

A PRELIMINARY ANALYSIS OF RECENT CAPTURES OF SMALL CETACEANS IN PERU AND CHILE

Koen Van Waerebeek ¹
Marie-Françoise Van Bressem ^{1,2}
Joanna Alfaro-Shigueto ¹
Gian Paolo Sanino ^{3,4}
David Montes ¹
Karina Ontón ¹

¹ Peruvian Centre for Cetacean Research (CEPEC),
Jorge Chávez 302, Pucusana, Lima-20, Peru

² Department of Vaccinology-Immunology, Faculty of Veterinary Medicine,
University of Liège, Sart Tilman, 4000 Liège, Belgium

³ Centre for Marine Mammals Research Leviathan, Lo Beltran 2251, Vitacura, Santiago,
Chile

⁴ Sección Zoología, Museo Nacional de Historia Natural, Casilla 787, Santiago, Chile

ABSTRACT

Limited monitoring of 30 fishing ports on the central and northern Peruvian coast, from 03°29'S to 14°10'S, in the period 1995-99, yielded evidence of small cetacean exploitation in 25 ports (83%). Despite hiding of catches by fishermen, we documented the remains of (minimum) 452 captured small cetaceans, comprising 66 unidentified and 386 identified individuals belonging to seven species (% of known species total): *Phocoena spinipinnis* (n=168, 43.5%), *Lagenorhynchus obscurus* (n=84, 21.8%), *Delphinus capensis* (n=67, 17.3%), *Truncatus truncatus* (n=35, 9.1%), *Delphinus* sp. (n=24, 6.2%), *Delphinus delphis* (n=4, 1.0%), *Globicephala* sp. (n=3, 0.8%) and *Ziphius cavirostris* (n=1, 0.3%). Meat continues to be consumed and sold by coastal people, but mostly locally. Indications are, in contrast with earlier years, that large amounts of both meat and blubber are used as bait in the shark fisheries. Not only long-lines but also large-mesh gillnets are baited. Accounts of harpooning indicate demand for bait exceeds the quantity by-catches can provide. Proportion of dusky dolphin in total catches off central Peru has been in continuous decline since recording started in 1985, adding weight to the hypothesis (Van Waerebeek, 1994) that it may reflect a true decrease in their abundance due to exploitation. We also document nine recent cases of confirmed by-catch, suspected by-catch or confirmed intentional take in north-central Chile (Regions II, III, IV) affecting *P. spinipinnis* (3), *Kogia breviceps* (3), *D. capensis* (1), *Globicephala melas* (1) and *Mesoplodon peruvianus* (1). Information was collected opportunistically, therefore true catch levels may be much higher than results seem to suggest. Further dedicated field research is recommended.

KEYWORDS: BURMEISTER'S PORPOISE; DUSKY DOLPHIN; LONG-BEAKED COMMON DOLPHIN ; SHORT-BEAKED COMMON DOLPHIN; BOTTLENOSED DOLPHIN; SHORT-FINNED PILOT WHALE; LESSER BEAKED WHALE; CUVIER'S BEAKED WHALE; PYGMY SPERM WHALE; CONSERVATION; DIRECT CAPTURE; INCIDENTAL CATCHES; FISHERIES; GILLNETS.

**Paper presented to the
51st Annual Meeting of the
International Whaling Commission
Scientific Committee**

**Grenada
3-15 May 1999**

INTRODUCTION

Dolphin and porpoise populations world-wide are subjected to varying levels of mortality from by-catches and direct takes in a multitude of fisheries (Mitchell, 1975; Northridge, 1984, 1996; Perrin, 1988; IWC, 1994; Reeves and Leatherwood, 1994). In Peru and Chile, as in many other countries, no official statistics on small cetacean catches are available to date (see Antonietti *et al.*, 1998). Cetaceans as quintessential migratory mammals are widely regarded as a common natural heritage that require regional and global management policies for their conservation (CMS, 1997), therefore the information void on fisheries related mortality in the Southeast Pacific has long been cause for international concern (e.g. Gaskin *et al.*, 1987; Perrin, 1988; Reeves and Leatherwood, 1994).

In Peru, independent scientists have monitored dolphin and porpoise takes in maritime fishing ports since 1985, initially under the auspices of the United Nations Environment Programme (UNEP), and have submitted data for international scrutiny (e.g. Gaskin *et al.*, 1987). Onshore monitoring of cetacean landings for tallying purposes was efficient and fairly reliable because the great majority of captured animals ended up in the main fish markets at wharves to be retailed (then legally) for human consumption (Van Waerebeek, 1986; Read *et al.*, 1988; Van Waerebeek and Reyes, 1990, 1994a,b). Regulatory measures became inevitable when an estimated 15-20,000 small cetaceans per annum were captured in Peru without any form of management (Van Waerebeek and Reyes, 1994b). In 1990, backed by overwhelming public support, national legislation was introduced making it illegal to hunt, harass or kill small cetaceans or to trade their products. We were able to compile catch statistics through port monitoring even after 1990 because the ban initially was not enforced and cetaceans continued to be openly commercialized (Van Waerebeek and Reyes, 1990a,b; 1994a,b; García-Godos, 1992; Van Waerebeek *et al.*, 1997).

In 1994, a second, more stringent, small cetacean conservation law was enacted in which district and provincial authorities were assigned co-responsibility in enforcement. Henceforth carcasses typically ceased to be landed and cetacean meat vanished from the public commercial circuit, including market stalls, restaurants and gourmet shops. Although not backed by firm figures, indications were that harpooning and direct net sets on dolphin schools diminished following the sudden closure of the market. Notwithstanding, the disappearance of dead dolphins and porpoises from public view was partly a cosmetic effect which falsely suggested exploitation had halted altogether.

Accidental by-catches in artisanal gillnets and industrial coastal purse-seine fisheries¹, combined a substantial but undetermined percentage of total mortality, evidently were not mitigated by the ban. Nonetheless the trade ban represented, while not the definitive solution, a first step towards a comprehensive plan for the conservation and management of small cetaceans in Peru and the eastern South Pacific. It implicitly recognized that large-scale exploitation of cetacean stocks was unacceptable, at least until stocks had been properly assessed.

In Chile small cetacean takes have periodically been documented in the past, most notably the hunting of Peale's dolphin *Lagenorhynchus australis*, Chilean dolphin *Cephalorhynchus eutropia* and Commerson's dolphin *Cephalorhynchus commersonii* for crab bait in southern Chile and harpooning and net entanglements of southern right whale dolphins *Lissodelphis peronii* off central and northern Chile (e.g. Aguayo, 1975; Sielfeld, 1983; Sielfeld *et al.*, 1977; Torres *et al.*, 1979, 1990; Guerra *et al.*, 1987; Lescrauwaet, 1989; Lescrauwaet and Gibbons, 1994; Reyes and Oporto, 1994; Van Waerebeek *et al.*, 1994). Presently the perception prevails that cetacean exploitation constitute isolated events and cause negligible mortality, rooted in a misleading 'absence of evidence' premise. Limited opportunistic sampling, preliminary results of which are presented here, indicates that fisheries related kills, including directed takes, continue to affect several cetacean species, but at unknown levels.

Cetaceans were protected by Decree N°40 of the *Reglamento de la ley de caza* (February 1972), in 1977 replaced by Supreme Decree N°381 of the Ministry of Agriculture, dictating an absolute moratorium on the capture of cetaceans in Chilean waters (Sielfeld, 1983). Also, Chile has recently become party to the Convention on the Conservation of Migratory Species of Wild Animals (CMS).

Fisheries-small cetacean interactions in Peru and Chile have been discussed on a species base for *P. spinipinnis* (Van Waerebeek and Guerra, 1986; Van Waerebeek and Reyes, 1986, 1990b), *Delphinus capensis* (Van Waerebeek, 1993), *L. obscurus* (Van Waerebeek, 1992, 1994), *Tursiops truncatus* (Van Waerebeek *et al.*, 1990), *L. peronii* (Van Waerebeek *et al.*, 1991), *Stenella coeruleoalba* (Van Waerebeek *et al.*, 1999), *Kogia spp.* (Reyes and Van Waerebeek, 1992) and *Balaenoptera acutorostrata* cf. *bonaerensis* (Van Waerebeek and Reyes, 1994c).

MATERIAL AND METHODS

Unlike preceding monitoring efforts in Peru (Read *et al.*, 1988; Van Waerebeek and Reyes, 1990, 1994a,b; Van Waerebeek *et al.*, 1997), it was beyond the scope of this study to estimate mortality rates per unit time or total annual mortality. Also, when port authorities implemented the small cetacean exploitation ban, fishermen resorted to a strategy of hiding takes which precluded estimation of captures through any shore-based survey effort. We set out to test the hypothesis, utilizing chance encounters and circumstantial evidence, that small cetacean mortality in fisheries remains common and geographically wide-spread along Peru's coast, affecting several species.

Thirty Peruvian maritime ports were visited in the period January 1995 - February 1999, including (from 03°29'S south to 14°10'S): Puerto Pizarro, La Cruz, Zorritos, Cancas, Máncora, Los Organos, Cabo Blanco, Talara, Paita, Matcaballo, Constante,

¹ For small, schooling fish, like southern anchovy and Pacific sardine, caught to supply the fish meal and fish oil industry.

Parachique, Bayovar, San José, Pimentel, Santa Rosa, Pacasmayo, Salaverry, Chimbote, Casma, Culebras, Huarmey, Supe, Chancay, Ancón, Pucusana, Cerro Azul, Tambo de Mora, San Andrés (Pisco) and Laguna Grande. For fisheries purposes the coast has conventionally been divided in a northern, a central and a southern sector (see Figure 1 in Van Waerebeek and Reyes, 1994). The southern sector was not sampled.

Restricted by resources, monitoring effort was widely variable and often opportunistic, ranging from one morning and documenting a single landing event in ports where (from past experience) we did not expect major cetacean catches (e.g. Puerto Pizarro, La Cruz), to a maximum of 38 days at Cerro Azul, central Peru, where a directed dolphin fishery operated until at least 1994 (Read *et al.*, 1988; Van Waerebeek *et al.*, 1997). Although several ports could be checked in a single field trip departing from Lima, the timing of such sorties was randomized, determined by factors independent from ongoing fisheries effort, e.g. observers visiting coastal towns for miscellaneous reasons.

The landing event, lasting from one to a few hours, was discreetly observed in most instances by a team of two scientists (including at least one of the authors), all of whom had extensive experience surveying fisheries. We perused beaches in the immediate vicinity of wharves and harbour facilities as well as near-by dumps for evidence including discarded skeletons, skulls, organs and scattered bones. Informal interviews with fishermen, locals and port authorities yielded significant additional insights; this information was treated as merely indicative and not used as data unless the source was a trusted informant, i.e. the veracity of whose claims had been verified on earlier occasions.

In Chile, data and specimens were collected during irregular visits by biologists to ports in the III and IV Region. Three cases were documented during boat-based cetacean surveys by the Centre for Marine Mammal Research Leviathan in the summers of 1998-99.

Reported specimen numbers are minima: only heads, skulls or calvariae² were considered proof for tallying purposes, except where other cetacean remains (e.g. blubber, severed tail stock) could not possibly be associated (e.g. different state of freshness) to cranial bones found in the same port. We collected selected voucher specimens and tissue samples; in Peru deposited in the CEPEC Cetacean Reference Collection, Pucusana; in Chile at the Centre for Marine Mammal Research Leviathan in Santiago, Chile. Samples of skin or other soft tissues were conserved in 20% DMSO saline solution for molecular genetic studies. Abundant photographic evidence supports notes.

Although cetaceans that died from natural causes are normally readily distinguishable from fishery interaction victims (absence of net marks, cut marks and signs of manipulation), we did not include data from Peru for the period September 1997 through April 1998 when a severe El Niño caused increased natural mortality of small cetaceans through apparent starvation (CEPEC, unpublished data; J.C. Reyes, pers. comm. to KVV).

² Plural of calvaria (*f.* Latin) referring to the upper dome of the skull (without mandibula); 'also calvarium' (Morris, 1992). The latter, a derived, New Latin form, can be used in English but is incorrect Latin; therefore we do not recommend its use.

RESULTS

1. PERU

General

Of the 30 ports perused, only in three far northern fishing communities, each sampled for but a single day (Puerto Pizarro, La Cruz, Cabo Blanco) and two ports on the central coast (Casma and Tambo de Mora; respectively one and three days sampled) did we not encounter specimen evidence of takes (Tables 1-4). Sampling conditions departed drastically from those of pre-ban monitoring years, the result of fishermen hiding captured cetaceans, including accidental ones. Virtually no complete animals were brought ashore in ports close to Lima (e.g. Pucusana, Cerro Azul) or larger ports where control is more prevalent (e.g. Chimbote), while in smaller fishing towns distant from Lima (e.g. Salaverry, San José) attitudes were somewhat more relaxed and a few fresh carcasses could still be seen. An unknown, but reportedly high percentage of captured cetaceans are kept onboard for use as bait (see below), the remainder is filleted in the boats and the meat taken ashore in bags. Butcher offal is dumped at sea; presumably only a small part of this washes ashore.

Material evidence and information gleaned from interviews largely coincided. On 1st December 1998, a photograph by R.Sandoval of two evidently utilized dolphin carcasses on a beach of bahía El Ferrol, Chimbote, was published on the front page of Peru's leading newspaper (El Comercio, N° 82.951).

Species catch composition

In the period 1995-99, despite the general tendency for cover-up, we could gather evidence for a total of 452 captured small cetaceans, comprising 66 unidentified and 386 identified individuals belonging to seven species (% of total specimens identified to genus or species): *P. spinipinnis* (n=168, 43.5%), *L. obscurus* (n=84, 21.8%), *D. capensis* (n=67, 17.3%), *T. truncatus* (n=35, 9.1%), *Delphinus* sp. (n=24, 6.2%), *D. delphis* (n=4, 1.0%), *Globicephala* sp. (n=3, 0.8%) and *Ziphius cavirostris* (n=1, 0.3%).

The species composition of captures in the northern coastal sector, based on both fresh and decomposed remains of 215 identified small odontocetes, was as follows: *P. spinipinnis* (n=126, 58.6%), *D. capensis* (n=44, 20.5%), *Delphinus* sp. (n=21, 9.8%), *T. truncatus* (n=12, 5.6%), *L. obscurus* (n=7, 3.3%), *D. delphis* (n=4, 1.9%) and *Z. cavirostris* (n=1, 0.5%). Over the same period the species composition of captures in the central coastal sector of Peru, based on remains of 171 small odontocetes was as follows [in square brackets: % for 1991-93]: *L. obscurus* (n=77, 45%) [52.8%]; *P. spinipinnis* (n=42, 24.6%) [11.9%]; *D. capensis* (n=23, 13.5%) [31.8%]³; *T. truncatus* (n=23, 13.5%) [3.4%]; *Delphinus* sp. (n=3, 1.8%); and *Globicephala* sp. (n=3, 1.8%). No *D. delphis* were found this time.

Use of cetacean products

Before the ban in 1994, dolphin/porpoise meat was widely and openly commercialized in markets and restaurants. Since then, bar a few exceptions (including a popular market in Chimbote), cetacean meat has been handled and sold stealthily. Quantity therefore can not be assessed. In fishing communities like Pucusana and Pisco (J.C. Reyes, pers.comm. to KVV) the meat is typically sold from house to house as to avoid seizure. *Muchame*, the dried/salted gourmet variety is reported to be available on the black

³ Including all *Delphinus* spp.

market in limited quantities, at exorbitant prices.

Many captured cetaceans are stowed in artisanal boats lying anchored away from the wharf waiting to be utilized as bait during the next fishing sortie. The baiting of longline hooks with chunks of cetacean meat and blubber in the shark and ray fishery has been commonplace for several years (Van Waerebeek *et al.*, 1997). However, a so far unreported practice is the baiting of large-mesh drift gillnets (*redes animaleros*) with cetacean meat suspended from the netting, in order to attract sharks. One fisher of Pucusana and another from Cerro Azul claimed this method is now wide-spread; one added 'it was indispensable to bait gillnets in order to land a reasonable amount of shark'. This would indicate that the incentive to capture cetaceans may again be on the rise, while coastal shark stocks may be overexploited.

2. CHILE

Case studies

Evidence is presented of nine specimens of small cetaceans, seven found on beaches near fishing ports in central Chile, one being cut-up in a port, and one found floating in coastal waters off northern Chile. Five species (four families) are involved (Table 5). Seven of the nine (78%) showed undeniable physical signs of capture and/or utilization by humans. Bone material, tissue samples, photographs and digital video footage support our findings.

The calvaria of a subadult male lesser beaked whale *Mesoplodon peruvianus* (GPS004) showed two bullet holes. One of these, 10.9mm in diameter, traversed the left (proximal) maxillary, the palatinum and vomer; the other hole, similar in diameter (and in the same plane), apparently resulted from a bullet shot obliquely through the nares which shattered proximal parts of the right maxillary and much of the right pterygoid hamula. The fact that both bullets passed right through the head, leaving smoothly contoured holes, suggests the fireweapon was high-powered and/or fired from short range.

One Burmeister's porpoise (no number assigned) was found dead on beach Playa De Choros in 1995 (Table 5) with a large wound in the gular region of the anterior thorax, possibly inflicted by an accidental hooking in a long-line for dogfish, known to be set from this beach. No tooth marks of potential aggressors (shark, bottlenose dolphin, sea lion) were present. No meat or blubber had (yet) been removed and all fins were intact when found. However, a few days later the carcass had disappeared, probably taken away, not by the sea. Another Burmeister's porpoise (GPS003) was witnessed while being butchered by a fisherman at the wharf of Punta De Choros on 17 February 1998 (Table 5). The fisherman's claim that the animal got entangled in his nets was supported by the presence of linear netmarks anterodorsally on the head. A series of tissue samples were collected as well as the head. The carcass of a third porpoise (IRD001), found on the beach of Bahía Inglesa, had evidently been cut by humans, who also severed the flukes. The skull (collected) presented cut-marks on the maxillary.

A female long-finned pilot whale (GPS008) was found stranded at Caleta Chañaral. Deep wounds like caused by a hand-held harpoon, are documented on high-quality digital film. The harpooning was further corroborated by local witnesses who volunteered the information while watching the *in situ* necropsy performed by one of us (GPS). They indicated that a ~15m fishing boat from Coquimbo, equipped with a bow-sprit and harpoons, designed for the harpoon fishery of *albacore* (referring to swordfish *Xiphias*

gladius), and which was operating in the *Reserva Nacional Pingüino de Humboldt* (4th Region) wounded the pilot whale. The boat had indeed been seen (and was filmed) in the area by GPS and volunteers. A second pilot whale reportedly died also from wounds and stranded but was taken away before it could be examined.

One pygmy sperm whale carcass (GPS007) and a long-beaked common dolphin (GPS005) were found stranded on the beach at fishery wharves of respectively San Antonio and Playa Choros, which strongly suggests these died from interactions with fisheries. Another pygmy sperm whale carcass (GPS007) was found floating in a high-effort fishery zone SW off Iquique during the 1997-98 IWC SOWER blue whale cruise off Chile (Findlay *et al.*, 1998). Two dead sperm whales *Physeter macrocephalus* were also found floating in this same area.

DISCUSSION

The abundant evidence of captured and utilized dolphins and porpoises in Peru, despite fishermen going at great lengths to hide these, confirmed our H⁰ hypothesis: it suggests that fishery related mortality levels of *Phocoena spinipinnis*, *Lagenorhynchus obscurus*, *Delphinus capensis* and *Tursiops truncatus* (in descending order) range from moderate to high. In four of every five ports visited in central and northern Peru remains of captured specimens were found. Friendly fishermen admitted in private that harpooning of dolphins continues to be common practice. However, the great majority of Burmeister's porpoises that die in fisheries are true by-catches. Van Waerebeek (1994) warned about a very significant (chi-square, $p < 0.0001$) decrease in the proportional representation of dusky dolphin in catches off central Peru as a potential sign of a true decrease in abundance due to fisheries mortality : from 77.5% (CI 76.5-78.5%) of catches in 1985-90 down to 52.8% (CI 50.6-55.0%) in 1991-93. In 1995-99 the proportion of dusky dolphins further decreased to 45% (CI 37.5-52.5%)⁴

No recent data have been published on the dynamics of Peruvian artisanal fisheries (see Antonietti *et al.*, 1998). Miscellaneous observations and interviews suggest effort has roughly remained comparable to 1994 levels, or has increased, e.g. in some villages of northern Peru, depending on the port. Drift and set gillnets with a wide range of mesh sizes (both poly- and monofilament), longlines and small-scale purse-seines continue to be the principal artisanal fishing arts. Considering that no gear modifications, closed seasons or areas were introduced, tested or proposed, there are no compelling reasons to expect significant changes in accidental by-catch rates. For the period 1985-1994 estimates of total small cetacean mortality ranged and increased from 5,500 up to 20,000 animals per annum, depending on the year (Read *et al.*, 1988; Van Waerebeek and Reyes, 1994).

It is unclear whether the increased demand for bait in Peru, and hence the incentive to hunt dolphins, has compensated in quantitative terms the presumably reduced demand for cetacean meat as food item. If so, mortality levels could again be on the rise. The conservation status of Peruvian coastal shark stocks (particularly blue, mako, thresher and hammerhead) and dolphin stocks may now be intricately linked in a downward spiral; the scarcer sharks become as a result of excessive fishing effort, the lower the CPUE and the bigger the 'need' for extensive baiting of gillnets and longlines with high-quality bait⁵ leading to a higher hunting pressure on dolphins.

⁴ Confidence intervals computed according normal approximation rule.

⁵ Fishermen unanimously claim that chunks of cetacean muscle with blubber constitute superior shark bait in terms of

In future monitoring schemes we should anticipate an increasing sophistication in the stealth with which fishermen will exploit small cetaceans. While independent shipboard observer programmes can rather straightforwardly estimate accidental catches providing fair approximate data on total fishery effort are available (see e.g. Northridge, 1996), novel methods will need to be developed in order to quantify illegal harpooning and other intentional captures.

The specimen evidence from the 3rd and 4th Region of Chile demonstrates recent direct kills and net by-catches of a variety of small cetaceans. Such exploitation off north-central and northern Chile is not new. Aguayo (1975), Sielfeld (1983) and Cárdenas *et al.* (1986) reported incidental catches, and uses of meat including both food and bait. During the fishing season for swordfish in the mid-1980s, harpooning of dolphins occurred in the Antofagasta or 2nd Region (Guerra, 1984). Guerra *et al.* (1987) documented 18 cases of net entanglements and harpooning of *T. truncatus*, *L. obscurus* and *P. spinipinnis* off northern Chile. Artisanal fishermen of Paquica (21°53'S) and Cobija (22°35'S) were reported to have captured small cetaceans for commercial purposes in 1986 (Cárdenas *et al.*, 1986). On 8 September 1986, the senior author recorded several artisanal fishing boats equipped with a bowsprit in the harbour of Taltal (25°25'S) and was told these were meant 'for the harpooning of swordfish, sharks and dolphins' (Van Waerebeek and Guerra, 1986).

The use of firearms to hunt small cetaceans, which most likely killed the *M. peruvianus* individual, has antecedents in the austral zone of Chile (Cárdenas *et al.*, 1986). Most larger artisanal and semi-industrial fishing boats, like the swordfish boats, carry fire-arms onboard. One of the pilot whales when moribund or already dead on the beach was shot four times by a fisherman from Caleta Chañaral.

Specific information on cetacean exploitation in Chile is, compared to what is known from Peru, still very scarce. The stealth factor and prompt utilization of carcasses no doubt constitutes a formidable obstacle in assessing catch frequencies. Nevertheless, further field research is recommended in an attempt to improve baseline data and the understanding of, if not quantitatively, the full range and nature of interactions that exist between coastal cetaceans and fisheries off western South America.

ACKNOWLEDGEMENTS

We greatly thank José Luis Brito, Ignacio Rubilar, Guillermo Ruz for help in collecting specimens; Elsa (Yayais) Cabrera, Karen Geysen, Diana Vega and LEVIATHAN volunteers for participating in field work. We also gratefully acknowledge the excellent collaboration of the Policía Ecológica del Perú, the Dirección General de Capitanías y Guardacostas (Marina de Guerra del Perú), the divers club of the Stadio Italiano de Chile, Santiago and the many cooperative fishermen and informants. In particular we thank Peruvian Vicealmirante and Director General Luis Bianchi Muñoz and the Director del Medio Ambiente, Capitán de Navío Carlos Lema Osoreo. Port monitoring in Peru was supported by the Gesellschaft zum Schutz der Meeressäuger (GSM), Columbus Zoo, Belgian Agency for Development Aid (AGCD), the Southwest Fisheries Science Center (NMFS, NOAA) and IdeaWild.

REFERENCES

- Aguayo, L.L. 1985. Progress report on small cetacean research in Chile. *J. Fish. Res. Board Can.* 32: 1123-43.
- Antoniotti, E., Portal, M. and Bacigalupo, J. 1998. Catálogo de publicaciones IMARPE. *Inf. Prog. Inst. Mar Perú* 78. 45pp.
- Cárdenas, J.C., Oporto, J. and Stutzin, M. 1986. Problemas de manejo que afectan a las poblaciones de cetáceos menores en Chile. Propositiones para una política de conservación y manejo. Segundo encuentro científico sobre el medio ambiente, Talca, 4-8 agosto 1986: 29-37.
- CMS, 1997. Guide to the Convention on the Conservation of Migratory Species of Wild Animals. UNEP/CMS Secretariat. 20pp.
- Findlay, K., Pitman, R., Tsurui, T., Sakai, K., Ensor, P., Iwakami, H., Ljungblad, D., Shimada, H., Thiele, D., Van Waerebeek, K., Huckle-Gaete, R., Sanino-Vattier, G.P. 1998. 1997/1998 IWC-Southern Ocean Whale and Ecosystem research (IWC-SOWER) blue whale cruise, Chile. Report to IWC. 39pp.
- García-Godos, A. 1992. Captura estacional de cetáceos menores en la caleta de Ancón. *Memoria X Congreso Nacional de Biología 02-07 agosto 1992*, Lima: 273-79.
- Gaskin, D.E., Read, A.J., Van Waerebeek, K., Reyes, J.C. and McKinnon, J.S. 1987. Exploitation and Biology of small cetaceans in the coastal waters of Peru and northern Chile. Final Report to UNEP and IUCN. 98pp.
- Guerra, C. 1984. Informe sobre manejo de mamíferos marinos en la II Región. *Sociedad de Vida Silvestre de Chile*, 39: 8-12.
- Guerra, C., Van Waerebeek, K., Portflitt, G., and Luna, G. 1987. Presencia de cetáceos frente a la segunda región de Chile. *Estud. Oceanol.* 6: 87-96.
- IWC, 1994. Gillnets and Cetaceans. W.F. Perrin, G.P. Donovan & J. Barlow (eds.). *Report of the International Whaling Commission Special Issue 15*. 629pp.
- Lescrauwaet, A.C. 1989. Dolphins as Chilean crab bait. *Whalewatcher* 23(4): 9-10.
- Lescrauwaet, A.C. and Gibbons, J. 1994. Mortality of small cetaceans and the crab bait fishery in the Magallanes Area of Chile since 1980. *Rep. Int. Whal. Commn. (Special Issue 15)*: 485-94.
- Mitchell, E.D. 1975. *Porpoise, Dolphin and Small Whale Fisheries of the World. Status and Problems*. IUCN Monogr. 3, IUCN, Gland, Switzerland. 129pp.
- Morris, C.G. (ed.) 1992. *Academic Press Dictionary of Science and Technology*. Academic Press, San Diego, London.
- Northridge, S.P. 1984. World review of interactions between marine mammals and fisheries. *FAO Fisheries Technical paper* 251, FAO Rome. 190pp.
- Northridge, S.P. 1996. A review of marine mammal bycatch observer schemes with recommendations for best practice. *JNCC Report*, no. 219. 42pp.
- Perrin, W.F. (ed.) 1988. *Dolphins, Porpoises, and Whales. An Action Plan for the Conservation of Biological Diversity: 1988-1992*. IUCN Gland, Switzerland. 30pp.
- Read, A.J., Van Waerebeek, K., Reyes, J.C., McKinnon, J.S. and Lehman, L.C. 1988. The exploitation of small cetaceans in coastal Peru. *Biological Conservation* 46:53-70.
- Reeves, R.R. and Leatherwood, S. 1994. *Dolphins, porpoises and whales. 1994-1998 Action Plan for the Conservation of cetaceans*. IUCN Gland, Switzerland. 92pp.
- Reyes, J.C. and Oporto, K. 1994. Gillnet fisheries and cetaceans in the Southeast Pacific. *Rep. Int. Whal. Commn. (Special Issue 15)*: 467-474.
- Reyes, J.C. and Van Waerebeek, K. 1992. Nuevos registros del género *Kogia* en Perú. In: Anales III Reunión de Trabajo de Especialistas en Mamíferos Acuáticos de América del Sur Montevideo Uruguay, 25-30 de Julio 1988: 54-61.

- Sielfeld, W. K. 1983. *Mamíferos marinos de Chile*. Universidad de Chile, Santiago. 199pp.
- Sielfeld, W., Venegas, C. and Atalah, A. 1977. Consideraciones acerca del estado de los mamíferos marinos en Chile. *Ans. Inst. Pat. Punta Arenas* (Chile) 8: 297-315.
- Torres, D., Yañez, J. and Cattán, P. 1979. Mamíferos marinos de Chile: antecedentes y situación actual. *Biol. Pesq. Chile* 11: 49-81.
- Torres, D., Oporto, J.A. and Cárdenas, J.C. 1990. Antecedentes y proposiciones para la conservación de los mamíferos marinos en Chile. *Ser. Cient. INACH* 40: 103-115.
- Van Waerebeek, K. 1986. Notes on the presence of Burmeister's porpoises and other small cetaceans on the coasts of northern Chile and southern Peru. Survey report: 27 May-10 June 1986. IUCN/UNEP Burmeister's porpoise project (unpublished). 6pp.
- Van Waerebeek, K. 1992. Records of dusky dolphins, *Lagenorhynchus obscurus* (Gray, 1828) in the eastern South Pacific. *Beaufortia* 43(4): 45-61.
- Van Waerebeek, K. 1993. Mortality of long-snouted common dolphins and other small cetaceans in coastal fisheries off Peru. Contract report to Marine Mammal Division Southwest Fisheries Science Center, La Jolla California, USA (unpublished). 7pp.
- Van Waerebeek, K. 1994. A note on the status of the dusky dolphins (*Lagenorhynchus obscurus*) off Peru. *Rep. Int. Whal. Commn. (Special Issue 15)*: 525-527.
- Van Waerebeek, K. and Guerra, C.G. 1986. Review of the distribution and status of the Burmeister's porpoise in Chile. Report: cetacean survey in II Region of Chile, August-September 1986. Universidad de Antofagasta, Instituto de Investigaciones Oceanológicas, Antofagasta, Chile. 25pp (unpublished).
- Van Waerebeek, K. and Reyes, J.C. 1986. Survey Report: Distribution and fishery interaction of the Burmeister's porpoise and other small cetaceans in northern Peru. IUCN/UNEP Burmeister's porpoise project (unpublished). 10pp.
- Van Waerebeek, K. and Reyes, J.C. 1990a. Catch of small cetaceans at Pucusana port central Peru during 1987. *Biological Conservation* 51(1): 15-22.
- Van Waerebeek, K. and Reyes, J.C. 1990b. Incidental catch and sightings of Burmeister's porpoise in Peru 1988-1989. Paper SC/42/SM5 presented to International Whaling Commission Scientific Committee, Noordwijkerhout Netherlands, June 1990. 24pp.
- Van Waerebeek, K. and Reyes, J.C. 1994a. Interaction between small cetaceans and Peruvian fisheries in 1988-1989 and analysis of trends. *Reports of the International Whaling Commission* (Special Issue 15): 495-502.
- Van Waerebeek, K. and Reyes, J.C. 1994b. Post-ban small cetacean takes off Peru: a review. *Reports of the International Whaling Commission* (Special Issue 15): 503-20.
- Van Waerebeek, K. and Reyes, J.C. 1994c. A note on incidental mortality of southern minke whales off western South America. *Reports of the International Whaling Commission* (Special Issue 15): 521-23.
- Van Waerebeek, K., Reyes, J.C., Luscombe, B.A. 1988. Revisión de la distribución de pequeños cetáceos frente al Perú. pp. 345-51. In: H. Salzwedel, A. Landa (eds.). Recursos y Dinámica del Ecosistema de Afloramiento Peruano. *Boletín del Instituto del Mar del Perú*, Callao, Vol. extraordinario.
- Van Waerebeek, K., Reyes, J.C., Read, A.J., McKinnon, J.S. 1990. Preliminary observations of bottlenose dolphins from the Pacific coast of South America. pp. 143-54. In: S. Leatherwood and R.R. Reeves (eds). *The Bottlenose Dolphin*. Academic Press, San Diego. 653 pp.
- Van Waerebeek, K., Canto, J., Gonzalez, J., Oporto, J. and Brito, J.L.. 1991. Southern right whale dolphins *Lissodelphis peronii* off the Pacific coast of South America. *Zeitschrift für Säugetierkunde* 56: 284-95.
- Van Waerebeek, K. 1994. A note on the status of the dusky dolphin in Peru. *Reports of*

the International Whaling Commission (Special Issue 15): 525-28.

Van Waerebeek, K., Van Bresseem, M.F., Félix, F., Alfaro-Shigueto, J., García-Godos, A., Chávez, L., Ontón, K., Montes, D. and Bello, R. 1997. Mortality of dolphins and porpoises in coastal fisheries off Peru and southern Ecuador in 1994. *Biological Conservation* 81: 43-49.

Van Waerebeek, K., Félix, F., Haase, B., Palacios, D.M., Mora-Pinto, D. and Muñoz-Hincapié, M. 1999. Inshore records of striped dolphin *Stenella coeruleoalba* from the Pacific coasts of South America. *Rep. Int. Whal. Commn.* In press.

TABLE CAPTIONS

Table 1. Results of limited fishing port monitoring for captured cetaceans on the central coast of Peru in 1995. Acronyms: L.obs= *Lagenorhynchus obscurus*; D.cap= *Delphinus capensis*; D.del = *Delphinus delphis*; Del.sp.= *Delphinus* sp.; T.tru= *Tursiops truncatus*; P.spi= *Phocoena spinipinnis*; Unid. =unidentified. Day (D), Month (M), Year (Y). Type information: landings of fresh animals (L); non-fresh remains (R), monitoring period (MO).

Table 2. Results of fishing port monitoring for captured cetaceans on the northern coast of Peru in 1995. Acronyms, ibidem as above.

Table 3. Results of fishing port monitoring for captured cetaceans in coastal Peru in 1996-98. Acronyms ibidem as above.

Table 4. Results of fishing port monitoring for captured cetaceans in Peru in 1999. Acronyms ibidem as above.

Table 5. Specimen evidence of small cetaceans killed in indirect and directed takes in Chile, 1995-99. In brackets specimen condition (I-V) when found. R. = Chilean Region (I-XII).

PORT	D	M	Y	TYPE	L.obs	D.cap	D.del	Del.sp	T.tru	P.spi	Other	Unid.	COMMENTS
CENTRAL COAST					1995								
Chancay	28	2	95	R/L	0	0	0	0	0	3	0	2	Fresh blubbers of 3 P.spi. on the beach, likely landed the same morning; meat and ribs of two unidentified cetacean.
Chancay	1	3	95	L	1	0	0	0	0	3	0	1	Biological samples taken of JAS-43, JAS-44, MFB-749, MFB-750. Meat seen of an unidentified cetacean.
Chancay	7	3	95	L	0	0	0	0	0	0	0	11	Meat and ribs of some 11 small cetaceans caught with rays by five artisanal gillnet boats.
Chancay	8	3	95	L	0	0	0	0	0	1	0	1	Both cetaceans caught with rays; MFB-751; 6 boats mostly fishing rays and dogfish 'tollo blanco'
Chancay	9	3	95	L	0	0	0	0	0	1	0	0	JAS-46 caught with rays; four boats are landing their catches.
Chancay	19	3	95	N									Landing of 6 P.spi. was reported by the beach 'sergeant' (sargento de playa).
Chancay	22	3	95	-	0	0	0	0	0	0	0	0	Boats mostly fishing for rays.
Chancay	23	3	95	L/R	0	0	0	0	0	2	0	0	Porpoise JAS-48 was seen landed; a relatively fresh porpoise head was found on the beach; boats fishing rays.
Chancay	29	3	95	L	0	0	0	0	0	1	0	0	Porpoise MFB-752 landed in the afternoon; reportedly another P.spi was landed before the observer's arrival (7h50 am).
Chancay	30	3	95	-	0	0	0	0	0	0	0	0	7-9 boats, mostly fishing rays; Ecological Police visited port, left poster informing on the protection of dolphins and turtles.
Chancay	31	3	95	L/R	35	5	0	0	4	9	0	0	2 porpoises (JAS-50, -52) landed at the fishmarket. Large quantity of skulls/heads found on the beach.
Chancay	6	5	95	L	0	0	0	0	0	0	0	1	Meat of an unidentified cetacean; five boats fishing for rays. Apparently cetaceans were landed on 4 and 5 May.
Chancay	10	5	95	R	5	0	0	0	0	0	0	0	The animals were caught by purse-seiner (bolichera) on 8 May; JAS found the heads on 10 May.
Chancay	11	5	95	L	0	1	0	0	0	1	0	0	Both (JAS-56 and -57) were already cut when seen. Three boats fishing rays.
Chancay	18	5	95	-	0	0	0	0	0	0	0	0	Only one boat landing catches. No cetaceans.
Chancay	29	5	95	-	0	0	0	0	0	0	0	0	No cetaceans seen landed.
Chancay	13	9	95	-	0	0	0	0	0	0	0	0	Boat owner and fishmonger were fined for trading cetacean meat; no catches seen landed.
Chancay	14	9	95	-	0	0	0	0	0	0	0	0	No cetaceans seen landed.
Chancay	20	9	95	-	0	0	0	0	0	0	0	0	No cetaceans seen landed.
Pucusana	2	1	95	B	0	0	0	0	0	1	0	0	A Burmeister's porpoise (JAS-41) seen in a boat; was not landed.
Pucusana	18	2	95	R	0	0	0	0	1	0	0	0	Found on Naplo beach, complete, but musculature removed for meat (KVV-2412).
Pucusana	29	3	95	R	0	0	0	0	1	0	0	0	Specimen found stranded on the beach (KVV-2417), clear net marks on snout and tail, one fluke cut.
Pucusana	22	4	95	B	2	0	0	0	0	0	0	0	Told by local informant; JAS-53 and -54 were confirmed in a fishing boat.
Pucusana	14	10	95	R	1	0	0	0	0	0	0	0	Entire animal (MFB-753) found on the beach, but with dorsal musculature removed.
Cerro Azul	16	2	95	R	15	0	0	0	5	0	0	1	Besides 15 heads/calvaria, blubbers of 2 L.obs found. Unidentified: one skull and the postcranials of 9 specimens, 2 blubbers and the viscera of 5 cetaceans were observed.
Cerro Azul	23-30	9	95	MO	0	0	0	0	0	0	0	0	Mostly inshore fishery (pejerrey, mismis, mojarilla); no cetaceans recorded.
Cerro Azul	1-12	10	95	MO									
Cerro Azul	2	10	95	B	0	0	0	0	0	0	0	2	Meat of 2 unidentified cetaceans used as bait. Caught alongside sharks by two offshore boats.
Cerro Azul	5	10	95	B	0	0	0	0	0	0	0	3	Meat of 3 unidentified cetaceans used as bait. Caught by two offshore boats alongside sharks and bonitos.
Cerro Azul	8	10	95	MO	0	0	0	0	0	0	0	(8?)	Fishermen of two offshore-going boats told observer of 6 and 2 captured cetaceans, but 'had dumped them'
Cerro Azul	12	10	95	N	0	0	0	0	0	0	0	2	Fishermen (reliable) reported catching 2 cetaceans with sharks; used for food; 5 other boats landed sharks and rays.
Cerro Azul	1-19	11	95	MO									Inshore and offshore fisheries
Cerro Azul	2	11	95	N	0	0	0	0	0	(2?)	0	(4?)	Fishermen reported 1 porpoise and 4 unid. dolphins (possibly L.obs) caught by the same boat, with sharks.
Cerro Azul	8	11	95	R	0	0	0	0	0	0	0	2	Meat of 2 unidentified cetaceans used as bait; caught by one offshore boat with sharks and bonito.
Cerro Azul	9	11	95	MO	0	0	0	0	0	0	0	(19?)	Fishermen of one offshore boat reported having 'discarded' (possibly utilized as bait) 19 small cetaceans.
Cerro Azul	19	11	95	L	1	0	0	0	0	0	0	0	JAS-61 caught with sharks, swordfish
Tambo de Mora	25	9	95	-	0	0	0	0	0	0	0	0	Rays and some sharks were landed.
Tambo de Mora	26	9	95	-	0	0	0	0	0	0	0	0	Rays and guitar fishes were landed.
Tambo de Mora	29	9	95	-	0	0	0	0	0	0	0	0	Rays and guitar fishes were landed.
San Andres	18	3	95	R	0	0	0	0	1	3	0	0	1 calvaria and 2 mandibulae of P.spi (KVV-2414 till -2416) and 1 skull of T.tru (JAS-47) on beach north of fishmarket.
Laguna Grande	26	6	95	R	1	0	0	0	0	0	0	0	Observer A.Garcia-Godos, CEPEC
<i>Regional total</i>					61	6	0	0	12	25	0	24	N =104 (identified)
					(%)	(58.7)	(5.8)	(0)	(0)	(11.5)	(24.0)	(0)	

Table 1.

PORT	D	M	Y	TYPE	L.obs	D.cap	D.del	Del.sp.	T.tru	P.spi	Other	Unind.	Comments
1995													
NORTHERN COAST													
Puerto Pizarro	20	1	95	-	0	0	0	0	0	0	0	0	Cetaceans infrequently taken, or not at all. Fisheries concentrate on molluscs and crustaceans.
La Cruz	20	1	95	-	0	0	0	0	0	0	0	0	Cetaceans seem infrequently taken and people are aware of the prohibition.
Zorritos	18	1	95	R	0	0	0	0	0	0	0	1	Observers arrived late. Remains found close to fishmarket. Small cetaceans are taken from time to time.
Zorritos	20	1	95	R	0	0	1	0	0	0	0	0	Calvaria JAS-42 collected. One odontocete reported landed the day before.
Cancas	17	1	95	-	0	0	0	0	0	0	0	0	No evidence of cetaceans, but observers arrived late for today's landings.
Mancora	18	1	95	R	0	0	0	1	0	0	0	0	Partial calvaria on beach; unidentified cetacean postcranials were seen in a hole in the ground.
Mancora	2	12	95	R	0	0	0	0	0	0	1	0	Juv. <i>Ziphius cavirostris</i> (MFB-754) stranded alive but wounded, on 12 Nov.; entanglement in trap net.
Los Organos	17	1	95	L?	0	0	0	0	0	1?	0	0	Observers were told that 1 porpoise was landed earlier and that people were fighting for the meat.
Los Organos	18	1	95	-	0	0	0	0	0	0	0	0	Fishermen told observers that cetacean meat is commonly used as bait.
Cabo Blanco	19	1	95	-	0	0	0	0	0	0	0	0	Reportedly locals 'do not fish cetaceans', well aware of prohibition. No landings observed (late arrival).
Talara	19	1	95	R	0	0	2	0	2	0	0	0	Heads, one relatively fresh, of bottlenose dolphin; two calvariae of D.del collected (MFB-744, 745); indications are of frequent dolphin landings. Quasi-official 'cortador de chanchos' (dolphin butcher).
Matacaballo	13	1	95	R	0	2	0	0	0	0	0	0	Skulls, postcranials and flipper found on beach near landing site; one skull (MFB-741) collected.
Constante	13	1	95	R	0	0	0	0	0	3	0	0	Two skulls and one complete skeleton found on the beach.
Constante	14	1	95	R	0	0	0	1	0	4	0	2	Skulls/calvariae of 4 P.spi plus tail of a P.spi. One unidentified specimen is likely T. tru.
Constante	15	1	95	R	0	0	0	0	0	3	0	0	3 skulls and postcranials of one P.spi. on the northern beach.
Parachique	14	1	95	R	0	1	0	0	0	0	0	1?	1 skull of D.cap found on beach; plus postcranials of an unident. species
Bayovar	14	1	95	R	0	7	1	1	1	18	0	3	P.spi: 2 blubbers/flippers, 1 blubber, 4 tails, 1 skeleton, mandibulae (4 pairs); Delphinus: mandibulae (6); Unident. cetacean: 2 skulls and one blubber.
Bayovar	15	1	95	-	0	0	0	0	0	0	0	0	Info from fishmarket: Coryphaena are fished with longlines. No dolphins landed.
Bayovar	5	4	95	R	0	0	0	0	1	1	0	0	Cervicals of P.spi. (KVW-2418) collected at port; postcranials of T.tru (KVW-2419) found on the beach.
San José	4	11	95	R	0	1	0	1	0	0	0	0	Calvariae of a D.cap (KVW-2422) and of a likely D.del (KVW-2421) collected.
San José	5	11	95	R	0	2	0	0	0	0	0	0	Calvariae (KVW-2423 and -2424) gathered from beach at port.
San José	7	11	95	R	0	0	0	0	0	1	0	0	Decomposed head (KVW-2428).
San José	8	11	95	L	0	0	0	0	0	1	0	0	KVW-2427, netted in sink gillnets.
San José	9	11	95	R	0	0	0	0	0	1	0	0	Calvaria (KVW-2428), found north of port.
San José	11	11	95	L	0	0	0	0	0	4	0	0	4 P.spi taken together (RJD-1 till -4) by a single boat.
San José	17	11	95	L	0	0	0	0	0	1	0	0	RJD-5 caught with rays; head and fins were cut-off in an attempt to make carcass look like a shark.
Pimentel	5	11	95	R	0	1	0	0	0	0	0	0	Calvaria (KVW-2425) collected.
Santa Rosa	5	11	95	R	0	1	0	0	0	0	0	0	Partial skeleton (KVW-2426).
Pacasmayo	10	6	95	R	0	0	0	0	0	1	0	0	Fresh blubber (cut) washed on the beach.
Pacasmayo	11	6	95	-	0	0	0	0	0	0	0	0	No cetaceans seen landed. Fishermen are fishing in this period.
Salaverry	27	5	95	R	0	0	0	2	0	5	0	0	Besides the remains considered, the lungs of 1 P.spi were also seen.
Salaverry	9	6	95	R	1	0	0	2	0	16	0	8	Remains include fresh heads, skulls, calvariae, unidentified blubbers and viscera.
Salaverry	10	6	95	-	0	0	0	0	0	0	0	0	No cetaceans landed.
Salaverry	8	12	95	R	0	1	0	0	0	6	0	0	D. cap (JAS-63); fresh heads of P.spi (one collected, JAS-62).
Chimbote	12	6	95	L	0	0	0	0	0	10	0	0	Fresh animals taken with rays and soles. Tissues sampled: JAS-55, -59, -60, KOS-372.
Chimbote	13	6	95	-	0	0	0	0	0	0	0	0	Observers present from 05:30 till 08:30 am. No cetaceans seen landed.
Regional total					1	16	4	8	4	75	1	14	N =109
%					(0.9)	(14.7)	(3.7)	(7.3)	(3.7)	(68.8)	(0.9)		

Table 2.

PORT	D	M	Y	TYPE	L.obs	D.cap	D.del	D.sp	T.tru	P.spi	Other	Unid.	Comments
								1996					
NORTHERN COAST													
San José	7-14	10	96	MO									
San José	11	10	96	L	0	0	0	0	0	1	0	0	LMG-1 caught in unspecified gillnet
San José	13	10	96	L	0	0	0	0	0	1	0	0	RBC-61 caught in unspecified gillnet
Salaverry	17	7	96	L	0	0	0	0	0	2	0	0	Porpoises (RBC-50, -51) reportedly taken in artisanal seiners (<i>bolicheras</i>)
Salaverry	20	7	96	L	0	0	0	0	0	1	0	0	Porpoise (RBC-52) apparently caught in artisanal seiner (<i>bolichera</i>)
Salaverry	11	8	96	L	0	0	0	0	0	1	0	0	RBC-55
Salaverry	mid	10	96	R	0	0	0	0	0	3	0	0	JAS-70, -71, -72 (fresh heads).
Salaverry	3-12	12	96	MO									
Salaverry	3	12	96	L	0	0	0	0	0	1	0	0	RBC-69
Salaverry	7	12	96	L	0	0	0	0	0	1	0	0	LMG-2
Salaverry	9	12	96	L	0	0	0	1	0	0	0	0	FOC-2
Chimbote	8	8	96	L	0	0	0	0	1	0	0	0	RBC-54
Regional total					0	0	0	1	1	11	0	0	N = 13 (identified)
CENTRAL COAST													
Pucusana	29	2	96	R	0	0	0	0	0	1	0	0	Fresh blubber remains (MFB-755) found on Naplo beach.
Cerro Azul	15-23	1	96	MO									Artisanal fisheries (nearshore and coastal offshore).
Cerro Azul	18	1	96	L	0	0	0	0	0	1?	0	1?	Fishermen told observer, animals not seen; unidentified may be L.obs.
Cerro Azul	19	1	96	L	0	0	0	0	0	1	0	0	JAS-64 with dogfish (tollo mamita), rays and guitarfish landed; inshore gillnet fishery.
								1997					
Salaverry	15-28	2	97	R	0	0	0	0	0	8	0	0	JAS-65 till -72 collected during sealion census in Feb. 97; JAS-65 till -69 fresh heads
								1998					
NORTHERN COAST													
Salaverry	26	11	98	R	4	19	0	0	0	9	0	0	Heads (JAS-81 till -86, MFB-760, -761, -763, 764,-765) and skulls/calvaria; skin samples. Other remains (blubber/viscera and postcranials) were also seen but not detailed.
Chimbote	13	8	98	R	0	0	0	1	0	4	0	0	Relatively fresh heads found on the beach close to fishmarket (JAS-76; MFB-758, 759). Other miscellaneous remains were also observed.
Chimbote	26	11	98	R	1	2	0	0	0	3	0	2	Heads (JAS-79, -80, -87, -88; skin samples); 1 blubber, 1 respiratory tract, 1 flipper (all unid.).
Regional total					5	21	0	1	0	16	0	2	N = 43 (identified)
					(%)	(11.6)	(48.8)	(0)	(2.3)	(0)	(37.2)	(0)	
CENTRAL COAST													
Pucusana	24	5	98	R	0	0	0	0	0	0	0	1	Freshly cut stomach of an unidentified small cetacean washed ashore on Naplo beach.
Pucusana	16	7	98	R	0	1	0	0	0	0	0	0	Head, backbone & viscera on beach; musculature removed (MFB-756); young animal.
Pucusana	18	7	98	R	0	1	0	0	0	0	0	0	Head found on the beach, young animal (MFB-757).
Pucusana	30	9	98	R	0	0	0	0	1	0	0	0	Entire but cut specimen (JAS-78) found on Naplo beach.
Pucusana	early	11	98	R	0	0	0	0	0	0	0	1	Blubber of an unidentified cetacean.
Pucusana	13	12	98	R	0	0	0	0	0	0	0	1	Blubber of an unidentified cetacean seen on Naplo beach.
San Andres	26	5	98	R	2	0	0	0	0	0	0	2	L.obs (JAS-73 and -74) were butchered.
Regional total					2	2	0	0	1	0	0		N= 5 (identified)

Table 3.

Date	PORT	Type	L.obs	D.cap	D.del	Del.sp.	T.tru	P.spi	Other	Unid.	Observ	Comments	
1999													
NORTHERN COAST													
26-Jan-99	Zorritos	beach/ fish -	0	0	0	0	0	0	0	0		Beach survey and visit to fishmarket late in the afternoon. Artisanal fisheries.	
28-Jan-99	Mancora	beach/ fish -	0	0	0	0	0	0	0	0		Beach survey and visit to fishmarket in the morning. Artisanal and industrial fisheries.	
23-Jan-99	Los Organos	beach/ fish -	0	0	0	0	0	0	0	0		Beach survey and visit to fishmarket late afternoon. Artisanal and industrial fisheries.	
23-Jan-99	Talara	beach	R	0	1	0	7	3	2	0	4	JAS, MFB tuno, treshner shark, horse mackerel	
22-Jan-99	Constante	beach	R	0	0	0	1	0	0	0	5	JAS Beach survey. MFB-776, till -779 and JAS-100. Besides the 4 unident. specimens indicated 2 vertebral columns and 1 old blubber (unidentified) were also seen.	
22-Jan-99	Bayovar		R	0	3	0	2	1	0	0	0	JAS, MFB Beach survey between 'Las Delicias' and Constante. <i>Delphinus</i> sp. is probably D.cap. (JAS-96) while two of the unidentified are probably T.tru.	
21-Jan-99	Paita		R	0	0	0	0	1	0	0	0	JAS Besides the remains mentioned, observers saw 4 vertebral of unidentified cetaceans. Specimens are: JAS-95 and -99 and MFB-770 till -772 and MFB-782.	
19-Mar-99	Pacasmayo		R	0	1	0	0	0	7	0	0		JAS-94 (skin sample) found underneath garbage on the small beach (~300m)
19-Jan-99	Salaverry		R	1	0	0	0	0	5	0	1		Skulls (3 status V ; 4 status IV) on beach just north of wharf. Skull of D.cap.
18-Mar-99	Salaverry		R	0	1	0	0	0	8	0	1		Remains found in dump. In addition heads and calvaria of 4 D.cap, probably recorded in Dec. 1998; and remains of 10 other unident. cetaceans (blubbers, dorsal fin, tails, postcranials and mandibulae).
20-Jan-99	Chimbote	-		0	0	0	0	0	0	0	0		Butchered porpoise carcasses (7 of status II) ~complete in dump; unid. delphinid carcass (no skull)
19-Jan-99	Chimbote		R	0	1	0	1	2	2	0	2		Observers at fishmarket from 4:30 - 7:30am; are told that dolphins and cetaceans are cut in boats.
17-Mar-99	Chimbote		R	0	0	0	0	0	0	0	1		Found on small beach alongside fishmarket. Besides, heads of 2 other D. cap and 1 L.obs thought to have been counted in December 1998.
17-Mar-99	Casma	-		0	0	0	0	0	0	0	0		Delphinid intestinal tract, lungs (II) on beach beside wharf . Beach had been cleaned some days ago.
16-Mar-99	Culebras		R	0	0	0	0	0	0	0	1		Fishermen moved out because port sanded in due to El Nino rains (river sedimentation).
	Regional total			1	7	0	11	7	24	0			Unidentified broken delphinid vertebrae (V) near the new pier.
		(%)		(2)	(14)	(0)	(22)	(14)	(48)	(0)			N = 50 (identified) (100)
CENTRAL COAST													
15-Mar-99	Huarmey		R	1	5	0	2	0	0	0	0		Skulls (IV-V) in Puerto artesanal; Delphinus broken rostra only. Cutmarks obvious; remains hidden in cave .
15-Mar-99	Huarmey		R	0	5	0	0	1	0	0	0		Skulls on the beach of the Puerto industrial. Other remains as vertebrae, ribs and backbones.
15-16 Mar 99	Supe		R	0	0	0	0	0	1	0			Skull (V) on beach .
3 Feb 99	Ancon		R	0	1	0	1	2	1	0	0	JAS, MFB Beach survey north of fishmarket; both T.truncatus were young individuals. JAS-106, MFB-783 till -785. besides, the remains of up to 7 cetaceans were observed.	
17-Jan-99	Pucusana	-											Informant told KVVW that dolphins continue to be caught, some in gillnets some harpooned, used as bait for the shark fishery.
22-Jan-99	Pucusana		L	0	0	0	0	0	0	0	3		3 dolphins (without head) reportedly seen in fishmarket at night during the 1st half of January 99.
23-24 Jan 99	Pucusana		L	1	0	0	0	0	0	0	4	KVVW KVVW 5 gillnetted duskies in boat, kept for bait. One fresh head was received (KVVW-4000); skin samples of this animal and the others were obtained (KVVW-4001 till 4005).	
07-Feb-99	Pucusana		B	0	0	0	0	0	0	3			Fluke parts of 3 pilot whales provided by informant; captured in gillnets off Playa Asia; skin samples.
25-Jan-99	Cerro Azul		R	12	4	0	0	7	5	0	1		Besides, one anterior postcranial of 1 T.tru and postcranial of an unid. dolphin were also seen on beach.
	Regional total			14	15	0	3	10	7	3			Market worker told KVVW that dolphin meat is still consumed locally, the remainder used for shark bait
		(%)		(26.9)	(28.8)	(0)	(5.8)	(19.2)	(13.5)	(5.8)			N = 52 (identified) (100)

Table 4.

Species	Cat N°	Locality	Position	Date	Collector	Voucher material	Comments
<i>Mesoplodon peruvianus</i>	GPS004	Playa Choros, IV R.	29°15'S,71°26'W	Jan-95	Guillermo Ruz	Calvaria (V)	Beach pick-up; evidence in bone of two gunshots through head
<i>Delphinus capensis</i>	GPS005	Playa Choros, IV R.	29°15'S,71°26'W	Jan-95	Guillermo Ruz	Calvaria (V)	Beach pick-up; at fishing port of Punta de Choros
<i>Phocoena spinipinnis</i>	IRD001	south of Bahia Inglesa	27°10'S,70°55'W	18-Feb-99	Ignacio Rubilar	Skull, teeth, photos, ext. measurements	Stranded with multiple cut marks and flukes severed
<i>Phocoena spinipinnis</i>	GPS003	port Punta de Choros IV R.	29°14'S,71°28'W	17-Feb-98	G. P. Sanino	Skull, teeth, testis, eye, blood, skin blubber, photos, video	Carcass (II) with net marks butchered openly on wharf ; meat reportedly used for human consumption.
<i>Phocoena spinipinnis</i>	[none]	Playa Choros, IV R.	29°15'S,71°26'W	1995	Guillermo Ruz	Photos	Found on beach with large wound in anterior thorax; possibly taken in long-lines set from shore. Specimen utilized by locals.
<i>Kogia breviceps</i>	GPS002	Playa Sto.Domingo, V R.	31°41'S,71°38'W	1 Apr 95	G. P. Sanino	Skeleton, teeth, tissue, photos	Stranded (IV); pectoral fin sliced off. SL= 3.4m
<i>Kogia breviceps</i>	GPS006	offshore SW of Iquique II Region	22°23'S,71°15'W	20-Dec-97	GPS and KVVW	Mandible (no teeth), tissue, photos	Carcass (IV) found floating in high intensity fisheries area during 1997-98 IWC SOWER blue whale cruise
<i>Kogia breviceps</i>	GPS007	San Antonio, V R.	34°10'S,71°38'W	1-7 Nov 98	Jose Luis Brito	Teeth, tissue, stom. cts.(squid beaks), nematodes.	Stranded in vicinity of fishing port; skeleton in Museo Regional de San Antonio.
<i>Globicephala melas</i>	GPS008	Caleta Chanaral, III R.	29°04'S,71°29'W	01-Feb-99	G. P. Sanino	Skeleton, teeth, skin, partial heart photos, video	Stranded (III), harpoon wounds; + witness evidence directed take; parts muscle & blubber removed

Table 5.