, REUT, NOAA NWFSC; Ken Balcomb, Center for Whale Research;

Adam U, Center for Whale Research

Photogrammetric analyses were conducted to determine growth rates of young individual Southern Resident killer whales from the 1970s to the present. Measurements of specific individuals were made from photographs taken over several years to determine growth rates. The results will be analyzed to determine if patterns of growth rate have changed in a way that may be consistent with food limitation and thus suggest a causal mechanism for the changes in survivorship.

Project Title: Standardized killer whale necropsy protocol. Investigators: Dr. Joseph Gaydos, University of California, Davis Wildlife Health Center; Dr. Stephen Raverty, British Columbia Ministry of Agriculture and Food

The objective of this project was to compile all previous stranding and necropsy data on killer whales worldwide and develop a standardized necropsy protocol to be disseminated worldwide. Because diseases in wild killer whales are poorly understood and have the potential to adversely impact small populations of killer whales, the development and dissemination of a standardized necropsy protocol for killer whales is of great value to ensure that the data collected are maximized.

The NWFSC funded three research projects investigating Southern Resident killer whale distribution and habitat utilization patterns.

Project Title: Coastal sighting network. Investigator: Ken Balcomb, Center for Whale Research

This study investigated where Southern Resident killer whale pods are in the late fall, winter, and early spring when they are not in Puget Sound or the Georgia Basin waters of Washington, USA. Visits to ports and harbors along the west coast, reports posted by the general public on the killer whale sighting web site, and reports called in by the general public on a toll free number provided data on the identification and location of Southern Resident killer whale pods over the winter period in areas outside of Puget Sound and the Georgia Basin. These data will help identify habitat-use, potential foraging areas, and anthropogenic threats to the population during winter.

Project Title: Southern Resident killer whale winter location monitoring. Investigator: Ken Balcomb, Center for Whale Research

The objective of this study was to identify full range and habitat-use of the Southern Resident killer whale population and potential foraging areas in Puget Sound waters of Washington, USA during the winter period. Whale locations and IDs were documented by both biweekly surveys and responses to sighting network leads to determine areas in the Puget Sound and Georgia Basin that Southern Resident pods frequent during the late fall through early spring.

Project Title: Summer range habitat use of Southern Resident killer whale pods. Investigators: Dr. Eli Holmes, REUT, NOAA NWFSC; Dr. Glenn VanBlaricom, University of Washington; Dr. Richard Osborne, Whale Museum; Donna Hauser, University of Washington

The objective of this study is to examine temporal and spatial changes in habitat use by the three Southern Resident killer whale pods to investigate differences between the pods in habitat use. The investigators in this study are analyzing existing location data of Southern Resident killer whales to determine habitat use in the summer. Consideration of Southern Resident killer whales for listing under the Endangered Species Act:

Reconvening of the Biological Review Team for Southern Resident killer whales. The Biological Review Team (BRT) was reformed to consider the status of Southern Resident killer whales under the Endangered Species Act as ordered by the U.S. District Court. Dr. Peggy Krahn was selected as the Team Leader for the BRT, providing coordination, organization and communication for the team and will be the primary author for the updated status review report. In addition, Dr. Brad Hanson (habitat/foraging ecology/whale watching), Dr. Mike Ford (distinct population segment), Dr. John Stein (toxicology), Dr. Robin Waples (genetics) and Gina Ylitalo (contaminants) serve as team members and Dr. Linda Jones serves as an adviser. The majority of the BRT attended a session of the Cetacean Systematics Conference "Killer whales: A case study of the interface between cetacean systematics and conservation" that was held in La Jolla, CA in April 30 – May 2, 2004 to obtain the most current information on taxonomy and conservation of this species. The BRT will meet in late May 2004 to discuss new scientific data on Southern Resident killer whales and will submit an updated status review report to the Northwest Regional Office by 16 August 2004.

SWFSC

None reported.

10. Literature cited

AFSC

- Mizroch, S. A. 2003. Digital photography improves efficiency of individual dolphin identification: A reply to Markowitz et al. *Marine Mammal Science* 19 (3):612-614.
- Mizroch, S. A. and González Peral, U. 2004 Abstract. Digital Databases: The integration of digital still, GPS and whale biopsy data improves accuracy of individual identifications and enhances field and lab analysis. Presented at the 29th annual meeting of the Mexican Marine Mammal Society (SOMEMMA).
- Mizroch, S. A. and Sims, C. 2004 (web) Protocol for Editing Digital Humpback Whale Tail Flukes Images using ACDSsee 6.0. <http://nmml.afsc.noaa.gov/pdf/NMMLEditingProtocol.pdf>

- Mizroch, S. A., Herman, L.M., Straley, J.M., Glockner-Ferrari, D., Jurasz, C., Darling, J.D., Cerchio, S., Gabriele, C.M., Salden, D.R. and von Ziegesar, O. *In press*. Estimating the adult survival rate of Central North Pacific humpback whales. *Journal of Mammalogy*.
- Perez, M.A. 2003. Compilation of marine mammal incidental take data from the domestic and joint venture groundfish fisheries in the U. S. EEZ of the North Pacific, 1989-2001. U. S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-138, 145 p.
- Rugh, D., Braham, H. and Miller, G. 1992. Methods for photographic identification of bowhead whales, *Balaena mysticetus*. *Can. J. Zool.* 70:617-624.
- Rugh, D.J., Shelden, K.E.W. and Mahoney, B.A.. 2000. Distribution of belugas, *Delphinapterus leucas*, in Cook Inlet, Alaska, during June/July, 1993-2000. *Mar. Fish. Rev.* 62(3):6-21.
- Santos Tieder, L and Mizroch, S.A.. 2003 Abstract. A new scanning protocol for black and white negatives. Presented at the 2003 Biennial Marine Mammal Conference. <http://nmml.afsc.noaa.gov/pdf/NMMLScanningProtocol.pdf>
- Sims, C. and Mizroch, S. A. Protocol for exporting EXIF metadata into an MS Access database. <http://nmml.afsc.noaa.gov/pdf/NMMLMetadataProtocol.pdf>

NWFSC

AMAP. (1998) AMAP Assessment Report: Arctic Pollution Issues. Arctic Monitoring and Assessment Programme (AMAP), Oslo, Norway, xii + 859 pp.

Calambokidis J, Barlow J (1991) Chlorinated hydrocarbon concentrations and their use for describing population discreteness in harbor porpoises from Washington, Oregon, and California. In: Marine mammal strandings in the United States. Reynolds III JE and Odell DK, eds. Proceedings of the Second Marine Mammal Stranding Workshop; 3-5 December 1987, Miami, FL, pp.101-110. US Dep. Commer., NOAA Tech. Rep. 98.

Jarman WM, Norstrom RJ, Muir DCG, Rosenberg B, Simon M, Baird RW (1996) Levels of organochlorine compounds, including PCDDs and PCDFs, in the blubber of cetaceans from the West Coast of North America. *Mar. Pollut. Bull.* 32:426-436.

SWFSC

Carretta, J.V. 2002. Preliminary estimates of cetacean mortality in California gillnet fisheries for 2001. Rept. Int. Whal. Comm., Scientific Committee document SC/54/SM12. [Available from Southwest Fisheries Science Center, 8604 La Jolla Shores Dr., La Jolla, CA 92037, USA].

11. Publications*11.1 Published or 'In Press' papers only***AFSC**

- Friday, N. and Smith, T.D. 2003. The Effect of Age and Sex Selective Harvest Patterns for Baleen Whales. *Journal of Cetacean Research and Management.* 5(1): 23-28.
- Mizroch, S. A., Herman, L.M., Straley, J.M., Glockner-Ferrari, D., Jurasz, C., Darling, J.D., Cerchio, S., Gabriele, C.M., Salden, D.R. and von Ziegesar, O. *In press*. Estimating the adult survival rate of Central North Pacific humpback whales. *Journal of Mammalogy*.
- Rugh, D., DeMaster, D., Rooney, A., Breiwick, J., Shelden, K. and Moore, S. 2003. A review of bowhead whale (*Balaena mysticetus*) stock identity. *J. Cetacean Res and Manage.* 5(3):267-279.
- Shelden, K.E.W., Rugh, D.J., Mahoney, B.A. and Dahlheim, M.E.. 2003. Killer whale predation on belugas in Cook Inlet, Alaska: Implications for a depleted population. *Marine Mammal Science:* 19(3):529–544.
- Shelden, K.E.W., Schulman-Janiger, A. and Rugh, D.A. *In press*. Gray whales born north of Mexico's "calving" lagoons: an indicator of recovery? *Ecological Applications*.
- Stevick, P.T., Allen, J., Clapham, P.J, Friday, N., Katona, S.K., Larsen, F., Lien, J., Mattila, D.K., Palsbøll, P.J., Sigurjónsson, J., Smith, T.D., Øien, N. and Hammond, P.S. 2003. North Atlantic Humpback Whale Abundance and Rate of Increase Four Decades After Protection from Whaling. *Marine Ecology Progress Series* 258:263-273.

NWFSC

Krahn M.M., Ylitalo G.M., Stein J.E., Aguilar A. and Borrell A. 2003. Organochlorine contaminants in cetaceans: how to avoid errors when comparing datasets. *J. Cetacean Res. Manage.* 5(2):103-113.

Krahn M.M., Herman D.P., Ylitalo G.M., Sloan C.A., Burrows D.G., Hobbs R.C., Mahoney B.A., Yanagida G.K., Calambokidis J. and Moore S.E. *In press*. Stratification of lipids, fatty acids and organochlorine contaminants in blubber of white whales and killer whales. *J. Cetacean Res. Manage.*

Stein J.E., Tilbury K.L., Meador J.P., Gorzelany J., Worthy, G.A.J. and Krahn, M.M. 2003. Ecotoxicological investigations of bottlenose dolphin (*Tursiops truncatus*) strandings: accumulation of persistent organic

chemicals and metals. In *Toxicology of Marine Mammals*, (Bossart, G., Fournier, M., O'Shea, T., and Vos, J., eds.) Taylor and Francis, Philadelphia, PA, pp. 458-488.

SWFSC

- Aitken, N, S. Smith, C. Schwarz, and P. Morin. 2004. Single nucleotide polymorphism (SNP) discovery in mammals: A targeted-gene approach. *Molecular Ecology* 13, 1423-1431.
- Archer, F., T. Gerrodette, S. Chivers, and A. Jackson. 2004. Annual estimates of the unobserved incidental kill of pantropical spotted dolphin (*Stenella attenuata attenuata*) calves in the tuna purse-seine fishery of the eastern tropical Pacific. *Fish.Bull.* 102:233-244
- Archer, F.I., K.M. Robertson. 2004. Age and length at weaning and development of diet of pantropical spotted dolphins, *Stenella attenuata*, from the eastern tropical Pacific. *Marine Mammal Science* 20(2):232-245.
- Bannister, J.L. and S.L. Hedley. (In review). Southern Hemisphere Group IV humpback whales: their status from a recent aerial survey. *Memoirs of the Queensland Museum*.
- Barlow, J. and G. Cameron. 2003. Field experiments show that acoustic pingers reduce marine mammal bycatch in the California drift gillnet fishery. *Marine Mammal Science*.
- Boness, D.J., P.J. Clapham, and S.L. Mesnick. (In press). Life history and reproductive strategies. In: (R. Hoelzel, ed.) *Marine Mammal Biology*. Blackwell Science, Ltd.
- Buckland, S.T., Thomas, L., Marques, F., Strindberg, S., Hedley, S.L., Pollard, J.H., Borchers, D.L. and Burt, M.L. (In press). Distance sampling: recent advances and future directions. In *Proceedings from TIES conference*, September 2000.
- Calambokidis, J. and J. Barlow. 2003. Abundance of blue and humpback whales in the eastern North Pacific estimated by capture-recapture and line-transect methods. *Marine Mammal Science*. 36p.
- Chivers, S.J., R.G. LeDuc, K.M. Robertson, N.B. Barros, and A.E. Dizon. (Submitted). Molecular genetics of pygmy and dwarf sperm whales (Genus *Kogia*) suggest a new phylogenetic species. *Journal of Mammalogy*. 26 pp.
- Clapham, P., J. Barlow, M. Bessinger, T. Cole, D. Mattila, R. Pace, D. Palka, J. Robbins and R. Seton. 2003. Abundance and demographic parameters of humpback whales from the Gulf of Maine and stock definition relative to the Scotian Shelf. *Journal of Cetacean Research and Management* 5(1):13-22.
- Clapham, P.J., P. Berggren, S. Childerhouse, N.A. Friday, T. Kasuya, L. Kell, K-H. Kock, S. Manzanilla, G. di Sciara, W.F. Perrin, A.J. Read, R.R. Reeves, E. Rogan, L. Rojas-Bracho, T.D. Smith, M. Stachowitsch, B.L. Taylor, D. Thiele, P.R. Wade, and R.L. Brownell. 2003. Viewpoint: Whaling as science. *Bioscience* 53: 210-212.
- Dalebout, M.L., C.S. Baker, G.J.B. Ross, R.C. Anderson, P.B. Best, V.G. Cockcroft, H.L. Hinsz, V. Peddemors, and R. L. Pitman. 2003. Genetic identification of new specimens reveals the external appearance and extends the distribution of Longman's beaked whale *Indopacetus pacificus* (Cetacea: *Ziphiidae*). *Marine Mammal Science* 19(3):421-461.
- Edwards, E. (Submitted). Mother-calf behavior and its implications for dolphins chased by tuna purse-seiners: A review. *Marine Mammal Science*
- Escorza-Treviño, S. A. Lang, and A.E. Dizon. (Submitted). Genetic differentiation and intraspecific structure of eastern tropical Pacific spotted dolphins, *Stenella attenuata*, revealed by mitochondrial and microsatellite DNA analyses. *Conservation Genetics*. 28p.
- Fiedler, P.C. (Submitted). Environmental change in the eastern tropical Pacific Ocean: II. Review of ENSO and decadal variability. *Marine Ecology Progress Series*. 36 p.
- Fiedler, P.C., and L.D. Talley. (Submitted). Hydrography of the eastern tropical Pacific: A review. *Progress in Oceanography*. 62p.
- Forney, K.A., P.R. Wade, and J. Waite. (In prep). Worldwide abundance and distribution of killer whales. In: "Whales, whaling and ocean ecosystems", U.C. Press.
- Gendron, D. and Mesnick, S.L. (In press). Sloughed skin: a method for the systematic collection of tissue samples from Baja California blue whales. *Journal of Cetacean Research and Management (IWC)*.
- Gerrodette, T., P.K. Dayton, and T.J. Ragen. 2003. Thinking like a lobbyist. *Cons. In Prac.* 4(2, Spring). p. 44-45.
- Hillman, G.R., Würsig, B., Gailey, G.A., Kehtarnavaz, N., Drobyshevsky, A., Araabi, B.N., Tagare, H.D. and Weller, D.W. 2003. Computer-assisted photo-identification of individual marine vertebrates: A multi-species system. *Aquatic Mammals* (29)1:117-123.
- Jefferson, T. A. and B. E. Curry. (In press) *Stenella clymene*. *Mammalian Species*.
- Jefferson, T. A. and S. K. Hung. (In review) *Neophocaena phocaenoides*. *Mammalian Species*.
- Kinzey, D. and T. Gerrodette. 2003. Distance measurements using binoculars from ships at sea: Accuracy, precision and effects of refraction. *J. of Cetacean Res. and Mgmt.* 5:159-171.
- LeDuc, R.G., A. Rosenberg, A.E. Dizon, A.M. Burdin, S.A. Blokhin, and R.L. Brownell, Jr. (Submitted). Genetic analyses (mtDNA and microsatellites) of two populations of bowhead whales. *Journal of Cetacean Research & Management*.

- Levenson, D. H., and A. E. Dizon. 2003. Genetic evidence for the ancestral loss of short-wavelength-sensitive cone pigments in mysticete and odontocete cetaceans. *Proceedings of the Royal Society: Biological Sciences*. 270:673-679.
- Lowry, M.S. and K.A. Forney. (In Press). Abundance and distribution of California sea lions in central and northern California during 1998 and summer 1999. *Fishery Bulletin*.
- Lowry, M.S., and M.O. Maravilla-Chavez. (Submitted). Recent abundance of California sea lions in Baja California, Mexico and the United States. *Proceedings of the 6th California Islands Symposium*, December 1-3, 2003 in Ventura Co., California. 21p. (as of 12/16/03)
- Lyengar, A., C.A. Stockwell, D. Layfield, and P.A. Morin. (In press) Characterisation of microsatellite markers in white sands pupfish (*Cyprinodon tularosa*). *Molecular Ecology Notes*.
- Martien, K.K. and B.L. Taylor. (In press). Limitations of hypothesis-testing in defining management units for continuously distributed species. *Journal of Cetacean Research & Management*
- Martien, K.K., R. LeDuc, B.L Taylor, M. Berube, P.J. Palsboll, R.L. Brownell, P.J. Clapham, T.D. Smith, P.K. Dayton, R.R. Reeves, H.C. Rosenbaum. (Submitted). Response to Roman and Palumbi. *Science*.
- Mellinger, D. K. and J. Barlow. 2003. Future directions for acoustic marine mammal surveys: stock assessment and habitat use. NOAA OAR Special Report, NOAA/PMEL Contribution 2557, available from NOAA Pacific Environmental Laboratory. 37pp.
- Mesnick, S.L., Evans, K. Taylor, B.L., Hyde, J., Escorza-Treviño, S and Dizon, A.E. 2003. Sperm whale social structure: why it takes a village to raise a child. pp. 170-174 *In*: (F.B.M. de Waal and P.L. Tyack, eds.) *Animal Social Complexity: Intelligence, Culture and Individualized Societies*. Harvard University Press.
- Morin, P. A. & Goldberg, T. L. 2004. Determination of genealogical relationships from genetic data: A review of methods and applications. *In*: *Kinship and Behavior in Primates* (Ed. by Chapais, B. & Berman, C. M.), pp. 15-45. New York: Oxford Univ. Press.
- Morin, P.A., G. Luikart, R.K. Wayne, and the SNP workshop group. 2004. SNPs in ecology, evolution, and conservation. *Trends in Ecology and Evolution* 19(4):208-216.
- Nsubuga, A.M., M.M. Robbins, A. Roeder, P.A. Morin, C. Boesch and L. Vigilant. (Submitted). Factors affecting the amount of genomic DNA extracted from ape feces and the identification of an improved sample storage method. *Molecular Ecology Notes*. 19p. (as of 3/17/04)
- Oleson, E. M., J. Barlow, J. Gordon, S. Rankin, and J. A. Hildebrand. 2003. Low frequency calls of Bryde's whales. *Marine Mammal Science* 19(2):160-172.
- Oswald, J.N, J. Barlow, & T.F. Norris. 2003. Acoustic identification of nine Delphinid species in the eastern tropical Pacific Ocean. *Marine Mammal Science*.
- Perrin, W.F. and S.L. Mesnick. (In Press). Sexual ecology of the spinner dolphin, *Stenella longirostris*: geographic variation in mating system. *Marine Mammal Science*.
- Perryman, W.L., G.M. Watters, and L.K. Schwartz. (Submitted). Ice might not be nice for pregnant gray whales. *Nature*. 6p.
- Pitman, R.L. 2003. Good whale hunting. *Natural History* December 2003/January 2004:24-28.
- Pitman, R.L. and P. Ensor. 2003. Three different forms of killer whales in Antarctic waters. *Journal of Cetacean Research and Management* 5(2):131-139.
- Pitman, R.L. and P.H. Dutton. (In review). Killer whale predation on a leatherback turtle in the northeast Pacific. *Pacific Science*.
- Pitman, R.L., S. O'Sullivan, and B. Mase. (In Press). Killer whales (*Orcinus orca*) attack a school of pantropical spotted dolphins (*Stenella attenuata*) in the Gulf of Mexico. *Aquatic Mammals*.
- Pitman, R.L., S. O'Sullivan, and B. Mase. 2003. Killer whales (*Orcinus orca*) attack a school of pantropical spotted dolphins (*Stenella attenuata*) in the Gulf of Mexico. *Aquatic Mammals* 29(3):321-324.
- Rankin, S, J. Barlow, and J.N. Oswald. (Submitted). Sounds of the tropical bottlenose whale. *Marine Mammal Science*. 9 p.
- Roeder, A.D., F.I. Archer, H.H. Poinar, and P.A. Morin. (Submitted). A novel method for collection and preservation of feces for genetic studies." *Molecular Ecology Notes*. 11p. (as of 3/16/04)
- Rosenberg, A. and Mesnick, S.L. (Submitted). The cetacean ZFX and ZFY genes: interfamilial characterization of a novel region facilitates gender determination. *Molecular Ecology*.
- Smith, B. D., G. Braulik, T. A. Jefferson, B. D. Chung, C. T. Vinh, D. V. Du, B. V. Hahn, P. D. Trong, D. T. Ho, and V. V. Quang. (In review). Notes on two cetacean surveys in the Gulf of Tonkin. *Raffles Bulletin of Zoology*.
- Smith, B.D., N. Aitken, C. Schwarz, and P.A. Morin. (Accepted). Characterisation of 15 SNP markers for chimpanzees (*Pan troglodytes*). *Molecular Ecology Notes*. 8 p. (as of 3/11/04)
- Springer, A.M., J.A. Estes, G.B. van Vliet, T.M. Williams, D.P. DeMaster, D.F. Doak, E.M. Danner, and K.A. Forney. (In press). Collapse of marine megafauna: Foods the killer whales ate? *Science*. 13 p.
- Stolen, M. and J. Barlow. (In press). A model life table for bottlenose dolphins (*Tursiops truncatus*) from the Indian River Lagoon system, Florida, USA. *Marine Mammal Science*.

- Swartz, S. L., T. Cole, M. A. McDonald, J. A. Hildebrand, E. M. Oleson, A. Martinez, P. J. Clapham, J. Barlow, and M. L. Jones. (In press). Acoustic and visual survey of humpback whales (*Megaptera novaeangliae*) in the eastern and southern Caribbean Sea. *Caribbean Journal of Science*.
- Taylor, B. L. (Submitted) Deciding upon Units to Conserve in the Face of Uncertainty. Marine Mammal Commission.
- Taylor, B. L., Wade, P.R., Ramakrishnan, U., Gilpin, M. and Akçakaya H.R. (In Press). Incorporating uncertainty in PVAs for the purpose of classifying species by risk. In *Population Viability Analysis*. Eds. S.R. Beissinger and D.R. McCollough.
- Taylor, B.L., J. Barlow, R. Pitman, L. Ballance, T. Klinger, D. DeMaster, J. Hildebrand, J. Urban, D. Palacios, & J. Mead. (Submitted). Sounding the alarm for beaked whales. *Science*. 6 p.
- Taylor, B.L., J. Barlow, R. Pitman, L. Ballance, T. Klinger, D. DeMaster, J. Hildebrand, J. Urban, D. Palacios, and J. Mead. (Submitted). Research needed to assess risk of acoustic impact on beaked whale populations. *Journal of Oceanic Engineering*. 7p.
- Vilchis, L.I., L.T. Ballance, and P.C. Fiedler. (Submitted). Oceanic habitat of tropical seabirds: exploring habitat relationships with generalized additive models. *Marine Ecology Progress Series*.
- Watters, G.M. R.J. Olson, R.C. Francis, P.C. Fiedler, J.J. Polovina, S.B. Reilly, K.Y. Aydin, C.H. Boggs, T.E. Essington, C.J. Walters, & J.F. Kitchell. 2003. Physical forcing and the dynamics of the pelagic ecosystem in the eastern tropical Pacific: Simulations with ENSO-scale and global-warming climate drivers. *Can. J. Fish. Aquat. Sci.* 60:1161-1175.
- Wayne, R.K. and P.A. Morin. 2004 Conservation genetics in the new molecular age. *Front. Ecol. Environ.* 2004; 2(2):89-97.
- Weller, D.W. (In Press). Book Review -- Cetacean societies: Field studies of whales and dolphins. Eds. J. Mann, R.C. Connor, P.L. Tyack, & H. Whitehead. *Animal Behaviour*.
- Weller, D.W. 2003. Can the Western Gray whale Survive? The Plight of a Critically Endangered Whale. *Whale* 8: 4-6.
- Weller, D.W., Burdin, A.M., Bradford, A.L., Ivashchenko, Y.V., Tsidulko, G.A. and Brownell, R.L., Jr. 2003. Gray whales off Sakhalin Island, Russia: July-September 2002, a joint U.S.-Russian scientific investigation. Final contract report to Marine Mammal Commission (unpublished). 78 pp.
- Weller, D.W., Lang, A.R. and Defran, R. H. (Submitted). The Common Bottlenose Dolphin (*Tursiops truncatus*). San Diego Zoological Society, San Diego, CA.

11.2 Unpublished literature

AFSC

- Perez, M.A. 2003. Compilation of marine mammal incidental take data from the domestic and joint venture groundfish fisheries in the U. S. EEZ of the North Pacific, 1989-2001. U. S. Dep. Commer., NOAA Tech. Memo. NMFS-AFSC-138, 145 p.

NWFSC

- Ylitalo G.M. Organochlorine analyses of whole blood of a juvenile northern resident killer whale. Report submitted to NOAA Fisheries NOAA Fisheries Northwest Regional Office, March 2003, 8 pp.
- Ylitalo G.M. Results of chemical contaminant and lipid analyses of tissues of gray whales collected during a Russian subsistence harvest in 2001. Report submitted to NOAA Fisheries Office of Protected Resources, May 2003, 12 pp.
- Ylitalo G.M. Report on concentrations of polycyclic aromatic hydrocarbons in tissues of various marine mammals that stranded after an oil spill in Buzzards Bay, MA. Report submitted to NOAA Fisheries Office of Law Enforcement (Scituate, MA), July 2003, 18 pp.
- Ylitalo G.M. and Brown D.W. Chemical contaminant and lipid analyses of blubber of harbor porpoises that stranded at various sites in Washington State, May – June 2003. Report submitted to NOAA Fisheries Northwest Regional Office, January 2004, 6 pp.

SWFSC

All of the following SWFSC Administrative Reports and Technical Memorandums are available from the Southwest Fisheries Science Center; 8604 La Jolla Shores Drive; La Jolla, CA 92037 USA

- Barlow, J. 2003. Preliminary estimates of the abundance of cetaceans along the U.S. west coast: 1991-2001. SWFSC Admin Rept. LJ-03-03. 31p.
- Barlow, J. 2003. Cetacean abundance in Hawaiian waters during Summer/Fall 2002. SWFSC Admin Rept. LJ-03-13. 20p.

- Carretta, J.V. 2003. Preliminary estimates of harbor porpoise abundance in California from 1997 and 1999 aerial surveys. SWFSC Admin Rept. LJ-03-04. 12p
- Carretta, J.V., K.A. Forney, M.M. Muto, J. Barlow, J. Baker and M. Lowry. (In press). U.S. Pacific marine mammal stock assessments: 2003. NOAA Technical Memorandum. 291p.
- Carretta, J.V. & K.A. Forney. 2004. Preliminary estimates of harbor porpoise abundance in California from 1999 and 2002 aerial surveys. SWFSC Admin Rept. LJ-04-01. 13p
- Chivers, S.J., R.G. LeDuc, and K.M. Robertson. 2003. A feasibility study to evaluate using molecular genetic data to study population structure of eastern North Pacific *Delphinus delphis*. SWFSC Admin. Rept. LJ-03-12. 14p.
- Fiedler, P.C. & V. Philbrick. (In prep.) Environmental change in the eastern tropical Pacific Ocean: Observations in 1986-1990 and 1998-2000. NOAA Technical Memorandum.
- Krahn, M., P. Wade, S. Kalinowski, M. Dahlheim, B. Taylor, B. Hanson, G. Ylitalo, R. Angliss, J. Stein, and R. Waples. 2003. Status review under the Endangered Species Act: Southern resident killer whales (*Orcinus orca*). NOAA Technical Memorandum NMFS-NOAA-NWFSC-54. 135p.
- LeDuc, R. (In press). Report of the results of the 2002 survey for North Pacific right whales. NOAA Technical Memorandum NMFS-NOAA-TM-357. 58p (as of 1/26/04)
- Ostman-Lind, J., A.D. Driscoll-Lind, and S.H. Rickards. 2004. Delphinid abundance, distribution and habitat use off the western coast of the Island of Hawaii. Contract Admin. Rept. LJ-04-02C. 28p. (as of 05/25/04)
- Philbrick, V.A., P.C. Fiedler, L.T. Ballance and D.A. Demer. 2003. Report of ecosystem studies conducted during the 2001 Oregon, California, and Washington (ORCAWALE) marine mammal survey on the Research Vessels *David Starr Jordan* and *McArthur*. NOAA Technical Memorandum NOAA-TM-NMFS-SWFSC-349. 50 p.
- Taylor, B.L., M. Scott, J. Heyning and J. Barlow. 2003. Suggested guidelines for recovery factors for endangered marine mammals. NOAA Technical Memorandum NOAA-TM-NMFS-SWFSC-354.
- Weihls, D. (In press). Investigation into energetic constraints on dolphin swimming. SWFSC Admin Rept. LJ-03-10C. 42p.