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# **Cetaceans of Venezuela: Their Distribution and Conservation Status**

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**Abstract.**—Sighting, stranding, and capture records of whales and dolphins for Venezuela were assembled and analyzed to document the Venezuelan cetacean fauna and its distribution in the eastern Caribbean. An attempt was made to confirm species identification for each of the records, yielding 443 that encompass 21 species of cetaceans now confirmed to occur in Venezuelan marine, estuarine, and freshwater habitats. For each species, we report its global and local distribution, conservation status and threats, and the common names used, along with our proposal for a Spanish common name. Bryde's whale (*Balaenoptera edeni*) is the most commonly reported mysticete. The long-beaked common dolphin (*Delphinus capensis*) is the most frequent of the odontocetes in marine waters. The boto or tonina (*Inia geoffrensis*) was found to be ubiquitous in the Orinoco watershed. The distribution of marine records is consistent with the pattern of productivity of Venezuelan marine waters, i.e., a concentration at 63°07'W through 65°26'W with records declining to the east and to the west. An examination of the records for all cetaceans in the Caribbean leads us to conclude that seven additional species may be present in Venezuelan waters.

## Cetaceans of Venezuela: Their Distribution and Conservation Status

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## Introduction

The cetaceans inhabiting the Caribbean are poorly known (Jefferson and Lynn, 1994). A few taxonomic papers on the Windward Islands region (largely summarized in Caldwell et al., 1971a) were a consequence of studying whaling in the area (Price, 1985). Most of the other publications have focused on a particular species or on sightings or strandings at a particular locality.

Surveys have been limited in scope and duration. Erdman et al. (1973) first surveyed the area's cetacean fauna, concentrating on the northeastern Caribbean. They identified seven species and noted the presence of twenty more that were not identified. Later van Bree (1975) confirmed 21

species in the southern Caribbean and estimated that an additional four would eventually be found. Casinos (1986) reported 24 confirmed species and predicted one more for the southeast Caribbean. Mignucci-Giannoni<sup>1</sup> reported 24 species for Puerto Rico and the Virgin Islands. Cuervo Díaz et al. (1986) cited eight confirmed species and 15 expected for the Colombian Caribbean and two species for the Colombian rivers. Prieto Rodríguez (1988) cited nine confirmed species for that same region. Vidal (1990) expanded the list to 15 ma-

<sup>1</sup> Mignucci-Giannoni, A. A. 1996. Marine mammals strandings in Puerto Rico and the United States and British Virgin Islands. Department of Marine Sciences, University of Puerto Rico, Mayaguez, 247 p., unpubl. doctoral dissertation.

rine species and predicted that at least one more would be found. Debrot et al. (1998) reviewed the records for the Leeward Dutch Antilles and confirmed 13 records for those islands. Examination of the distributional records of some species has led many investigators to predict that others are present in the Caribbean although they remain unreported (Caldwell et al., 1971a; van Bree, 1975; Cuervo Díaz et al., 1986; Perrin and Gilpatrick, 1994; Perrin and Hohn, 1994; Perrin et al., 1994a; Perrin et al., 1994c).

Although there have been some systematic aerial surveys of the area (e.g., Meade and Koehnken, 1991; Notarbartolo di Sciarà<sup>2</sup>), they have been of limited duration. Other sources of knowledge about Venezuela's cetacean fauna are sparse in comparison to some other regions of the world because of two major factors: absence of an organized whaling industry and lack of interest by local naturalists. Foreigners have generated most of the information on cetaceans in Venezuela (Table 1). Romero et al. (1991) attempted the first comprehensive compilation of records of Venezuelan cetaceans, documenting 17 species. Later, Romero et al. (1997b) showed that cetacean utilization by Venezuelan fishermen was much more extensive than previously known, thus providing a basis for evaluating threats to the conservation status of Venezuelan species.

This paper summarizes all the records that we could locate or were made available to us regarding cetaceans in Venezuelan marine and freshwater environments. We present 443 records comprising reports of about 5,000 individual animals spanning 21 confirmed species. We interpret them, where possible, to suggest the conservation status of these species. This report updates and supplants Romero et al. (1991) and we therefore encourage referring to and citing this document rather than the earlier one.

## Materials and methods

### Area of coverage

Venezuelan coastal localities include both Caribbean and North Atlantic waters. We include all inland waters within Venezuela and marine waters within the territorial sea, namely the 670,000 km<sup>2</sup> of maritime space (Territorial Sea + Contiguous Zone + Inner Waters + Continental Margin + Continental Shelf + Exclusive Economic Zone) as defined by the Law of the Sea (cf. Romero, 1990).

### Data compilation

Data were compiled from both scientific and nontechnical literature, from collections of museums and similar institutions, and from unpublished sightings by reliable observers, including those using photographs or videotape recordings (Table 2). These embrace, but are not limited to, records of stranded, accidentally caught, and intentionally captured animals (see Romero et al., 1997b). We include in this compilation only those reports from scientific publications and popular accounts that provide sufficient information, such as clear descriptions, drawings, or photographs, to permit unambiguous species identification. Recognizing the problems of using sighting records for species identification (Evans, 1980), we include only those by qualified observers reporting very distinctive species such as humpback whales (*Megaptera novaeangliae*), killer whales (*Orcinus orca*), and sperm whales (*Physeter macrocephalus*). Original sources were used wherever possible; secondary sources are noted in brackets. All unpublished material has been deposited in the libraries of the International Whaling Commission (IWC, Cambridge, United Kingdom) and the University of Miami (Coral Gables, Florida).

We tried to independently verify the identification of every specimen in Venezuelan collections. Appendix 1 shows the list of institutions from which specimens were studied, their abbreviations and locations. We are aware there may be additional information at some institutions that was not made available to us [e.g., the unverified preliminary findings from the Caribbean Stranding Network (P.R.) reported by Díaz et al. (1995)].

### Taxonomic arrangement

We follow the most recent cetacean species list and taxonomic order recognized by the IWC Scientific Committee (Perrin et al., 1994b) except for the position of the family Physeteridae where we follow Heyning (1995). Taxonomic ranks above the genus level follow Barnes et al. (1985). For the genus *Stenella*, we follow Perrin et al. (1987). Discussion of taxonomic status of species is included only when relevant to the nomenclature used in this paper. Taxonomic names of species follow Rice (1998) and the conventions of nomenclature and format are as recommended by the International Commission for Zoological Nomenclature.

### Common or vernacular names

English names follow standard nomenclature (Perrin et al., 1994b). Spanish names are given in alphabetical order for each species. Those names that are used in Venezuela are preceded by an asterisk. For names used

<sup>2</sup> Notarbartolo di Sciarà, G. 1979. Progress report July and August 1979. Hubbs-Sea World Research Institute, 1700 South Shore Rd., San Diego, California 92109, 2 p.

**Table 1**  
History of major developments in Venezuelan cetology.

| Date            | Development   | Source                             |
|-----------------|---|------------------------------------|
| 6,000–2,000 ybp | Utilization of cetaceans by aboriginals   | Sanoja, 1989                       |
| 1498            | First cetacean sighting by a European. C. Columbus names the Paria Gulf as “Golfo de la Ballena” (“Whale’s Gulf”), a feeding ground for whales.                 | Columbus, 1498                     |
| 1647            | First written description of a cetacean ( <i>Inia geoffrensis</i> ).  | de Carvajal, 1648                  |
| 1755            | First scientific description of <i>I. geoffrensis</i> , by P. Löfling. Manuscript remains unpublished to date.  | Romero et al., 1997a               |
| 1782            | First publication of a description of a Venezuelan cetacean ( <i>I. geoffrensis</i> ), by S. Gilij.   | Gilij, 1782                        |
| 1814            | Publication of von Humboldt’s encounter with <i>I. geoffrensis</i> , and possibly <i>Sotalia fluviatilis</i> and <i>Stenella longirostris</i> .                 | von Humboldt, 1814                 |
| 1841            | First report of <i>Physeter macrocephalus</i> . First report of a stranded cetacean for Venezuela.  | Codazzi, 1841                      |
| 1843            | First report of whaling off the coast of Venezuela. Probably <i>P. macrocephalus</i> .  | Anonymous, 1843                    |
| 1853            | First report of whaling of <i>Megaptera novaeangliae</i> .  | Mitchell and Reeves, 1983          |
| 1868            | First report for presence of <i>Delphinus capensis</i> (f. <i>delphis</i> ).  | Ernst, 1868                        |
| 1873            | First report of a balaenopterid, probably <i>Balaenoptera edeni</i> .   | Ernst, 1877                        |
| 1884            | First report of commercial use of dolphin products.   | Ernst, 1884                        |
| 1891            | First report of <i>Steno bredanensis</i> and, possibly, <i>Globicephala macrorhynchus</i> .   | Ernst, 1891                        |
| 1894            | Report of whaling on <i>Orcinus orca</i> .  | Reeves and Mitchell, 1988          |
| 1912            | First confirmed report of <i>Sotalia fluviatilis</i> .  | Osgood, 1912                       |
| 1921            | First report of <i>Pseudorca crassidens</i> .   | Miller, 1921                       |
| 1947            | First technical report on dolphin fisheries in Venezuela.   | Fiedler et al., 1947               |
| 1954            | First report of <i>Balaenoptera physalus</i> , <i>Megaptera novaeangliae</i> , and <i>Tursiops truncatus</i> .  | Anduze, 1954                       |
| 1963            | First confirmed report of <i>B. physalus</i> .  | Moore, 1968                        |
| 1966            | First report of <i>Stenella frontalis</i> .   | Mitchell, 1970                     |
| 1966            | First confirmed report of <i>T. truncatus</i> .   | Caldwell and Caldwell, 1971b       |
| 1972            | First confirmed report of <i>S. longirostris</i> and <i>D. capensis</i> .   | van Halewijn and van Bree, 1972    |
| 1974            | First confirmed report of <i>Balaenoptera borealis</i> and <i>Balaenoptera edeni</i> .  | Mitchell and Kozicki <sup>1</sup>  |
| 1978            | First confirmed report of <i>M. novaeangliae</i> .  | Winn and Winn, 1978                |
| 1980            | First report of <i>G. macrorhynchus</i> .   | Casinos and Bou, 1980              |
| 1981            | First published report of <i>Ziphius cavirostris</i> .  | Casinos, 1981                      |
| 1981            | Pilleri and Pilleri suggest the presence of <i>Inia geoffrensis geoffrensis</i> and <i>I. g. humboldtiana</i> in Venezuela.                                     | Pilleri and Pilleri, 1982          |
| 1990            | First report of <i>Stenella clymene</i> in Venezuela.   | Agudo, 1990                        |
| 1991            | First list of Venezuelan cetaceans based on actual records. First records for <i>Grampus griseus</i> , <i>Steno bredanensis</i> , and <i>Feresa attenuata</i> . | Romero et al., 1991                |
| 1993            | First confirmed report of <i>B. physalus</i> .  | Bolaños Jiménez and Lira, 1993     |
| 1993            | First confirmed record of <i>O. orca</i> .  | Rodríguez et al., 1993             |
| 1997            | First comprehensive analysis of cetacean fisheries.<br>First record of <i>S. coeruleoalba</i> .   | Romero et al., 1997b<br>This paper |

<sup>1</sup> Mitchell, E. D., and V. M. Kozicki. 1974. The sei whale (*Balaenoptera borealis*) in the northwest Atlantic Ocean. IWC/SC/SP74/32, Arctic Biological Station, Fisheries and Marine Service, Department of the Environment, Box 400, Ste. Anne de Bellevue, Province de Quebec, Canada, 48 p., unpubl. manuscr.

exclusively in a particular region, the region is identified in parentheses.

Our sources for common or vernacular names in Spanish, and for Venezuela in particular, are interviews with local fishermen, the scientific bibliography (mostly Casinos, 1986; Vidal, 1990; Romero et al., 1991; Romero

and Agudo, 1993), and popular literature written in Spanish on natural history in general and cetaceans in particular. There is not, however, a standard nomenclature for Spanish names. Some common names are literal translations from English that make little sense in Spanish. Others are used exclusively in one country or region.

**Table 2**

The locations for record numbers can be found on the species maps (Figs. 3 through 19). Marine records for Venezuela are given state-ized. State names are not used for offshore records nor for islands within the “Dependencias federales” (federal territories not assigned locality corresponds to the confluence of both rivers. A river followed by a non-capitalized name refers to a town and/or geographical If there is more than one record for a locality, they are ordered chronologically. When a locality is unspecific (e.g., “Venezuela” or “eastern Venezuela are provided when available. Within any one longitude, records are arranged by latitude from south to north. For identical garita Island”), then no coordinates are assigned.

| Record | Species                 | Locality  | Lat.<br>°N | Long.<br>°W |
|--------|-------------------------|---|------------|-------------|
| 1      | <i>B. borealis</i>      | SUCRE: E. San Juan de Las Galdonas                        | 10 44      | 62 50       |
| 2      | <i>B. borealis</i>      | N. ESPARTA: NE. Punta Ballena, Isla de Margarita          | 11 03      | 63 44       |
| 3      | <i>B. borealis</i>      | N. ESPARTA: E. Islote Farallón Blanco, Isla de Margarita  | 10 58      | 63 45       |
| 4      | <i>B. edeni</i>         | N. ESPARTA: NE. Islote Farallón Blanco, Isla de Margarita | 11 00      | 63 44       |
| 5      | <i>B. edeni</i>         | N. ESPARTA: NE. Punta Ballena, Isla de Margarita          | 11 03      | 63 44       |
| 6      | <i>B. edeni</i>         | N. ESPARTA: NE. Punta Ballena, Isla de Margarita          | 11 03      | 63 44       |
| 7      | <i>B. edeni</i>         | N. ESPARTA: E. Islote Farallón Blanco, Isla de Margarita  | 10 58      | 63 45       |
| 8      | <i>B. edeni</i>         | N. ESPARTA: Pampatar, Isla de Margarita                   | 11 00      | 63 48       |
| 9      | <i>B. edeni</i>         | N. ESPARTA: Punta de Piedras, Isla de Margarita           | 10 54      | 64 07       |
| 10     | <i>B. edeni</i>         | SUCRE: Caguire, Golfo de Cariaco                          | 10 29      | 64 08       |
| 11     | <i>B. edeni</i>         | N. ESPARTA: Ensenada de Charagato, Isla de Cubagua        | 10 49      | 64 10       |
| 12     | <i>B. edeni</i>         | N. ESPARTA: Boca del Río, Isla de Margarita               | 10 58      | 64 10       |
| 13     | <i>B. edeni</i>         | SUCRE: Península de Araya                                 | 10 35      | 64 17       |
| 14     | <i>B. edeni</i>         | SUCRE: Playa Colorada                                     | 10 25      | 64 18       |
| 15     | <i>B. edeni</i>         | Between Puerto La Cruz and Isla de Margarita              | 10 30      | 64 20       |
| 16     | <i>B. edeni</i>         | Between Puerto La Cruz and Porlamar                       | 10 40      | 64 20       |
| 17     | <i>B. edeni</i>         | NW Isla Caracas and Picuda Grande                         | 10 24      | 64 28       |
| 18     | <i>B. edeni</i>         | 10 km N-NW Isla Caracas del Oeste                         | 10 25      | 64 29       |
| 19     | <i>B. edeni</i>         | Between Puerto La Cruz and Isla de Margarita              | 10 30      | 64 30       |
| 20     | <i>B. edeni</i>         | La Blanquilla   | 11 55      | 64 35       |
| 21     | <i>B. edeni</i>         | ANZOATEGUI: Off Puerto La Cruz                            | 10 15      | 64 38       |
| 22     | <i>B. edeni</i>         | SE La Tortuga   | 10 50      | 65 10       |
| 23     | <i>B. edeni</i>         | 2 km NW I. La Tortuga                                     | 10 59      | 65 22       |
| 24     | <i>B. edeni</i>         | 20 nautical miles E of La Orchila                         | 11 49      | 65 48       |
| 25     | <i>B. edeni</i>         | MIRANDA: between Boca del Horno and Los Totumos           | 10 32      | 66 04       |
| 26     | <i>B. physalus</i>      | N. ESPARTA: Isla de Margarita                             |            |             |
| 27     | <i>B. physalus</i>      | N. ESPARTA: Playa El Silguero, Isla de Margarita          | 10 53      | 63 54       |
| 28     | <i>B. physalus</i>      | FALCON: E coast of the Península de Paraguana             | 11 43      | 69 46       |
| 29     | <i>M. novaeangliae</i>  | VENEZUELA   |            |             |
| 30     | <i>M. novaeangliae</i>  | VENEZUELA   |            |             |
| 31     | <i>M. novaeangliae</i>  | VENEZUELA   |            |             |
| 32     | <i>M. novaeangliae</i>  | VENEZUELA   |            |             |
| 33     | <i>M. novaeangliae</i>  | Los Testigos  | 11 25      | 63 05       |
| 34     | <i>M. novaeangliae</i>  | Between El Morro de Puerto Santo and Los Testigos         | 11 00      | 63 07       |
| 35     | <i>M. novaeangliae</i>  | Isla de Aves  | 15 46      | 63 37       |
| 36     | <i>M. novaeangliae</i>  | Off Cumana  | 10 29      | 64 15       |
| 37     | <i>M. novaeangliae</i>  | Between Puerto La Cruz and Islas Chimanas                 | 10 16      | 64 38       |
| 38     | <i>M. novaeangliae</i>  | La Tortuga  | 10 51      | 65 18       |
| 39     | <i>M. novaeangliae</i>  | MIRANDA: Between Carenero and Buche                       | 10 31      | 66 06       |
| 40     | <i>M. novaeangliae</i>  | VARGAS: Playa La Salina, Puerto Carayaca                  | 10 34      | 67 05       |
| 41     | <i>P. macrocephalus</i> | VENEZUELA   |            |             |
| 42     | <i>P. macrocephalus</i> | VENEZUELAN CARIBBEAN                                      |            |             |
| 43     | <i>P. macrocephalus</i> | Between Puerto La Cruz and Punta Penas                    |            |             |
| 44     | <i>P. macrocephalus</i> | N. ESPARTA: Isla de Margarita                             |            |             |
| 45     | <i>P. macrocephalus</i> | Between El Morro de Puerto Santo and Los Testigos         | 11 00      | 63 07       |
| 46     | <i>P. macrocephalus</i> | Between Los Testigos and Los Frailes                      | 11 20      | 63 30       |

**Table 2**

by-state from east to west. Since Venezuela is administratively divided into “states” (in the U.S. sense), each state’s name is fully capitalized to any state). Freshwater records are ordered alphabetically by capitalized river name. Two such capitalized names indicate that the feature associated with the river. We have retained the original locality names and political units (states, districts) as much as possible. Venezuela”), it precedes any that are specific. Dates are shown by month (when available) followed by year. Map coordinates for coordinates, they are arranged chronologically beginning with the oldest record. When the location given is too imprecise (e.g., “Mar-

| Date <sup>1</sup> | Record type | No. of individ. | Museum specimen <sup>2</sup> | Reference <sup>3</sup>  |
|-------------------|-------------|-----------------|------------------------------|---|
| 7/1991            | 1           | 2               |                              | R. Verginelli-Torres*   |
| 9/1966            | 1           | >1              |                              | Mitchell 1974, Mitchell & Chapman 1977, Mitchell & Kozicki <sup>4</sup> |
| 2/1969            | 3           | 1               |                              | Mitchell 1974, Mitchell & Chapman 1977, Mitchell & Kozicki <sup>4</sup> |
| 9/1966            | 3           | 1               |                              | Mitchell 1974, Mitchell & Chapman 1977, Mitchell & Kozicki <sup>4</sup> |
| 6–7/1979          | 2           | 3               |                              | Mondolfi 1981   |
| 9/1966            | 1           | >1              |                              | Mitchell 1974, Mitchell & Chapman 1977, Mitchell & Kozicki <sup>4</sup> |
| 2/1969            | 3           | 1               |                              | Mitchell 1974, Mitchell & Chapman 1977, Mitchell & Kozicki <sup>4</sup> |
| 1970              | 5           | 1               | Museo del Mar, Boca de Rio   | Casinos 1986, Agudo & Romero 1996                                       |
| 3/1979            | 5,7         | 1               |                              | Notarbartolo di Sciara 1983   |
| 8/1962            | 5           | 1               |                              | Flores 1977   |
| 1963              | 4,5         | 1               | MEDIMAR n/n                  | Cagnolaro & Notarbartolo di Sciara 1979                                 |
| 8/1932            | 4,5         | 1               | MCNC 1159                    | Bolaños Jiménez 1994, Agudo 1995  |
| 4/1974            | 4,5         | 1               |                              | Mondolfi <sup>5</sup>   |
| 8/1992            | 2           | 1               |                              | Picture seen by Agudo   |
| 11/1979           | 1,5         | 125 + 2         |                              | Notarbartolo di Sciara 1983   |
| 10–11/1977        | 1           | 86              |                              | Anonymous, text fn 4  |
| 9/1979            | 1           | 3               |                              | Gremone 1979b   |
| 9/1979            | 1           | 1               |                              | Gremone 1979b   |
| 11/1979           | 3           | 1               |                              | Watkins 1981  |
| 5/1993            | 4,5         | 1               | MDMBR n/n                    | Bolaños Jiménez 1994, Agudo 1995  |
| 1979              | 2           | 1               |                              | Leatherwood et al. 1982   |
| 5/1989            | 1           | 1               |                              | I. Agudo**  |
| 1978              | 5           | 1               |                              | Notarbartolo di Sciara 1983   |
| 3/1989            | 1           | 1               |                              | I. Agudo**  |
| 8/1961            | 4,5         | 1               | EBRG 11875                   | Agudo 1993  |
| b. 1954           | 5           | >1              |                              | Anduze <sup>6</sup>   |
| 8/1993            | 4,5,7?      | 1               | EBRG 17779                   | Bolaños Jiménez & Lira 1994, Lira et al. 1995                           |
| 2/1959            | 5           | 1               |                              | Agudo 1995, Lira et al. 1995  |
| XIX Century       | 6           | >1              |                              | Townsend 1935   |
| 1-4/1853          | 6           | >1              |                              | Logbook bark Solon  |
| 1853              | 6           | >~2             |                              | Logbook brig September  |
| b. 1954           | 5           | >1              |                              | Anduze <sup>6</sup>   |
| 10/1989           | 1           | 1               |                              | I. López*   |
| 9/1989            | 1           | 2               |                              | E. Marval*  |
| 3/1990            | 1           | >1              |                              | G. Solé*  |
| 12/1870–4/1871    | 1,6         | 4               |                              | Logbook of the Thriver  |
| 4/1990            | 2           | 1               |                              | Anonymous 1990 (Rev. Producto (82):22, July)                            |
| 2/1989            | 1           | 1               |                              | I. Agudo**  |
| 1960              | 5,6?        | 1               |                              | Romero & Agudo 1993, Agudo 1995   |
| 5/1990            | 2,4,5       | 1               | LBCS n/n                     | Agudo & Romero 1996, Boher & Garci <sup>7</sup>                         |
| b. 1841           | 1           |                 |                              | Codazzi 1841  |
| b. 1877           | 1           |                 |                              | Ernst 1877  |
| 8/1979            | 1           | 13              |                              | Notarbartolo di Sciara, text fn 2                                       |
| b. 1886           | 4           | 1               | MCNC n/n                     | Ernst 1886, Agudo & Romero 1996   |
| 9/1989            | 1           | 2               |                              | I. López*   |
| b. 1967           | 1,6         | >1              |                              | Vila 1967   |

*continued*

Table 2 (continued)

| Record | Species                 | Locality  | Lat.<br>°N | Long.<br>°W |
|--------|-------------------------|---|------------|-------------|
| 47     | <i>P. macrocephalus</i> | SUCRE: Ensenada Los Chivos, Playa Los Bordones  | 10 27      | 64 12       |
| 48     | <i>P. macrocephalus</i> | SUCRE: Punta Arenas, Península de Araya         | 10 30      | 64 14       |
| 49     | <i>P. macrocephalus</i> | La Blanquilla                                   | 11 49      | 64 37       |
| 50     | <i>P. macrocephalus</i> | N. ESPARTA: Off Porlamar, Isla de Margarita     | 10 55      | 63 51       |
| 51     | <i>P. macrocephalus</i> | ANZOATEGUI: Between Uchire and Boca de Unare    | 10 07      | 65 15       |
| 52     | <i>P. macrocephalus</i> | Higuerote - Laguna de Tacarigua, near Rio Chico | 10 20      | 65 57       |
| 53     | <i>I. geoffrensis</i>   | VENEZUELA                                       |            |             |
| 54     | <i>I. geoffrensis</i>   | VENEZUELA                                       |            |             |
| 55     | <i>I. geoffrensis</i>   | VENEZUELA                                       |            |             |
| 56     | <i>I. geoffrensis</i>   | VENEZUELA                                       |            |             |
| 57     | <i>I. geoffrensis</i>   | VENEZUELA                                       |            |             |
| 58     | <i>I. geoffrensis</i>   | VENEZUELA                                       |            |             |
| 59     | <i>I. geoffrensis</i>   | VENEZUELA                                       |            |             |
| 60     | <i>I. geoffrensis</i>   | VENEZUELA                                       |            |             |
| 61     | <i>I. geoffrensis</i>   | VENEZUELA                                       |            |             |
| 62     | <i>I. geoffrensis</i>   | VENEZUELA                                       |            |             |
| 63     | <i>I. geoffrensis</i>   | AGUARO: Playa del Sector La Vuelta del Oso      |            |             |
| 64     | <i>I. geoffrensis</i>   | APURE   |            |             |
| 65     | <i>I. geoffrensis</i>   | APURE   |            |             |
| 66     | <i>I. geoffrensis</i>   | APURE   |            |             |
| 67     | <i>I. geoffrensis</i>   | APURE   |            |             |
| 68     | <i>I. geoffrensis</i>   | APURE   |            |             |
| 69     | <i>I. geoffrensis</i>   | APURE   |            |             |
| 70     | <i>I. geoffrensis</i>   | APURE   |            |             |
| 71     | <i>I. geoffrensis</i>   | APURE   | 7 46       | 67 14       |
| 72     | <i>I. geoffrensis</i>   | APURE: Bogante                                  | 7 18       | 70 36       |
| 73     | <i>I. geoffrensis</i>   | APURE: El Perro                                 | 7 40       | 66 38       |
| 74     | <i>I. geoffrensis</i>   | APURE: Guaritico                                | 7 53       | 68 51       |
| 75     | <i>I. geoffrensis</i>   | APURE: Guaritico                                | 7 53       | 68 51       |
| 76     | <i>I. geoffrensis</i>   | APURE: above El Samán                           | 7 52       | 68 42       |
| 77     | <i>I. geoffrensis</i>   | APURE: below Peñita                             | 7 24       | 70 27       |
| 78     | <i>I. geoffrensis</i>   | APURE: San Fernando de Apure                    | 7 55       | 67 30       |
| 79     | <i>I. geoffrensis</i>   | APURE: San Fernando de Apure                    | 7 55       | 67 30       |
| 80     | <i>I. geoffrensis</i>   | APURE: San Fernando de Apure                    | 7 55       | 67 30       |
| 81     | <i>I. geoffrensis</i>   | APURE: San Fernando de Apure                    | 7 55       | 67 30       |
| 82     | <i>I. geoffrensis</i>   | APURE: San Fernando de Apure                    | 7 55       | 67 30       |
| 83     | <i>I. geoffrensis</i>   | APURE: San Fernando de Apure                    | 7 55       | 67 30       |
| 84     | <i>I. geoffrensis</i>   | APURE: San Fernando de Apure                    | 7 55       | 67 30       |
| 85     | <i>I. geoffrensis</i>   | APURE: San Fernando de Apure                    | 7 55       | 67 30       |
| 86     | <i>I. geoffrensis</i>   | APURE: San Fernando de Apure                    | 7 55       | 67 30       |
| 87     | <i>I. geoffrensis</i>   | APURE: San Fernando de Apure                    | 7 55       | 67 30       |
| 88     | <i>I. geoffrensis</i>   | APURE: San Fernando de Apure                    | 7 55       | 67 30       |
| 89     | <i>I. geoffrensis</i>   | APURE: San Fernando de Apure                    | 7 55       | 67 30       |
| 90     | <i>I. geoffrensis</i>   | APURE: San Fernando de Apure                    | 7 55       | 67 30       |
| 91     | <i>I. geoffrensis</i>   | APURE: San Fernando de Apure                    | 7 55       | 67 30       |
| 92     | <i>I. geoffrensis</i>   | APURE: San Fernando de Apure                    | 7 55       | 67 30       |
| 93     | <i>I. geoffrensis</i>   | APURE: San Fernando de Apure                    | 7 55       | 67 30       |
| 94     | <i>I. geoffrensis</i>   | APURE: San Fernando de Apure                    | 7 55       | 67 30       |
| 95     | <i>I. geoffrensis</i>   | APURE: San Fernando de Apure                    | 7 55       | 67 30       |
| 96     | <i>I. geoffrensis</i>   | APURE: San Fernando de Apure                    | 7 55       | 67 30       |
| 97     | <i>I. geoffrensis</i>   | APURE: San Fernando de Apure                    | 7 55       | 67 30       |
| 98     | <i>I. geoffrensis</i>   | APURE: San Fernando de Apure                    | 7 55       | 67 30       |
| 99     | <i>I. geoffrensis</i>   | APURE: San Fernando de Apure                    | 7 55       | 67 30       |

Table 2 (continued)

| Date <sup>1</sup> | Record type | No. of individ. | Museum specimen <sup>2</sup> | Reference <sup>3</sup>   |
|-------------------|-------------|-----------------|------------------------------|--|
| 8/1988            | 4,5         | 1               | MCNC 1160                    | Agudo 1995,b   |
| 3/1843            | 1           |                 |                              | Logbook of Solon   |
| 1761–1920         | 1,6         | >1              |                              | Townsend 1935  |
| 1984              | 1           | 1               |                              | J.C. Naser*  |
| b. 1841           | 5           |                 |                              | Codazzi 1841   |
| 1/1992            | 1           | 4               |                              | I. Agudo**   |
|                   | 4           | 1               | EBRG CD36                    | Bolaños Jiménez 1994, Agudo & Romero 1996                            |
|                   | 4           | 1               | MCNC 251                     | Bolaños Jiménez 1994, Agudo & Romero 1996                            |
| b. 1868           | 1(?)        |                 |                              | Ernst 1868   |
| 4/1967            | 4,6         | 1               | LACM-LARLB 349               | Smithsonian Institution Computer Files                               |
| 4/1967            | 4,6         | 1               | LACM-LARLB 351               | Smithsonian Institution Computer Files                               |
| 4/1967            | 4,6         | 1               | LACM-LARLB 352               | Smithsonian Institution Computer Files                               |
| 4/1967            | 4,6         | 1               | LACM-LARLB 441               | Smithsonian Institution Computer Files                               |
| 4/1968            | 4,6         | 1               | LACM-LARLB 348               | Smithsonian Institution Computer Files                               |
| 4/1970            | 4,6         | 1               | LACM-LARLB 350               | Smithsonian Institution Computer Files                               |
| 1990              | 4           | 1               | MCNUSB n/n                   | Bolaños Jiménez 1994, Agudo & Romero 1996                            |
| 2/1989            | 3           | 2               |                              | R. Henández*   |
| 3/1647            | 1           | >1              |                              | de Carvajal 1648   |
| 4/1757            | 1           |                 |                              | MS #2824, folios 191-195, Biblioteca del Palacio Real, Madrid, Spain |
| b. 1841           | 1           |                 |                              | Codazzi 1841   |
| b. 1884           | 4           |                 |                              | Ernst 1884   |
| 9/1893            | 4           |                 | UZM CN2                      | van Bree & Trebbau 1973  |
| 3/1981            | 1           | 122             |                              | Pilleri & Pilleri 1982   |
| 3/1983            | 6           | 2               |                              | Boede Wantzelius 1990  |
| 8/1989            | 1           | 52              |                              | Schnapp & Howroyd 1992   |
| 5/1986            | 1           | 3               |                              | Meade & Koehnken 1991  |
| 5/1986            | 1           | 5               |                              | Meade & Koehnken 1991  |
| 2/1979            | 1           | 3               |                              | Pilleri 1979   |
| 2/1979            | 1           | 2               |                              | Pilleri 1979   |
| 5/1986            | 1           | 1               |                              | Meade & Koehnken 1991  |
| 5/1986            | 1           | 2               |                              | Meade & Koehnken 1991  |
|                   | 4           | 1               | MBUCV w/n                    | Agudo & Romero 1996  |
|                   | 4           | 1               | USNM 395602                  | Smithsonian Institution Computer Files                               |
|                   | 4           | 1               | USNM 396166                  | Smithsonian Institution Computer Files                               |
| 3/1800            | 1           | >1              |                              | von Humboldt 1814  |
| 5/1966            | 4           | 1               | MBUCV 135                    | Trebbau & van Bree 1974  |
| 5/1966            | 4, 6        | 1               | ZMA 17771                    | ZMA data base  |
| 3/1968            | 4           | 1               | USNM 571263                  | Smithsonian Institution Computer Files                               |
| 3/1968            | 4           | 1               | USNM 571264                  | Smithsonian Institution Computer Files                               |
| 3/1968            | 4           | 1               | USNM 571429                  | Smithsonian Institution Computer Files                               |
| 4/1968            | 4, 6        | 1               | CAS 15977                    | Smithsonian Institution Computer Files                               |
| 4/1969            | 4           | 1               | USNM 395415                  | Smithsonian Institution Computer Files                               |
| 4/1969            | 4           | 1               | USNM 395416                  | Smithsonian Institution Computer Files                               |
| 3/1973            | 4,6         | 1               | ZMA 16109                    | van Bree & Trebbau 1973, ZMA data base                               |
| b. 1974           | 1           | 1               |                              | Trebbau & van Bree 1974  |
| b. 1974           |             | 5               |                              | Trebbau 1975   |
| b. 1974           | 4           | 1               | MCNC b                       | Trebbau & van Bree 1974  |
| b. 1974           | 4           | 1               | MCNC c                       | Trebbau & van Bree 1974  |
| b. 1974           | 4           | 1               | MCNC d                       | Trebbau & van Bree 1974  |
| 5/1974            | 4,6         | 1               | ZMA 16936                    | MZA data base  |
| 3/1975            | 6           | 5               |                              | Ostenrath 1976, Schenkan 1977, Sylvestre 1985                        |
| 2/1979            | 1           | 4               |                              | Pilleri 1979   |
| 6/1985            | 1           | 1               |                              | Meade & Koehnken 1991  |

*continued*



Table 2 (continued)

| Record | Species               | Locality                                     | Lat.<br>°N | Long.<br>°W |
|--------|-----------------------|--|------------|-------------|
| 100    | <i>I. geoffrensis</i> | APURE: E San Fernando de Apure               | 7 53       | 67 26       |
| 101    | <i>I. geoffrensis</i> | APURE: 15 km W San Fernando de Apure         | 7 57       | 67 34       |
| 102    | <i>I. geoffrensis</i> | APURE: 15 km W San Fernando de Apure         | 7 57       | 67 34       |
| 103    | <i>I. geoffrensis</i> | APURE: 15 km W San Fernando de Apure         | 7 57       | 67 34       |
| 104    | <i>I. geoffrensis</i> | APURE: 15 km W San Fernando de Apure         | 7 57       | 67 34       |
| 105    | <i>I. geoffrensis</i> | APURE: 15 km W San Fernando de Apure         | 7 57       | 67 34       |
| 106    | <i>I. geoffrensis</i> | APURE: 15 km W San Fernando de Apure         | 7 57       | 67 34       |
| 107    | <i>I. geoffrensis</i> | APURE: From San Fernando de Apure to 45 km W | 7 58       | 67 34       |
| 108    | <i>I. geoffrensis</i> | APURE: Caicara del Orinoco                   | 7 34       | 66 10       |
| 109    | <i>I. geoffrensis</i> | APURITO                                      | 7 54       | 68 28       |
| 110    | <i>I. geoffrensis</i> | APURITO                                      | 7 54       | 68 28       |
| 111    | <i>I. geoffrensis</i> | ARAUCA (In front of El Yagual)               | 7 29       | 68 25       |
| 112    | <i>I. geoffrensis</i> | ARAUCA (In front of El Yagual)               | 7 29       | 68 25       |
| 113    | <i>I. geoffrensis</i> | ARO  | 7 56       | 64 14       |
| 114    | <i>I. geoffrensis</i> | ATABAPO                                      |            |             |
| 115    | <i>I. geoffrensis</i> | ATABAPO                                      |            |             |
| 116    | <i>I. geoffrensis</i> | ATABAPO                                      | 4 00       | 67 45       |
| 117    | <i>I. geoffrensis</i> | ATABAPO                                      | 4 00       | 67 45       |
| 118    | <i>I. geoffrensis</i> | ATABAPO                                      | 4 00       | 67 45       |
| 119    | <i>I. geoffrensis</i> | ATABAPO                                      | 4 00       | 67 45       |
| 120    | <i>I. geoffrensis</i> | ATABAPO: GUAVIARE                            | 4 04       | 67 37       |
| 121    | <i>I. geoffrensis</i> | ATABAPO: TEMI                                | 3 14       | 67 24       |
| 122    | <i>I. geoffrensis</i> | BARIA  | 1 30       | 66 30       |
| 123    | <i>I. geoffrensis</i> | BARIA: PASIMONI                              | 1 24       | 66 27       |
| 124    | <i>I. geoffrensis</i> | CAÑO GUARITICO                               | 7 47       | 69 02       |
| 125    | <i>I. geoffrensis</i> | CAÑO GUARITICO                               | 7 47       | 69 02       |
| 126    | <i>I. geoffrensis</i> | CAÑO GUARITICO                               | 7 47       | 69 02       |
| 127    | <i>I. geoffrensis</i> | CAÑO GUARITICO                               | 7 47       | 69 02       |
| 128    | <i>I. geoffrensis</i> | CAÑO GUARITICO                               | 7 47       | 69 02       |
| 129    | <i>I. geoffrensis</i> | CAÑO GUARITICO: Hato El Frío                 | 7 49       | 68 54       |
| 130    | <i>I. geoffrensis</i> | CAÑO GUARITICO: Hato El Frío                 | 8 49       | 69 54       |
| 131    | <i>I. geoffrensis</i> | CAÑO GUARITICO: Hato El Frío                 | 9 49       | 70 54       |
| 132    | <i>I. geoffrensis</i> | CAÑO LA TIGRA                                | 7 42       | 69 46       |
| 133    | <i>I. geoffrensis</i> | CAÑO MANATI                                  | 7 40       | 66 45       |
| 134    | <i>I. geoffrensis</i> | CAPANAPARO                                   |            |             |
| 135    | <i>I. geoffrensis</i> | CAPANAPARO                                   | 7 02       | 67 28       |
| 136    | <i>I. geoffrensis</i> | CASIQUIARE                                   |            |             |
| 137    | <i>I. geoffrensis</i> | CASIQUIARE                                   |            |             |
| 138    | <i>I. geoffrensis</i> | CASIQUIARE                                   |            |             |
| 139    | <i>I. geoffrensis</i> | CASIQUIARE                                   |            |             |
| 140    | <i>I. geoffrensis</i> | CASIQUIARE:Tamatama-San Carlos de Río Negro  | 3 10       | 65 51       |
| 141    | <i>I. geoffrensis</i> | CASIQUIARE: before CAÑO MANOMI               | 2 00       | 66 00       |
| 142    | <i>I. geoffrensis</i> | CASIQUIARE: PASIMONI                         | 1 54       | 66 36       |
| 143    | <i>I. geoffrensis</i> | CASIQUIARE: before CAÑO EL PERRO             | 2 00       | 66 10       |
| 144    | <i>I. geoffrensis</i> | CASIQUIARE: Solano                           | 1 58       | 66 56       |
| 145    | <i>I. geoffrensis</i> | CAURA  | 1 32       | 65 00       |
| 146    | <i>I. geoffrensis</i> | CAURA: Laguna de Paramuto, near Maipa        | 7 24       | 65 00       |
| 147    | <i>I. geoffrensis</i> | CINARUCO                                     | 6 35       | 67 17       |
| 148    | <i>I. geoffrensis</i> | CINARUCO                                     | 6 35       | 67 17       |
| 149    | <i>I. geoffrensis</i> | CINARUCO                                     | 6 35       | 67 17       |
| 150    | <i>I. geoffrensis</i> | CINARUCO                                     |            |             |
| 151    | <i>I. geoffrensis</i> | CUNAVICHITO                                  | 6 45       | 67 25       |
| 152    | <i>I. geoffrensis</i> | GUANARE                                      |            |             |

Table 2 (continued)

| Date <sup>1</sup> | Record type | No. of individ. | Museum specimen <sup>2</sup> | Reference <sup>3</sup>                               |
|-------------------|-------------|-----------------|------------------------------|--|
| 5/1986            | 1           | 3               |                              | Meade & Koehnken 1991                                |
| 3/1966            | 6           | 1               |                              | Trebbau 1975   |
| 3/1966            | 6           | 1               |                              | Trebbau 1975   |
| 5/1966            | 6           | 1               |                              | Trebbau 1975   |
| 5/1966            | 6           | 1               |                              | Trebbau 1975   |
| 3-4/1968          | 4,6         | 1               | FMNH 57819                   | Trebbau 1975, Smithsonian Institution Computer Files |
| 3-4/1968          | 6           | 1               |                              | Trebbau 1975   |
| 7/1989            | 1           | 15              |                              | Schnapp & Howroyd 1992                               |
| 8/1989            | 1           | 9               |                              | Schnapp & Howroyd 1992                               |
| 5/1986            | 1           | 3               |                              | Meade & Koehnken 1991                                |
| 8/1989            | 1           | 9               |                              | Schnapp & Howroyd 1992                               |
| 9/1970            | 4           | 1               | EBRG 1739                    | Bolaños Jiménez 1994, Agudo & Romero 1996            |
| 1978              | 5           | 40              |                              | Pilleri 1979   |
| 10/1984           | 1           | 2               |                              | Meade & Koehnken 1991                                |
| b. 1841           | 1           |                 |                              | Codazzi 1841   |
| b. 1868           | 1           |                 |                              | Ernst 1868   |
| 5/1984            | 1           | 1               |                              | Meade & Koehnken 1991                                |
| 8/1984            | 1           | 2               |                              | Meade & Koehnken 1991                                |
| 10/1984           | 1           | 4-5             |                              | Meade & Koehnken 1991                                |
| 1/1985            | 1           | 3               |                              | Meade & Koehnken 1991                                |
| 4/1800            | 1           | >1              |                              | von Humboldt 1814                                    |
| 4/1800            | 1           | >1              |                              | von Humboldt 1814                                    |
| b. 1988           | 1           | 5-6             |                              | O'Hanlon 1988  |
| 12/1970-1/1971    | 1           | 6               |                              | Pilleri 1979 +R. Hoogerstein                         |
| 1970-1977         | 1           | >1              |                              | Pilleri & Gühr 1977                                  |
| b. 1974           | 1           | >1              |                              | Trebbau & van Bree 1974                              |
| 5/1986            | 1           | 6               |                              | Meade & Koehnken 1991                                |
| 7/1987            | 6           | 1               |                              | Boede Wantzelius 1990                                |
| 7/1987            | 6           | 1               |                              | Boede Wantzelius 1990                                |
| 2/1979            | 1           | 1               |                              | Pilleri 1979   |
| 5/1984            | 4           | 1               | MNHLS 6886                   | Bolaños Jiménez 1994, Agudo & Romero 1996            |
| 5/1984            | 4           | 1               | MNHLS 6899                   | Bolaños Jiménez 1994, Agudo & Romero 1996            |
| 5/1986            | 1           | 1               |                              | Meade & Koehnken 1991                                |
| 5/1986            | 1           | >4              |                              | Meade & Koehnken 1991                                |
| 1970-1977         | 1           | >1              |                              | Pilleri & Gühr 1977                                  |
| b. 1974           | 1           |                 |                              | Trebbau & van Bree 1974                              |
| 1851              | 1           |                 |                              | Wallace 1889   |
| b. 1877           | 1           |                 |                              | Ernst 1877   |
| b. 1891           | 1           |                 |                              | Ernst 1891   |
| 1983              | 1           | >1              |                              | Best & da Silva 1983                                 |
| 5/1981            | 1           | 8               |                              | Pilleri & Pilleri 1982                               |
| 1981              | 1           | 2               |                              | Pilleri et al. 1982                                  |
| 1981              | 1           | 3               |                              | Pilleri et al. 1982                                  |
| 1981              | 1           | 3               |                              | Pilleri et al. 1982                                  |
| b. 1988           | 1           | 1               |                              | O'Hanlon 1988  |
| 6/1985            | 1           | 2               |                              | Meade & Koehnken 1991                                |
| b. 1979           | 1           |                 |                              | Pilleri 1979 + R. Hoogerstein*?                      |
| 1970-1977         | 1           |                 |                              | Pilleri & Gühr 1977                                  |
| b. 1974           | 1           |                 |                              | Trebbau & van Bree 1974                              |
| 11/1982           | 1           | >3              |                              | Meade & Koehnken 1991                                |
| 11/1993-6/1994    | 1           | 489/972         |                              | McGuire & Winemiller 1998                            |
| 8/1989            | 1           | 5               |                              | A. Romero & A. Mayayo**                              |
| 1960-69           | 6           | >1              |                              | Harrison & Brownell 1971                             |

*continued*

Table 2 (continued)

| Record | Species               | Locality  | Lat.<br>°N | Long.<br>°W |
|--------|-----------------------|---|------------|-------------|
| 153    | <i>I. geoffrensis</i> | GUANARE VIEJO                                       |            |             |
| 154    | <i>I. geoffrensis</i> | GUANARE: Near Arismendi                             | 8 28       | 68 22       |
| 155    | <i>I. geoffrensis</i> | GUARICO   | 7 55       | 67 28       |
| 156    | <i>I. geoffrensis</i> | GUARICO   | 7 55       | 67 28       |
| 157    | <i>I. geoffrensis</i> | GUAVIARITO (Trib. of the Manapiare, Amazonas state) |            |             |
| 158    | <i>I. geoffrensis</i> | GUAVIARITO (Trib. of the Manapiare, Amazonas state) |            |             |
| 159    | <i>I. geoffrensis</i> | MANAPIARE: San Juan, 163 km E Puerto Ayacucho       | 5 19       | 66 08       |
| 160    | <i>I. geoffrensis</i> | MANAPIARE: San Juan de Manapiare                    | 5 19       | 66 03       |
| 161    | <i>I. geoffrensis</i> | MANAPIARE: N San Juan de Manapiare, Amazonas        | 5 21       | 66 03       |
| 162    | <i>I. geoffrensis</i> | MAVACA  | 2 00       | 65 10       |
| 163    | <i>I. geoffrensis</i> | NEGRO: Cucuy  | 1 14       | 66 50       |
| 164    | <i>I. geoffrensis</i> | NEGRO: Solano                                       | 1 58       | 66 57       |
| 165    | <i>I. geoffrensis</i> | ORINOCO   |            |             |
| 166    | <i>I. geoffrensis</i> | ORINOCO   |            |             |
| 167    | <i>I. geoffrensis</i> | ORINOCO   |            |             |
| 168    | <i>I. geoffrensis</i> | ORINOCO   |            |             |
| 169    | <i>I. geoffrensis</i> | ORINOCO   |            |             |
| 170    | <i>I. geoffrensis</i> | ORINOCO   |            |             |
| 171    | <i>I. geoffrensis</i> | ORINOCO   |            |             |
| 172    | <i>I. geoffrensis</i> | ORINOCO   |            |             |
| 173    | <i>I. geoffrensis</i> | ORINOCO (lower)                                     |            |             |
| 174    | <i>I. geoffrensis</i> | ORINOCO (lower)                                     |            |             |
| 175    | <i>I. geoffrensis</i> | ORINOCO (upper)                                     |            |             |
| 176    | <i>I. geoffrensis</i> | ORINOCO (upper)                                     | 3 55       | 67 05       |
| 177    | <i>I. geoffrensis</i> | ORINOCO: APURE                                      | 7 37       | 66 24       |
| 178    | <i>I. geoffrensis</i> | ORINOCO: APURE                                      | 7 37       | 66 24       |
| 179    | <i>I. geoffrensis</i> | ORINOCO: APURE                                      | 7 37       | 66 24       |
| 180    | <i>I. geoffrensis</i> | ORINOCO: ARATURE (Delta region)                     | 8 34       | 61 00       |
| 181    | <i>I. geoffrensis</i> | ORINOCO: ARO  | 7 58       | 64 11       |
| 182    | <i>I. geoffrensis</i> | ORINOCO: Atabapo                                    | 4 04       | 67 43       |
| 183    | <i>I. geoffrensis</i> | ORINOCO: Atabapo                                    | 4 04       | 67 43       |
| 184    | <i>I. geoffrensis</i> | ORINOCO: Barrancas                                  | 8 41       | 62 12       |
| 185    | <i>I. geoffrensis</i> | ORINOCO: Cabruta                                    | 7 40       | 66 13       |
| 186    | <i>I. geoffrensis</i> | ORINOCO: between Cabruta and Ciudad Guayana         |            |             |
| 187    | <i>I. geoffrensis</i> | ORINOCO: Caicara del Orinoco                        | 7 34       | 66 10       |
| 188    | <i>I. geoffrensis</i> | ORINOCO: Caicara del Orinoco                        | 7 34       | 66 10       |
| 189    | <i>I. geoffrensis</i> | ORINOCO: below Caicara del Orinoco                  | 7 33       | 66 22       |
| 190    | <i>I. geoffrensis</i> | ORINOCO: CAÑO ARAGUAITO (Delta region)              | 8 50       | 61 33       |
| 191    | <i>I. geoffrensis</i> | ORINOCO: CAÑO ARAGUAITO (Delta region)              | 8 50       | 61 33       |
| 192    | <i>I. geoffrensis</i> | ORINOCO: CAÑO ARAGUAITO (Delta region)              | 8 50       | 61 33       |
| 193    | <i>I. geoffrensis</i> | ORINOCO: CAÑO CARIDAD                               | 3 35       | 66 42       |
| 194    | <i>I. geoffrensis</i> | ORINOCO: CAÑO EL TORO (Delta region)                | 8 32       | 61 30       |
| 195    | <i>I. geoffrensis</i> | ORINOCO: Castillito                                 | 4 19       | 67 46       |
| 196    | <i>I. geoffrensis</i> | ORINOCO: Ciudad Bolivar                             | 8 11       | 63 34       |
| 197    | <i>I. geoffrensis</i> | ORINOCO: Ciudad Bolivar                             | 8 11       | 63 35       |
| 198    | <i>I. geoffrensis</i> | ORINOCO: Ciudad Bolivar                             | 8 11       | 63 35       |
| 199    | <i>I. geoffrensis</i> | ORINOCO: above Ciudad Guayana                       | 8 22       | 62 36       |
| 200    | <i>I. geoffrensis</i> | ORINOCO: Cunucunuma                                 | 3 11       | 66 01       |
| 201    | <i>I. geoffrensis</i> | ORINOCO: Delta region                               | 8 40       | 62 10       |
| 202    | <i>I. geoffrensis</i> | ORINOCO: El Infierno                                | 8 04       | 64 24       |
| 203    | <i>I. geoffrensis</i> | ORINOCO: El Jobal (below SUAPURE)                   | 6 38       | 67 00       |
| 204    | <i>I. geoffrensis</i> | ORINOCO: Esmeralda                                  | 3 10       | 65 32       |
| 205    | <i>I. geoffrensis</i> | ORINOCO: Esmeralda                                  | 3 10       | 65 32       |

Table 2 (continued)

| Date <sup>1</sup> | Record type | No. of individ. | Museum specimen <sup>2</sup> | Reference <sup>3</sup>                        |
|-------------------|-------------|-----------------|------------------------------|---|
| 4/1967            | 4           | 1               | LACM 28257                   | Smithsonian Institution Computer Files        |
| 1970–1977         | 1           |                 |                              | Pilleri & Gühr 1977                           |
| b. 1974           | 1           |                 |                              | Trebbau & van Bree 1974                       |
| b. 1979           | 1           |                 |                              | Pilleri 1979+R. Hoogerstein                   |
| 2–3/1972          | 1           |                 |                              | Pilleri 1979+ R. Hoogerstein                  |
| b. 1974           | 1           |                 |                              | Trebbau & van Bree 1974                       |
| 9/1967            | 4           | 1               | USNM 406801                  | Handley 1976                                  |
| 9/1973            | 4,6         | 1               | ZMA 17614                    | ZMA data base                                 |
| 9/1973            | 4,6         | 1               | ZMA 17615                    | van Bree & Trebbau 1973, ZMA data base        |
| 11/1984           | 1           | 1               |                              | Meade & Koehnken 1991                         |
| 1983              | 1           |                 |                              | Best & da Silva 1983                          |
| 8/1973            | 4,6         | 1               | ZMA 17613                    | van Bree & Trebbau 1973                       |
|                   | 1           | >1              |                              | Best & da Silva 1989b                         |
|                   | 4           | 1               | LACM 54453                   | LACM data base                                |
| b. 1841           | 1           |                 |                              | Codazzi 1841                                  |
| b. 1868           | 1           |                 |                              | Ernst 1868                                    |
| b.1871            | 1           | 7-8             |                              | Appun 1871                                    |
| b. 1877           | 1           |                 |                              | Ernst 1877                                    |
| b. 1891           | 1           |                 |                              | Ernst 1891                                    |
| 1907?             | 1           | >1              |                              | Mozans 1910                                   |
| 1755              |             | 1               |                              | Romero et al. 1997a                           |
| 1983              | 1           |                 |                              | Best & da Silva 1983                          |
| 1851              | 1           | >1              |                              | Wallace 1889                                  |
|                   | 1           | 2               |                              | Starkell 1988                                 |
| 4/1800            | 1           |                 |                              | von Humboldt 1814                             |
| 10/1984           | 1           | >6              |                              | Meade & Koehnken 1991                         |
| 5/1986            | 1           | 1               |                              | Meade & Koehnken 1991                         |
| 10/1987           | 1           | 2               |                              | Meade & Koehnken 1991                         |
| 10/1984           | 1           | 3               |                              | Meade & Koehnken 1991                         |
| 1800              | 1           | 2               |                              | von Humboldt 1814                             |
| b. 1868           | 1           |                 |                              | Ernst 1868                                    |
|                   | 1           | >1              |                              | Best & da Silva 1989b                         |
| 5/1986            | 1           | 2               |                              | Meade & Koehnken 1991                         |
| 1757–1766         | 1           | >1              |                              | Meade & Koehnken 1991                         |
| 1970–1977         | 1           |                 |                              | Pilleri & Gühr 1977                           |
| b. 1974           | 1           |                 |                              | Trebbau & van Bree 1974                       |
| 10/1984           | 1           | 1               |                              | Meade & Koehnken 1991                         |
| 10/1987           | 1           | 2               |                              | Meade & Koehnken 1991                         |
| 10/1989           | 1           | >2              |                              | Meade & Koehnken 1991                         |
| 10/1990           | 1           | >3              |                              | Meade & Koehnken 1991                         |
| 1981              | 1           | 4               |                              | Pilleri et al. 1982                           |
| 10/1987           | 1           | 1               |                              | Meade & Kohenken 1991                         |
| 1981              | 1           | 1               |                              | Pilleri et al. 1982                           |
|                   | 1           | 4               |                              | Kasuya & Kajihara 1974                        |
| 1970–1977         | 1           |                 |                              | Pilleri et Gühr 1977                          |
| b. 1974           | 1           |                 |                              | Trebbau & van Bree 1974                       |
| 10/1990           | 1           | 1               |                              | Meade & Koehnken 1991                         |
| 11/1984           | 1           | >2              |                              | Meade & Koehnken 1991                         |
|                   | 1           | 2               |                              | Kasuya (in litt.) (see Meade & Koehnken 1991) |
| b. 1986           | 2           |                 |                              | Maraven 1986                                  |
| 10/1984           | 1           | 2               |                              | Meade & Koehnken 1991                         |
|                   | 1           |                 |                              | Best & da Silva 1989a                         |
| 1983              | 1           |                 |                              | Best & da Silva 1989a                         |

continued

Table 2 (continued)

| Record | Species               | Locality                                       | Lat.<br>°N | Long.<br>°W |
|--------|-----------------------|--|------------|-------------|
| 206    | <i>I. geoffrensis</i> | ORINOCO: Gallo                                 | 6 23       | 67 13       |
| 207    | <i>I. geoffrensis</i> | ORINOCO: Guachapana (above VENTUARI)           | 3 52       | 67 04       |
| 208    | <i>I. geoffrensis</i> | ORINOCO: Guachapana (above VENTUARI)           | 3 52       | 67 04       |
| 209    | <i>I. geoffrensis</i> | ORINOCO: Guachapana (above VENTUARI)           | 3 52       | 67 04       |
| 210    | <i>I. geoffrensis</i> | ORINOCO: GUAVIARE                              | 4 00       | 67 40       |
| 211    | <i>I. geoffrensis</i> | ORINOCO: GUAVIARE                              | 4 00       | 67 40       |
| 212    | <i>I. geoffrensis</i> | ORINOCO: GUAVIARE                              | 4 00       | 67 40       |
| 213    | <i>I. geoffrensis</i> | ORINOCO: Isla Carnaban                         | 4 11       | 67 15       |
| 214    | <i>I. geoffrensis</i> | ORINOCO: Isla del Pato                         | 3 18       | 66 33       |
| 215    | <i>I. geoffrensis</i> | ORINOCO: Laguna de Monduapo                    | 4 54       | 67 47       |
| 216    | <i>I. geoffrensis</i> | ORINOCO: Las Bonitas                           | 7 51       | 65 38       |
| 217    | <i>I. geoffrensis</i> | ORINOCO: below Las Bonitas                     | 7 51       | 65 38       |
| 218    | <i>I. geoffrensis</i> | ORINOCO: below Las Bonitas                     | 7 51       | 65 38       |
| 219    | <i>I. geoffrensis</i> | ORINOCO: above Mapire                          | 7 44       | 64 43       |
| 220    | <i>I. geoffrensis</i> | ORINOCO: above Mapire                          | 7 44       | 64 43       |
| 221    | <i>I. geoffrensis</i> | ORINOCO: above Mapire                          | 7 44       | 64 43       |
| 222    | <i>I. geoffrensis</i> | ORINOCO: META                                  | 6 18       | 67 30       |
| 223    | <i>I. geoffrensis</i> | ORINOCO: META                                  | 6 10       | 67 30       |
| 224    | <i>I. geoffrensis</i> | ORINOCO: META                                  | 6 10       | 67 30       |
| 225    | <i>I. geoffrensis</i> | ORINOCO: META                                  | 6 10       | 67 30       |
| 226    | <i>I. geoffrensis</i> | ORINOCO: META                                  | 6 10       | 67 30       |
| 227    | <i>I. geoffrensis</i> | ORINOCO: META                                  | 6 10       | 67 30       |
| 228    | <i>I. geoffrensis</i> | ORINOCO: Monduapo (above VICHADA)              | 4 45       | 67 47       |
| 229    | <i>I. geoffrensis</i> | ORINOCO: OCAMO                                 | 2 47       | 65 12       |
| 230    | <i>I. geoffrensis</i> | ORINOCO: above OCAMO                           | 2 50       | 65 14       |
| 231    | <i>I. geoffrensis</i> | ORINOCO: Platanal                              | 2 25       | 64 54       |
| 232    | <i>I. geoffrensis</i> | ORINOCO: Puerto Ayacucho                       | 5 40       | 67 35       |
| 233    | <i>I. geoffrensis</i> | ORINOCO: Puerto Ayacucho                       | 5 40       | 67 35       |
| 234    | <i>I. geoffrensis</i> | ORINOCO: Puerto Ayacucho                       | 5 40       | 67 35       |
| 235    | <i>I. geoffrensis</i> | ORINOCO: near Sacupana                         | 8 39       | 61 48       |
| 236    | <i>I. geoffrensis</i> | ORINOCO: San Fernando de Atabapo               | 4 03       | 67 41       |
| 237    | <i>I. geoffrensis</i> | ORINOCO: Santa María del Orinoco               | 6 36       | 67 08       |
| 238    | <i>I. geoffrensis</i> | ORINOCO: Santa Bárbara del Orinoco             | 3 46       | 67 02       |
| 239    | <i>I. geoffrensis</i> | ORINOCO: Santa Bárbara del Orinoco             | 3 46       | 67 02       |
| 240    | <i>I. geoffrensis</i> | ORINOCO: Santa Bárbara del Orinoco             | 3 46       | 67 02       |
| 241    | <i>I. geoffrensis</i> | ORINOCO: Santa Bárbara del Orinoco             | 3 46       | 67 02       |
| 242    | <i>I. geoffrensis</i> | ORINOCO: Tamatama (confluence with CASIQUIARE) | 3 08       | 65 51       |
| 243    | <i>I. geoffrensis</i> | ORINOCO: Tamatama (confluence with CASIQUIARE) | 3 08       | 65 51       |
| 244    | <i>I. geoffrensis</i> | ORINOCO: Tamatama (confluence with CASIQUIARE) | 3 08       | 65 51       |
| 245    | <i>I. geoffrensis</i> | ORINOCO: Tamatama (confluence with CASIQUIARE) | 3 08       | 65 51       |
| 246    | <i>I. geoffrensis</i> | ORINOCO: Tití                                  | 3 57       | 67 23       |
| 247    | <i>I. geoffrensis</i> | ORINOCO: Tití                                  | 3 57       | 67 23       |
| 248    | <i>I. geoffrensis</i> | ORINOCO: TOMO                                  | 5 22       | 67 48       |
| 249    | <i>I. geoffrensis</i> | ORINOCO: between Venado and Tamatama           | 3 03       | 65 55       |
| 250    | <i>I. geoffrensis</i> | ORINOCO: VICHADA                               | 4 56       | 67 48       |
| 251    | <i>I. geoffrensis</i> | PARGUAZA                                       | 6 13       | 67 06       |
| 252    | <i>I. geoffrensis</i> | PASIMONI: BARIA                                | 1 25       | 66 25       |
| 253    | <i>I. geoffrensis</i> | PORTUGUESA                                     | 8 05       | 67 37       |
| 254    | <i>I. geoffrensis</i> | PORTUGUESA: near Guadarrama                    | 8 30       | 68 02       |
| 255    | <i>I. geoffrensis</i> | PORTUGUESA: near Guadarrama                    | 8 30       | 68 02       |
| 256    | <i>I. geoffrensis</i> | RAUDAL WAICA/CODAZZI (GUACA) Amazonas          | 2 01       | 64 01       |
| 257    | <i>I. geoffrensis</i> | SARARE: above Guasualito                       | 7 19       | 70 42       |
| 258    | <i>I. geoffrensis</i> | SURIPA   | 7 49       | 69 58       |

Table 2 (continued)

| Date <sup>1</sup> | Record type | No. of individ. | Museum specimen <sup>2</sup> | Reference <sup>3</sup>                    |
|-------------------|-------------|-----------------|------------------------------|---|
| 1981              | 1           | 1               |                              | Pilleri et al. 1982                       |
| 4/1984            | 1           | 2               |                              | Meade & Koehnken 1991                     |
| 5/1984            | 1           | 1               |                              | Meade & Koehnken 1991                     |
| 5/1984            | 1           | 1               |                              | Meade & Koehnken 1991                     |
| 4/1800            | 1           |                 |                              | von Humboldt 1814                         |
| b. 1841           | 1           |                 |                              | Codazzi 1841                              |
| b. 1868           | 1           |                 |                              | Ernst 1868                                |
| 1981              | 1           | 1               |                              | Pilleri et al. 1982                       |
| 1981              | 1           | 2               |                              | Pilleri et al. 1982                       |
| 1981              | 1           | 3               |                              | Pilleri et al. 1982                       |
| 3/1887            | 1           | 12              |                              | Chaffanjon 1889                           |
| 10/1984           | 1           | 2               |                              | Meade & Koehenken 1991                    |
| 10/1984           | 1           | 1               |                              | Meade & Koehenken 1991                    |
| 6/1986            | 1           | >2              |                              | Meade & Koehenken 1991                    |
| 4/1989            | 1           | 3               |                              | Meade & Koehenken 1991                    |
| 4/1989            | 1           | 2               |                              | Meade & Koehenken 1991                    |
|                   | 4           | 1               | ICNB 3703                    | Kasuya & Kajihara 1974                    |
| 5/1897            | 1           |                 |                              | Casinos & Ocana 1979                      |
| 6/1984            | 1           | 3               |                              | Bürger 1900                               |
| 6/1986            | 1           | 1               |                              | Meade & Koehnken 1991                     |
| 1983              | 1           | 2               |                              | Meade & Koehenken 1991                    |
| 4/1984            | 1           | 1               |                              | Meade & Koehenken 1991                    |
| 11/1984           | 1           | >3              |                              | Meade & Koehenken 1991                    |
| 11/1984           | 1           | 1               |                              | Meade & Koehenken 1991                    |
| 11/1984           | 1           | >3              |                              | Meade & Koehenken 1991                    |
| 1970–1977         | 1           |                 |                              | Pilleri & Gihl 1977                       |
| b. 1974           | 1           |                 |                              | Trebbau & van Bree 1994                   |
| 1983–1986         | 1           | -3              |                              | Meade & Koehnken 1991                     |
| b. 1974           | 1           |                 |                              | Trebbau & van Bree 1974                   |
| 1981              | 1           | 2               |                              | Pilleri et al. 1982                       |
| 3/1993            | 4           | 1               | EBRG 17458                   | Bolaños Jiménez 1994, Agudo & Romero 1996 |
| 1981              | 1           | 1               |                              | Pilleri et al. 1982                       |
| 4/1984            | 1           | 1               |                              | Meade & Koehnken 1991                     |
| 6/1984            | 1           | 3               |                              | Meade & Koehnken 1991                     |
| 1/1985            | 1           | 1               |                              | Meade & Koehnken 1991                     |
|                   | 4           | 1               | EBRG 4128                    | Bolaños Jiménez 1994                      |
| 5/1967            | 4,6         | 1               | USNM 406802                  | Handley 1976                              |
| 11/1984           | 1           | 3               |                              | Meade & Koehnken 1991                     |
| 1989              | 4           | 1               | MCNUSB w/n                   | Bolaños Jiménez 1994, Agudo & Romero 1996 |
| 9/1984            | 1           | 2               |                              | Meade & Koehnken 1991                     |
| 6/1986            | 1           | 1               |                              | Meade & Koehnken 1991                     |
| 6/1985            | 1           | 4-5             |                              | Meade & Koehnken 1991                     |
| 4/1981            | 1           | 12              |                              | Pilleri & Pilleri 1992                    |
| 10/1984           | 1           | >3              |                              | Meade & Koehnken 1991                     |
| 1983              | 1           | 3               |                              | Meade & Koehnken 1991                     |
| b. 1988           | 1           | >1              |                              | O'Hanlon 1988                             |
| 5/1986            | 1           | 2               |                              | Meade & Koehnken 1991                     |
| 1970–1977         | 1           |                 |                              | Pilleri & Gihl 1977                       |
| 1974              | 1           |                 |                              | Trebbau & van Bree 1974                   |
| 8/1951            | 1           |                 |                              | Anduze 1960                               |
| 5/1986            | 1           | 1               |                              | Meade & Koehnken 1991                     |
| 5/1986            | 1           | 2               |                              | Meade & Koehnken 1991                     |

continued

Table 2 (continued)

| Record | Species               | Locality  | Lat.<br>°N | Long.<br>°W |
|--------|-----------------------|---|------------|-------------|
| 259    | <i>I. geoffrensis</i> | TEMI  | 3 15       | 67 25       |
| 260    | <i>I. geoffrensis</i> | TEMI: TUAMINI   | 3 14       | 67 23       |
| 261    | <i>I. geoffrensis</i> | VENTUARI: San Juan                                    | 5 21       | 66 03       |
| 262    | <i>I. geoffrensis</i> | VENTUARI: San Juan                                    | 5 21       | 66 03       |
| 263    | <i>I. geoffrensis</i> | VENTUARI: Kanaripó                                    | 4 05       | 66 51       |
| 264    | <i>I. geoffrensis</i> | VENTUARI: Kanaripó                                    | 4 05       | 66 51       |
| 265    | <i>I. geoffrensis</i> | VENTUARI: Kanaripó                                    | 4 05       | 66 51       |
| 266    | <i>I. geoffrensis</i> | VENTUARI: Kanaripó                                    | 4 05       | 66 51       |
| 267    | <i>I. geoffrensis</i> | VENTUARI: Kanaripó                                    | 4 05       | 66 51       |
| 268    | <i>I. geoffrensis</i> | Isla de Margarita                                     |            |             |
| 269    | <i>S. bredanensis</i> | VENEZUELA: Caribbean                                  |            |             |
| 270    | <i>S. bredanensis</i> | SUCRE: Ensenada de Tigriilo                           | 10 22      | 64 23       |
| 271    | <i>S. fluviatilis</i> | VENEZUELA   |            |             |
| 272    | <i>S. fluviatilis</i> | DELTA DEL ORINOCO: Orinoco-Arature confluence         | 8 36       | 60 54       |
| 273    | <i>S. fluviatilis</i> | DELTA DEL ORINOCO: Cano Araguaito                     | 8 50       | 61 33       |
| 274    | <i>S. fluviatilis</i> | DELTA DEL ORINOCO: Cano Araguaito                     | 8 50       | 61 33       |
| 275    | <i>S. fluviatilis</i> | DELTA DEL ORINOCO: Cano Araguaito                     | 8 50       | 61 33       |
| 276    | <i>S. fluviatilis</i> | SUCRE: RÍO SAN JUAN, Golfo de Paria                   | 10 06      | 62 38       |
| 277    | <i>S. fluviatilis</i> | BOLIVAR: ORINOCO above Ciudad Guayana                 | 8 22       | 62 36       |
| 278    | <i>S. fluviatilis</i> | SUCRE: CAÑO GUARIQUEN                                 | 10 24      | 62 53       |
| 279    | <i>S. fluviatilis</i> | SUCRE: RÍO MANZANARES                                 | 10 27      | 64 10       |
| 280    | <i>S. fluviatilis</i> | ORINOCO: Vuelta del Torno, Isla del Infierno          | 8 04       | 64 24       |
| 281    | <i>S. fluviatilis</i> | ORINOCO: La Esmeralda                                 | 3 10       | 65 32       |
| 282    | <i>S. fluviatilis</i> | ORINOCO: between Cabruta and Caicara                  | 7 40       | 66 15       |
| 283    | <i>S. fluviatilis</i> | VARGAS  |            |             |
| 284    | <i>S. fluviatilis</i> | FALCON: Playa Sixto, La Vela de Coro                  | 11 28      | 69 35       |
| 285    | <i>S. fluviatilis</i> | FALCON: mouth RÍO CORO                                | 11 28      | 69 35       |
| 286    | <i>S. fluviatilis</i> | ZULIA   |            |             |
| 287    | <i>S. fluviatilis</i> | ZULIA: Canada de Hamburgo, Estrecho Lago de Maracaibo | 10 35      | 71 35       |
| 288    | <i>S. fluviatilis</i> | ZULIA: Lago de Maracaibo                              | 10 00      | 71 40       |
| 289    | <i>S. fluviatilis</i> | ZULIA: Lago de Maracaibo                              | 10 00      | 71 40       |
| 290    | <i>S. fluviatilis</i> | ZULIA: Lago de Maracaibo                              | 10 00      | 71 40       |
| 291    | <i>S. fluviatilis</i> | ZULIA: Lago de Maracaibo                              | 10 00      | 71 40       |
| 292    | <i>S. fluviatilis</i> | ZULIA: 15 km N Caimare Chico, Municipio Páez          | 11 40      | 71 40       |
| 293    | <i>S. fluviatilis</i> | ZULIA: 15 km N Caimare Chico, Municipio Páez          | 11 40      | 71 40       |
| 294    | <i>S. fluviatilis</i> | ZULIA: 15 km N Caimare Chico, Municipio Páez          | 11 40      | 71 40       |
| 295    | <i>S. fluviatilis</i> | ZULIA: 15 km N Caimare Chico, Municipio Páez          | 11 40      | 71 40       |
| 296    | <i>S. fluviatilis</i> | ZULIA: 15 km N Caimare Chico, Municipio Páez          | 11 40      | 71 40       |
| 297    | <i>S. fluviatilis</i> | ZULIA: South Lago de Maracaibo                        | 9 15       | 71 45       |
| 298    | <i>S. fluviatilis</i> | ZULIA: Boca de la Laguna La Paloma                    | 9 30       | 71 50       |
| 299    | <i>S. fluviatilis</i> | ZULIA: Boca de la Laguna La Paloma                    | 9 30       | 71 50       |
| 300    | <i>S. fluviatilis</i> | ZULIA: San Isidro, Laguna de Lagunetas                | 9 30       | 71 55       |
| 301    | <i>S. fluviatilis</i> | ZULIA: San Isidro, Laguna de Lagunetas                | 9 30       | 71 55       |
| 302    | <i>S. fluviatilis</i> | ZULIA: San Isidro, Laguna de Lagunetas                | 9 30       | 71 55       |
| 303    | <i>S. fluviatilis</i> | ZULIA: San Isidro, Laguna de Lagunetas                | 9 30       | 71 55       |
| 304    | <i>S. fluviatilis</i> | ZULIA: San Isidro, Laguna de Lagunetas                | 9 30       | 71 55       |
| 305    | <i>S. fluviatilis</i> | ZULIA: Ologa  | 9 30       | 72 00       |
| 306    | <i>S. fluviatilis</i> | ZULIA: Ologa  | 9 30       | 72 00       |
| 307    | <i>S. fluviatilis</i> | ZULIA: Rio Zulia, confluence with Catatumbo           | 9 04       | 72 17       |
| 308    | <i>G. griseus</i>     | La Blanquilla Is.                                     | 11 48      | 64 37       |
| 309    | <i>G. griseus</i>     | Ensenada El Falucho, La Blanquilla Is.                | 11 49      | 64 38       |
| 310    | <i>T. truncatus</i>   | SUCRE: Boca de Drago                                  | 10 44      | 61 48       |
| 311    | <i>T. truncatus</i>   | SUCRE: Boca de Drago                                  | 10 44      | 61 48       |

Table 2 (continued)

| Date <sup>1</sup> | Record type | No. of individ. | Museum specimen <sup>2</sup> | Reference <sup>3</sup>                    |
|-------------------|-------------|-----------------|------------------------------|---|
| 4/1800            | 1           |                 |                              | von Humboldt 1814                         |
| 5/1800            | 1           |                 |                              | von Humboldt 1814                         |
| 1983              | 1           | >3              |                              | Meade & Koehnken 1991                     |
| 7/1983            | 1           | >3              |                              | Meade & Koehnken 1991                     |
| 4/1984            | 1           | 2               |                              | Meade & Koehnken 1991                     |
| 5/1984            | 1           | 1               |                              | Meade & Koehnken 1991                     |
| 5/1984            | 1           | >3              |                              | Meade & Koehnken 1991                     |
| 8/1984            | 1           | 1               |                              | Meade & Koehnken 1991                     |
| 6/1986            | 1           | 1               |                              | Meade & Koehnken 1991                     |
|                   | 4           | 1               | MCNC 215                     | Trebbau & van Bree 1974                   |
|                   | 1           | 1               |                              | Ernst 1981                                |
| 8/1986            | 2, 5        | 1               |                              | Agudo 1995                                |
|                   | 6           | >1              |                              | Northridge 1984                           |
| 10/1990           | 1           | >4              |                              | Meade & Koehnken 1991                     |
| 10/1987           | 1           | >5              |                              | Meade & Koehnken 1991                     |
| 10/1989           | 1           | >2              |                              | Meade & Koehnken 1991                     |
| 10/1990           | 1           | >2              |                              | Meade & Koehnken 1991                     |
| 8/1978            | 1           | 3               |                              | Mondolfi & Muller <sup>d</sup>            |
| 10/1990           | 1           | 2               |                              | Meade & Koehnken 1991                     |
| 3/1990            | 1           | 2               |                              | A. Martínez and D. Mueler*                |
| 7/1799            | 1           | >1              |                              | von Humboldt 1814                         |
| 4/1986-3/1987     | 2           | >1              |                              | Maraven                                   |
| 1/1990            | 1           | >1              |                              | Borobia et al. 1991 + J. Ojasti*          |
| 1/1990            | 1           | >1              |                              | Borobia et al. 1991 + J. Ojasti*          |
|                   | 4           | 1               | MBUCV 136                    | A. Mayayo**                               |
| 2/1985            | 4           | 1               | MCIMAR n/n                   | Agudo et al. 1994                         |
| 1960's            | 1           | >1              |                              | J. Coty*                                  |
| b. 1996           | ?           | 4               |                              | Alvarado et al. 1995                      |
| 5/1985            | 5,6         | 1               | MBLUZ-M-0006                 | Agudo et al. 1994                         |
| 6/1911            | 4           | 1               | FMNH 18801                   | Osgood 1912, Borobia et al. 1991          |
| 6/1911            | 4           | 1               | FMNH 18802                   | Osgood 1912, Borobia et al. 1991          |
| 5/1912            | 4           | 1               | FMNH 34906                   | Borobia et al. 1991                       |
| 5/1912            | 4           | 1               | FMNH 34907                   | Borobia et al. 1991                       |
| 3/1977            | 5           | 1               | MCIBLUZ-M-775                | Agudo et al. 1994                         |
| 3/1977            | 5           | 1               | MCIBLUZ-M-776                | Agudo et al. 1994                         |
| 3/1977            | 5           | 1               | MCIBLUZ-M-777                | Agudo et al. 1994                         |
| 3/1987            | 5           | 1               | MCIBLUZ-M-7710               | Agudo et al. 1994                         |
| 1989              | 5           | 1               | MCIBLUZ-M-0152               | Agudo et al. 1994                         |
| 1987              | 1           | >1              |                              | Duarte Leal 1991                          |
| 4/1991            | 5           | 1               | MBLUZ-M-0165                 | Agudo et al. 1994                         |
| 4/1991            | 1           | >1              |                              | Rodríguez et al. 1993                     |
| 2/1981            | 5           | 1               | EBRG 2748                    | Casinos et al. 1981                       |
| 2/1981            | 5           | 1               | EBRG n/n                     | Casinos et al. 1981                       |
| 2/1981            | 5           | 1               | MBUCV 2819                   | Casinos et al. 1981, da Silva & Best 1994 |
| 2/1981            | 4           | 1               | EBRG CD 38                   | Bolaños Jiménez 1994, Agudo & Romero 1996 |
| 11/1981           | 4           | 1               | EBRG 2891                    | Bolaños Jiménez 1994, Agudo & Romero 1996 |
| 4/1991            | 5           | 1               | EBRG 17056                   | Bolaños Jiménez 1994, Agudo & Romero 1996 |
| b. 1993           | 3           | 8               |                              | Caballero 1992                            |
| 1990              | 1           | 5               |                              | Agudo 1995                                |
| 8/1988            | 7           | 1               | MCNUSB n/n                   | Romero et al. 1991                        |
| 8/1988            | 1           | >1              |                              | Agudo 1995b                               |
| 1988              | 4           | 1               | EBRG 10836                   | Romero et al. 1991                        |
| 1988              | 4           | 1               | EBRG 10837                   | Romero et al. 1991                        |

continued



Table 2 (continued)

| Record | Species                | Locality   | Lat.<br>°N | Long.<br>°W |
|--------|------------------------|--|------------|-------------|
| 312    | <i>T. truncatus</i>    | SUCRE: Boca de Drago                                       | 10 44      | 61 48       |
| 313    | <i>T. truncatus</i>    | N. ESPARTA: Playa Pampatar                                 | 10 59      | 63 48       |
| 314    | <i>T. truncatus</i>    | N. ESPARTA: Southern beach, Municipio Tubores              | 10 53      | 64 05       |
| 315    | <i>T. truncatus</i>    | N. ESPARTA: Isla de Margarita                              | 11 00      | 64 05       |
| 316    | <i>T. truncatus</i>    | N. ESPARTA: Cubagua  | 10 48      | 64 10       |
| 317    | <i>T. truncatus</i>    | SUCRE: Off Cumaná  | 10 29      | 64 11       |
| 318    | <i>T. truncatus</i>    | SUCRE: Playa Los Uveros, Carúpano                          | 10 40      | 64 15       |
| 319    | <i>T. truncatus</i>    | SUCRE: Off Araya beaches, Península de Araya               | 10 35      | 64 17       |
| 320    | <i>T. truncatus</i>    | SUCRE: Golfo de Santa Fé                                   | 10 15      | 64 25       |
| 321    | <i>T. truncatus</i>    | La Blanquilla  | 10 50      | 64 37       |
| 322    | <i>T. truncatus</i>    | ANZOATEGUI: Mouth of RIO UNARE                             | 10 06      | 65 12       |
| 323    | <i>T. truncatus</i>    | MIRANDA: Carenero-Buche-Los Totumos                        | 10 30      | 66 05       |
| 324    | <i>T. truncatus</i>    | VARGAS: Balneario Naiguatá                                 | 10 38      | 66 44       |
| 325    | <i>T. truncatus</i>    | FALCON: Isla de Pájaros                                    | 10 50      | 68 15       |
| 326    | <i>T. truncatus</i>    | FALCON: Isla de Pájaros                                    | 10 50      | 68 15       |
| 327    | <i>T. truncatus</i>    | FALCON: Isla de Pájaros                                    | 10 50      | 68 15       |
| 328    | <i>T. truncatus</i>    | ZULIA  |            |             |
| 329    | <i>T. truncatus</i>    | ZULIA: Caimare Chico, Distrito Páez                        | 11 40      | 71 40       |
| 330    | <i>S. frontalis</i>    | VENEZUELA  |            |             |
| 331    | <i>S. frontalis</i>    | VENEZUELA  | 10 57      | 61 34       |
| 332    | <i>S. frontalis</i>    | VENEZUELA  | 11 02      | 61 54       |
| 333    | <i>S. frontalis</i>    | VENEZUELA  | 11 02      | 61 54       |
| 334    | <i>S. frontalis</i>    | VENEZUELA  | 11 00      | 62 07       |
| 335    | <i>S. frontalis</i>    | VENEZUELA  | 11 25      | 62 22       |
| 336    | <i>S. frontalis</i>    | SUCRE: El Morro de Puerto Santo                            | 10 44      | 63 09       |
| 337    | <i>S. frontalis</i>    | SUCRE: El Morro de Puerto Santo                            | 10 44      | 63 09       |
| 338    | <i>S. frontalis</i>    | VENEZUELA  | 11 00      | 64 00       |
| 339    | <i>S. frontalis</i>    | N. ESPARTA: Ensenada La Guardia, Isla de Margarita         | 11 03      | 64 12       |
| 340    | <i>S. frontalis</i>    | SUCRE: Golfo de Santa Fe                                   | 10 15      | 64 25       |
| 341    | <i>S. frontalis</i>    | Isla La Tortuga  | 10 57      | 65 13       |
| 342    | <i>S. frontalis</i>    | Isla La Tortuga  | 10 56      | 65 18       |
| 343    | <i>S. frontalis</i>    | ANZOATEGUI: Boca de Uchire                                 | 10 09      | 65 26       |
| 344    | <i>S. frontalis</i>    | VARGAS: N Cabo Codera                                      | 10 36      | 66 03       |
| 345    | <i>S. frontalis</i>    | VENEZUELA  | 10 52      | 66 28       |
| 346    | <i>S. frontalis</i>    | VENEZUELA  | 10 52      | 66 28       |
| 347    | <i>S. frontalis</i>    | VENEZUELA  | 10 41      | 66 00       |
| 348    | <i>S. frontalis</i>    | FALCON: Playa Sixto, La Vela de Coro                       | 11 28      | 69 35       |
| 349    | <i>S. frontalis</i>    | ZULIA  |            |             |
| 350    | <i>S. frontalis</i>    | ZULIA: Isla San Carlos, N shore, Municipio Insular Padilla | 10 59      | 71 36       |
| 351    | <i>S. frontalis</i>    | ZULIA: Isla San Carlos, N shore, Municipio Insular Padilla | 10 59      | 71 36       |
| 352    | <i>S. frontalis</i>    | ZULIA: Caimare Chico, Municipio Páez                       | 11 40      | 71 40       |
| 353    | <i>S. attenuata</i>    | ANZOATEGUI   |            |             |
| 354    | <i>S. longirostris</i> | VENEZUELA  |            |             |
| 355    | <i>S. longirostris</i> | SUCRE: El Morro de Puerto Santo                            | 10 44      | 63 09       |
| 356    | <i>S. longirostris</i> | SUCRE: El Morro de Puerto Santo                            | 10 44      | 63 09       |
| 357    | <i>S. longirostris</i> | SUCRE: El Morro de Puerto Santo                            | 10 44      | 63 09       |
| 358    | <i>S. longirostris</i> | SUCRE: Off Turpialito, Golfo de Cariaco                    | 10 26      | 64 02       |
| 359    | <i>S. longirostris</i> | N. ESPARTA: Isla de Margarita                              | 11 00      | 64 05       |
| 360    | <i>S. longirostris</i> | SUCRE: Off RÍO MANZANARES mouth, Cumaná                    | 10 28      | 64 11       |
| 361    | <i>S. longirostris</i> | SUCRE: Punta Arenas, Peninsula de Araya                    | 10 30      | 64 14       |
| 362    | <i>S. longirostris</i> | SUCRE: Punta Arenas, Peninsula de Araya                    | 10 30      | 64 14       |
| 363    | <i>S. longirostris</i> | SUCRE: Bahía de Mochima                                    | 10 21      | 64 21       |
| 364    | <i>S. longirostris</i> | SUCRE: Golfo de Santa Fé, Parque Nacional Mochima          | 10 19      | 64 25       |

Table 2 (continued)

| Date <sup>1</sup> | Record type | No. of individ. | Museum specimen <sup>2</sup> | Reference <sup>3</sup>                                  |
|-------------------|-------------|-----------------|------------------------------|---|
| 1988              | 4           | 1               | EBRG 10838                   | Romero et al. 1991                                      |
| 3/1990            | 5           | 1               |                              | Agudo 1995  |
| 1960–1961         | 5           | 1               | MDMBR n/n                    | Bolaños Jiménez 1994                                    |
| b. 1981           | 1,6         | >1              |                              | Cervigón & Velásquez 1981                               |
| 4/1970            | 4           | 1               | Fundación La Salle           | Casinos 1986  |
| 3/1990            | 1           | >1              |                              | I. Agudo**  |
| 5/1990            | 5           | 1               |                              | Agudo 1995  |
| 4/1990            | 2           | -50             |                              | C.J. Rodríguez-Blondell*                                |
| 3/1990            | 3, 6        | 1               |                              | Agudo 1995  |
| 3/1966            | 7           | 1               |                              | Caldwell & Caldwell 1971b                               |
|                   | 5           | 1               | MHNSL n/n                    | Bolaños Jiménez 1994, Agudo & Romero 1996               |
| 1973              | 1           | 12              |                              | J. Sánchez*   |
| 4/1962            | 3, 5        | 1               |                              | Agudo 1995  |
| 9/1986            | 1,7         | 30              |                              | Tami et al. 1987  |
| 9/1986            | 4           | 1               | EBRG 13639                   | Romero et al. 1991                                      |
| 9/1986            | 4           | 1               | EBRG 15484                   | I. Agudo**  |
| b. 1996           | ?           | 4               |                              | Alvarado et al. 1995                                    |
| 7/1977            | 5           | 1               | CVTLUZ-MAM-778               | Agudo et al. 1994                                       |
|                   | 4           | 1               | MCNUSB n/n                   | A.I. Agudo**  |
|                   | 4           | 1               | EDM 710                      | Perrin et al. 1987                                      |
| 2/1969            | 4           | 1               | AMNH 239112                  | Perrin et al. 1987                                      |
| 2/1969            | 4           | 1               | AMNH 239114                  | Perrin et al. 1987                                      |
| 2/1972            | 1           | 12-15           |                              | Taruski & Winn 1976                                     |
| 2/1972            | 1           | 12              |                              | Taruski & Winn 1976                                     |
| 8/1988            | 4,6         | 1               | EBRG 16884                   | Agudo 1990, Romero et al. 1991                          |
| 8/1988            | 4,6         | 1               | EBRG 16889                   | Agudo 1990, Romero et al. 1991                          |
|                   | 1           |                 |                              | Perrin et al. 1987                                      |
| 1991              | 5           | 1               | MEDIMAR n/n                  | Bolaños Jiménez 1994, Agudo & Romero 1996               |
| 9/1988            | 3, 6        | 1               |                              | H. Ramírez Nahim*                                       |
| 1/1998            | 5           | >100            |                              | Bolaños & Boher 1998                                    |
| 5/1990            | 1           | 25              |                              | A. Martínez, R. Verginelli-Torres*                      |
| 1989              | 5           | 1               | MCNUSB n/n                   | Agudo 1995  |
| 9/1989            | 2           |                 |                              | Rev. Business Venezuela Kersher 1991 + H. Ramírez Nahim |
| 9/1966            | 4           | 1               | AMNH 239113                  | Perrin et al. 1987                                      |
|                   | 4           | 1               | EDM 706                      | Perrin et al. 1987                                      |
|                   | 4           | 2               | ZMA n/n                      | Perrin et al. 1987                                      |
| 3/1990            | 4,5         | 1               | MCIMAR n/n                   | Agudo 1995  |
| b. 1996           | ?           | 4               |                              | Alvarado et al. 1995                                    |
| 6/1900            | 4           | 1               | IC n/n                       | Agudo et al. 1994                                       |
| 4/1994            | 4,5         | 1               | IC n/n                       | Agudo et al. 1994                                       |
| 1991              | 4           | 1               | IC n/n                       | Agudo et al. 1994                                       |
| 1979              | 1           | 2               |                              | G. Notarbartolo di Sciarra**                            |
| 1969              | 2           | 3               |                              | Leatherwood et al. 1976                                 |
| 8/1988            | 4,6         | 1               | EBRG 16885                   | Agudo 1990, Romero et al. 1991                          |
| 8/1988            | 4,6         | 1               | EBRG 16886                   | Agudo 1990, Romero et al. 1991                          |
| 8/1988            | 4,6         | 1               | EBRG 16888                   | Agudo 1990, Romero et al. 1991                          |
| 1989              | 1           | >1              |                              | I. Agudo**  |
| 11/1979           | 1           | 150-400         |                              | Perrin et al. 1981                                      |
| 5/1990            | 1           | 13              |                              | R. Verginelli-Torres*                                   |
| 11/1799           | 1           | 15-16           |                              | von Humboldt 1814                                       |
| 2/1990            | 1           | 6               |                              | A.I. Agudo**  |
| 8/1990            | 1           | 26              |                              | I. Agudo**  |
| 10/1986           | 3           | 1               |                              | Siglo 21, Cumana  |

continued

Table 2 (continued)

| Record | Species                | Locality   | Lat.<br>°N | Long.<br>°W |
|--------|------------------------|--|------------|-------------|
| 365    | <i>S. longirostris</i> | ANZOATEGUI: W Isla Caracas del Este                                  | 10 16      | 64 27       |
| 366    | <i>S. longirostris</i> | ANZOATEGUI: Puerto La Cruz   | 10 13      | 64 38       |
| 367    | <i>S. longirostris</i> | ANZOATEGUI: Puerto La Cruz-Punta Peñas                               | 10 16      | 64 38       |
| 368    | <i>S. longirostris</i> | VARGAS: Punta El Caribe, Camurí Chico                                | 10 38      | 66 42       |
| 369    | <i>S. longirostris</i> | Isla de Barlovento, Archipiélago Las Aves                            | 11 58      | 67 27       |
| 370    | <i>S. longirostris</i> | NE Paraguaná- I. Aves de Sotavento-Arch. Las Aves                    | 12 00      | 67 40       |
| 371    | <i>S. clymene</i>      | SUCRE: El Morro de Puerto Santo                                      | 10 44      | 63 09       |
| 372    | <i>S. coeruleoalba</i> | 5 nautical mi. S La Blanquilla Is.                                   | 10 43      | 64 35       |
| 373    | <i>S. coeruleoalba</i> | 15 nautical mi. SW La Blanquilla Is.                                 | 11 40      | 64 50       |
| 374    | <i>S. coeruleoalba</i> | VENEZUELA  | 12 55      | 67 00       |
| 375    | <i>D. capensis</i>     | VENEZUELA  |            |             |
| 376    | <i>D. capensis</i>     | VENEZUELA  |            |             |
| 377    | <i>D. capensis</i>     | VENEZUELA  |            |             |
| 378    | <i>D. capensis</i>     | VENEZUELA  |            |             |
| 379    | <i>D. capensis</i>     | VENEZUELA  |            |             |
| 380    | <i>D. capensis</i>     | VENEZUELA  |            |             |
| 381    | <i>D. capensis</i>     | VENEZUELA  |            |             |
| 382    | <i>D. capensis</i>     | SUCRE: El Morro de Puerto Santo                                      | 10 44      | 63 09       |
| 383    | <i>D. capensis</i>     | SUCRE: El Morro de Puerto Santo                                      | 10 44      | 63 09       |
| 384    | <i>D. capensis</i>     | SUCRE: El Morro de Puerto Santo                                      | 10 44      | 63 09       |
| 385    | <i>D. capensis</i>     | SUCRE: El Morro de Puerto Santo                                      | 10 44      | 63 09       |
| 386    | <i>D. capensis</i>     | SUCRE: El Morro de Puerto Santo                                      | 10 44      | 63 09       |
| 387    | <i>D. capensis</i>     | SUCRE: El Morro de Puerto Santo                                      | 10 44      | 63 09       |
| 388    | <i>D. capensis</i>     | VENEZUELA  | 10 54      | 63 38       |
| 389    | <i>D. capensis</i>     | N. ESPARTA: Bella Vista, Porlamar, Isla de Margarita                 | 10 58      | 63 49       |
| 390    | <i>D. capensis</i>     | N. ESPARTA: Playa La Galera, Juan Griego, Isla de Margarita          | 11 05      | 63 59       |
| 391    | <i>D. capensis</i>     | N. ESPARTA: Punta de Piedras, Isla de Margarita                      | 10 54      | 64 06       |
| 392    | <i>D. capensis</i>     | N. ESPARTA: Laguna de Raya, Isla de Margarita                        | 10 55      | 64 06       |
| 393    | <i>D. capensis</i>     | N. ESPARTA: Laguna de Raya, Isla de Margarita                        | 10 55      | 64 06       |
| 394    | <i>D. capensis</i>     | N. ESPARTA: Isla de Margarita  | 11 00      | 64 06       |
| 395    | <i>D. capensis</i>     | N. ESPARTA: Isla de Margarita  | 11 00      | 64 06       |
| 396    | <i>D. capensis</i>     | SUCRE: Golfo de Cariaco  | 10 30      | 64 10       |
| 397    | <i>D. capensis</i>     | N. ESPARTA: Playa La Yegua, Isla de Margarita                        | 10 58      | 64 10       |
| 398    | <i>D. capensis</i>     | SUCRE: Off Cumaná  | 10 29      | 64 11       |
| 399    | <i>D. capensis</i>     | N. ESPARTA: Playa El Saco, Ensenada de La Guardia, Isla de Margarita | 11 03      | 64 12       |
| 400    | <i>D. capensis</i>     | SUCRE: Playa San Luis, Cumaná  | 10 27      | 64 13       |
| 401    | <i>D. capensis</i>     | SUCRE: Playa San Luis, Cumaná  | 10 27      | 64 13       |
| 402    | <i>D. capensis</i>     | Between Puerto La Cruz and Porlamar                                  | 10 40      | 64 20       |
| 403    | <i>D. capensis</i>     | Between Mochima and Península de Macanao                             | 10 40      | 64 20       |
| 404    | <i>D. capensis</i>     | SUCRE: W coast of the Sucre state                                    | 10 27      | 64 22       |
| 405    | <i>D. capensis</i>     | SUCRE: Parque Nacional Mochima                                       | 10 22      | 64 22       |
| 406    | <i>D. capensis</i>     | ANZOATEGUI: Punta Tigrillo   | 10 22      | 64 23       |
| 407    | <i>D. capensis</i>     | N. ESPARTA: Robledal   | 11 02      | 64 24       |
| 408    | <i>D. capensis</i>     | ANZOATEGUI: N Isla Caracas   | 10 25      | 64 26       |
| 409    | <i>D. capensis</i>     | NW Isla Caracas and I. Picuda Grande                                 | 10 24      | 64 28       |
| 410    | <i>D. capensis</i>     | ANZOATEGUI: Off Puerto La Cruz                                       | 10 13      | 64 31       |
| 411    | <i>D. capensis</i>     | Between Puerto La Cruz and Punta Penas                               | 10 16      | 64 38       |
| 412    | <i>D. capensis</i>     | N. ESPARTA: Beach south Municipio Tubores                            | 10 54      | 65 05       |
| 413    | <i>D. capensis</i>     | MIRANDA: 1 mi. N Cabo Codera   | 10 35      | 66 03       |
| 414    | <i>D. capensis</i>     | VARGAS: Playa Pescao, Los Caracas                                    | 10 38      | 66 34       |
| 415    | <i>F. attenuata</i>    | FALCON: Playa Tutacas  | 10 48      | 68 19       |
| 416    | <i>P. crassidens</i>   | SUCRE  |            |             |
| 417    | <i>P. crassidens</i>   | Agudo 1995b  | 10 16      | 64 38       |

Table 2 (continued)

| Date <sup>1</sup> | Record type | No. of individ. | Museum specimen <sup>2</sup> | Reference <sup>3</sup>                                    |
|-------------------|-------------|-----------------|------------------------------|---|
| 10/1979           | 1           | -500            |                              | Gremone 1979c   |
|                   | 2           | 4               |                              | Leatherwood et al. 1982                                   |
| 8/1979            | 1           | 30              |                              | Notarbartolo di Sciara, text fn 2                         |
| 1977              | 2           |                 |                              | Prieto 1977   |
| 11/1971           | 4           | 1               | ZMA 15138                    | van Halewijn & van Bree 1972                              |
| 4/1990            | 2           |                 |                              | M.E. Capaldo  |
| 8/1988            | 4, 7        | 1               | EBRG 16887                   | Agudo 1990, Agudo & Romero 1996                           |
| 8/1993            | 2           | 20              |                              | R. Varela and J.C. Capelo*                                |
| 3/1990            | 1           | 12              |                              | G. Solé*  |
| 7/1991            | 1           | 25              |                              | Jefferson & Lynn 1994                                     |
|                   | 4           | 1               | MDMBR n/n                    | Bolaños Jiménez 1994, Agudo & Romero 1996                 |
|                   | 4           | 1               | MDMBR n/n                    | Bolaños Jiménez 1994, Agudo & Romero 1996                 |
|                   | 4           | 1               | MDMCU n/n                    | Bolaños Jiménez 1994, Agudo & Romero 1996                 |
|                   | 4           | 1               | MDMCU n/n                    | I. Agudo**  |
| b. 1868           | 1           |                 |                              | Ernst 1868  |
| b. 1877           | 1           |                 |                              | Ernst 1877  |
| b. 1891           | 1           |                 |                              | Ernst 1891  |
| 2/1993            | 2, 6        | 13              |                              | Romero et al. 1997b                                       |
| 2/1993            | 4,6         | 1               | MHNLS n/n                    | A.I. Agudo and A. Romero**                                |
| 2/1993            | 4,6         | 1               | MHNLS n/n                    | A.I. Agudo and A. Romero**                                |
| 2/1993            | 4,6         | 1               | MHNLS n/n                    | A.I. Agudo and A. Romero**                                |
| 2/1993            | 4,6         | 1               | MHNLS n/n                    | A.I. Agudo and A. Romero**                                |
| 2/1993            | 4,6         | 1               | MHNLS n/n                    | A.I. Agudo and A. Romero**                                |
| 9/1966            | 4           | 1               | EDM 709                      | Mitchell 1970   |
| 1/1994            | 4,6         | 2               | MDMBR n/n                    | Agudo 1995  |
| 12/1992           | 4           | 1               | LBCS w/n                     | Agudo & Romero 1996                                       |
| 2/1993            | 5           | 1               | MDMBR n/n                    | Bolaños Jiménez 1994, Agudo & Romero 1996                 |
| 5/1994            | 5           | 1               | MDMBR n/n                    | Agudo 1995  |
| 5/1955            | 5           | 3               |                              | García et al. 1995, Díaz et al. 1995, Bolaños et al. 1995 |
| b. 1884           | 1           | 1               |                              | Ernst 1884  |
| b. 1981           | 1           | >1              |                              | Cervigón & Velásquez 1981                                 |
| b. 1977           | 2, 6        | 1               |                              | Flores 1977   |
| 6/1993            | 5           | 1               | MDMBR n/n                    | Bolaños Jiménez 1994, Agudo & Romero 1996                 |
| 3/1990            | 1           | >1              |                              | I. Agudo**  |
| 6/1993            | 5           | 1               | MDMBR n/n                    | Bolaños Jiménez 1994, Agudo & Romero 1996                 |
| 1/1971            | 5           | 1               | MDMCU n/n                    | Romero et al. 1991  |
| 5/1977            | 5           | 1               | MDMCU n/n                    | Romero et al. 1991  |
| 10-11/1977        | 1           | 5-1,000         |                              | Evans et al. 1979   |
| 6/1979            | 1           | >300            |                              | Gremone 1979a   |
| 1/1979            | 1,6         | -350            |                              | Notarbartolo Di Sciara <sup>o</sup>                       |
| 1989              | 2           | 12              |                              | Jácome 1989   |
| 7/1979            | 4,6         | 4               | EBRG CD37                    | Gremone 1979a, Agudo & Romero 1996                        |
| 10/1971           | 4,6         | 1               | ZMA 15137                    | van Halewijn & van Bree 1972                              |
| 9/1979            | 1           | 16x15-200       |                              | Gremone 1979b,c   |
| 9/1979            | 1           | >1              |                              | Gremone 1979b   |
| 1977              | 1           | >1              |                              | Mondolfi 1981   |
| 8/1979            | 1           | 820             |                              | Agudo 1995b   |
| 1960-1961         | 4           | 1               | MDMBR n/n                    | Bolaños Jiménez 1994, Agudo & Romero 1996                 |
| 8/1990            | 1           | -50             |                              | I. Agudo*   |
| 8/1980            | 5           | 1               |                              | Agudo 1995  |
| 2/1998            | 1,5         | 3               |                              | Villarroel et al. 1998                                    |
|                   | 5           |                 |                              | Casinos 1986 + Castellanos*                               |
| 8/1979            | 1           |                 |                              | Mondolfi 1981   |

continued

Table 2 (continued)

| Record | Species                 | Locality  | Lat.<br>°N | Long.<br>°W |
|--------|-------------------------|---|------------|-------------|
| 418    | <i>P. crassidens</i>    | Cayo Bequeve, Arch. Los Roques                    | 11 52      | 66 55       |
| 419    | <i>P. crassidens</i>    | Archipiélago Las Aves                             | 12 00      | 67 33       |
| 420    | <i>P. crassidens</i>    | ANZOATEGUI: SE Cayo Borracha                      | 10 58      | 68 15       |
| 421    | <i>P. crassidens</i>    | FALCON: San Juan de los Cayos                     | 11 12      | 68 25       |
| 422    | <i>O. orca</i>          | SW Isla de Aves                                   | 15 30      | 63 45       |
| 423    | <i>O. orca</i>          | 40 Nautical miles SW of Isla de Aves              | 15 11      | 64 07       |
| 424    | <i>O. orca</i>          | SUCRE: N Isla Picúa Pequena and Picúa Grande      | 10 21      | 64 30       |
| 425    | <i>O. orca</i>          | SE Isla La Blanquilla                             | 11 46      | 64 30       |
| 426    | <i>O. orca</i>          | Isla La Blanquilla                                | 10 50      | 64 37       |
| 427    | <i>O. orca</i>          | NW Isla La Blanquilla                             | 11 58      | 64 38       |
| 428    | <i>O. orca</i>          | E Isla La Orchila                                 | 11 15      | 66 01       |
| 429    | <i>O. orca</i>          | Halfway between Arch. Los Roques and La Guaira    | 11 10      | 66 45       |
| 430    | <i>O. orca</i>          | VARGAS: Off La Guaira                             | 10 40      | 66 55       |
| 431    | <i>O. orca</i>          | FALCON: Playuela, Parque Nacional Morrocoy        | 10 50      | 68 14       |
| 432    | <i>O. orca</i>          | ZULIA: Isla de San Carlos, Bahía del Tablazo      | 10 59      | 71 36       |
| 433    | <i>G. macrorhynchus</i> | VENEZUELAN CARIBBEAN                              |            |             |
| 434    | <i>G. macrorhynchus</i> | N. ESPARTA: Isla de Margarita                     |            |             |
| 435    | <i>G. macrorhynchus</i> | N. ESPARTA: 20 km from El Guamache                | 10 53      | 64 03       |
| 436    | <i>G. macrorhynchus</i> | La Blanquilla                                     | 10 55      | 64 37       |
| 437    | <i>G. macrorhynchus</i> | La Blanquilla                                     | 10 55      | 64 37       |
| 438    | <i>G. macrorhynchus</i> | La Blanquilla                                     | 10 55      | 64 37       |
| 439    | <i>G. macrorhynchus</i> | 20 nautical mi. W La Blanquilla                   | 11 46      | 65 00       |
| 440    | <i>Z. cavirostris</i>   | N. ESPARTA: Tubores, Isla de Margarita            | 10 54      | 64 05       |
| 441    | <i>Z. cavirostris</i>   | Las Tres Playas, S. Coast La Blanquilla           | 11 48      | 64 37       |
| 442    | <i>Z. cavirostris</i>   | 3 nautical miles Playa El Yaque, S. La Blanquilla | 11 48      | 64 38       |
| 443    | <i>Z. cavirostris</i>   | ZULIA: Playa Zulia-Mar, N Caimare Chico           | 11 13      | 71 52       |

<sup>1</sup> Record types: 1 = sighting; 2 = photograph or videotape; 3 = tagging; 4 = museum specimen; 5 = stranding; 6 = intentional capture; 7 = incidental capture.

<sup>2</sup> The abbreviations for museum collections can be found in Appendix I.

<sup>3</sup> \* = personal observation by person cited (affiliations are given in the acknowledgments section). \*\* = personal observation by one of the authors.

<sup>4</sup> Mitchell, E. D., and V. M. Kozicki. 1974. The sei whale (*Balaenoptera borealis*) in the northwest Atlantic Ocean. IWC/SC/SP74/32, Arctic Biological Station, Fisheries and Marine Service, Department of the Environment, Box 400, Ste. Anne de Bellevue, Province de Quebec, Canada, 48 p., unpubl. manuscr.

<sup>5</sup> Mondolfi, E. 1981. A preliminary report of the marine mammals in Venezuelan waters, Escuela de Biología, Universidad Central de Venezuela, Caracas, Venezuela, 10 p., unpubl. manuscr.

<sup>6</sup> Anduze, P. J. 1954. Orden Cetacea. In Mamíferos de Venezuela, insectívora perisodactyla. Bibl. FLASA, Soc. Cienc. Nat. La Salle, Caracas, 412 p., unpubl. manuscr.

“Tonina,” a derivative of the Latin word *thunnus* (tuna), was introduced by the Spaniards in Latin America and used for dolphins because, to an untrained observer, they resemble tuna, but “tonina” is no longer used in Spain. It, along with “delfín” (dolphin) and “ballena” (whale), is used for many species and all three words are thus very imprecise. There is also a great deal of regional variation in usage. “Delfín,” for example, is used in Venezuelan urban areas to identify species of the genera *Steno*, *Sotalia*, *Delphinus*, *Tursiops*, and *Stenella*. “Tonina,” on the other hand, is used for the same species in rural areas. Thus, there is a need for standard nomenclature in vernacular Spanish names of cetaceans to facilitate communication for legislation, trade, and conservation purposes, and as synonyms in popular writing.

We therefore offer our recommendations for the common name for each species. For some species, this

is neither difficult nor controversial because we found a single name used universally. Other cases are more complex because names used by fishermen differ from those used by biologists, names vary geographically, the same name is used for several species, and there may be no vernacular name, particularly for rare species. Our recommendations have been guided by the principles adopted by the American Fisheries Society’s Committee on Names of Fishes (Robins et al., 1991) and the American Ornithologists’ Union’s Committee on Classification and Nomenclature (AOU, 1998).

The basis of our recommendations for common names is:

- 1) Uniqueness and lack of ambiguity, i.e., a single vernacular name for each species and no two species sharing the same Spanish name;

Table 2 (continued)

| Date <sup>1</sup> | Record type | No. of individ. | Museum specimen <sup>2</sup> | Reference <sup>3</sup>                           |
|-------------------|-------------|-----------------|------------------------------|--|
| 3/1993            | 2,5,6       | 1               |                              | Agudo 1995                                       |
| 6/1883            | 5           | 1               | USNM 20932                   | Miller 1921                                      |
| 7/1979            | 2           | 40              |                              | Notarbartolo Di Sciara <sup>9</sup>              |
| 1975–1976         | 5           | 1               | MCNUCV n/n / EBRG 17028      | Castellanos & Casinos 1982, Bolaños Jiménez 1994 |
| 10/1988           | 1           | 1               |                              | I. Agudo**                                       |
| 1989              | 1           | 1               |                              | G. Solé*   |
| 1987              | 2           | 1               |                              | L. Orive*  |
| 1991              | 3           |                 |                              | I. Agudo**                                       |
| 3/1894            | 1           | >1              |                              | Logbook of the schooner Golden City              |
| 10/1988           | 1           | 1               |                              | I. Agudo**                                       |
| 1991              | 3           | 1               |                              | I. Agudo**                                       |
| 1989              | 1           | 2               |                              | R. Verginelli-Torres*                            |
| 1989              | 1           | 6               |                              | P. Blanco*                                       |
| 7-8/1983          | 5           | 1               |                              | Rodríguez et al. 1993 + M Palacios *             |
| 1/1979            | 4           | 1               | MBLUZ-M-0001                 | Agudo et al. 1994                                |
|                   | 1           | 1               |                              | Ernst 1891                                       |
|                   | 1           | >1              |                              | Cervigón & Velásquez 1981                        |
| 10/1971           | 5           | 22              | MDMBR n/n                    | Casinos & Bou 1980; Bolaños Jiménez 1994         |
|                   | 1           | >1              |                              | Anonymous <sup>10</sup>                          |
| 1965–1968         | 1           | >1              |                              | Mondolfi 1981                                    |
| 1993              | 5           | 4               | MDMBR n/n                    | Bolaños Jiménez 1994, Agudo & Romero 1996        |
| 6/1990            | 1           | -20             |                              | R. Verginelli*                                   |
| b. 1977           | 4           | 1               | MEDIMAR                      | Casinos 1981                                     |
| 7/1993            | 5           | 1               | MEDIMAR                      | Agudo 1995                                       |
| 10/1989           | 1           | 2               |                              | G. Solé*   |
| b. 1991           | 2,5         | 1               |                              | Agudo et al. 1994                                |

<sup>7</sup> Boher, S., and H. García. 1990. Un varamiento de la Ballena Jorobada *Megaptera novaeangliae* (Borowski, 1781) en la costa continental venezolana (CETACEA, BALAENOPTERIDAE). Informe Técnico PROFAUNA-MARNR, Caracas, 11 p., unpubl. manusc.

<sup>8</sup> Mondolfi, E., and R. Muller. 1979. Segundo Informe sobre los resultados obtenidos en las inspecciones realizadas en los canos del Golfo de Paria, el Delta del Orinoco, el Bajo Orinoco y el Bajo Apure. Caracas: Fudena, 77 p., unpubl. report.

<sup>9</sup> Notarbartolo di Sciara, G. 1979. Letter to Edgardo Mondolfi, 1 p.

<sup>10</sup> Anonymous. n/d. Los Recursos Pesqueros de la Región Nororiental de Venezuela. Estado de su explotación y posibilidades futuras. Margarita: EDIMAR, Fundación La Salle de Ciencias Naturales, 22 p., unpubl. manusc.

- 2) Simplicity;
- 3) Concordance with systematic classification, i.e., “delfín,” “tonina,” and their derivatives, only for odontocetes; “ballena” for mysticetes;
- 4) Retention of truly vernacular names, those widespread and widely used;
- 5) Including descriptive attributes such as coloration or general shape;
- 6) Avoiding names intended to honor people (e.g., “delfín de Risso” for *Grampus griseus*) if they lack descriptive value.

### Distribution and localities

Global distribution information has been provided for reference purposes only. The records for Venezuelan distribution are compiled by species and geography

(Table 2). For those species where the records indicate a recognizable geographic position (such as latitude and longitude and/or locality), a figure with a location map is included. Where we indicate “western,” “central,” or “eastern” parts or zones, our categories correspond to these locations: “western” is from Zulia through Falcon states, “central” is from Carabobo through Miranda states; and “eastern” is from Anzoategui through Delta Amacuro states (Fig. 1).

In the sections on conservation status and in remarks for each species, Caribbean localities are given in clockwise order beginning with the Bahamas, followed by Cuba, and so on, ending with Belize (Fig. 2).

### Habitat and ecology

Information on habitat and ecology is given only when

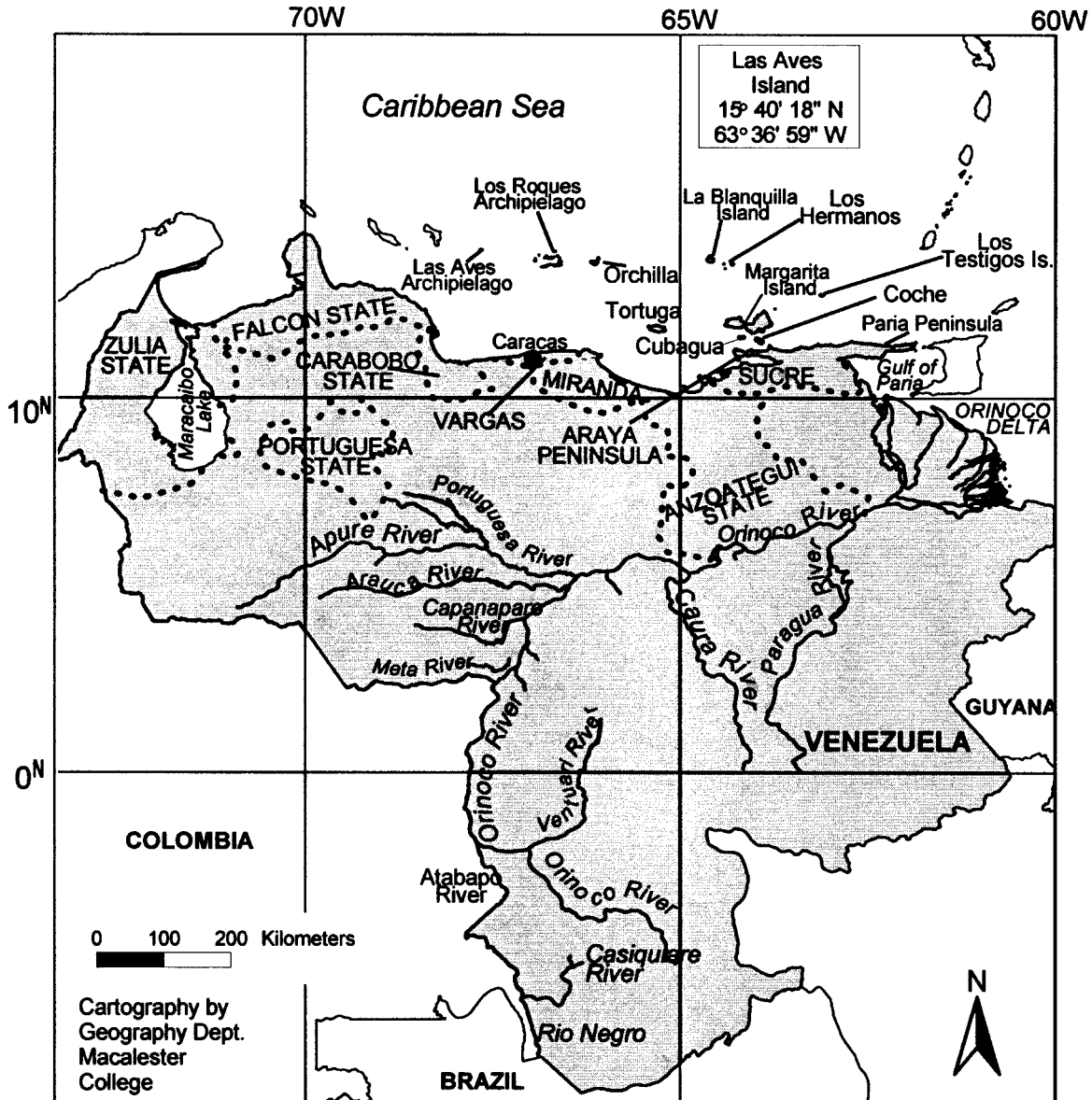


Figure 1

Map of Venezuela. Main localities cited in the text.

it is potentially relevant to resolve questions of distribution or to discuss conservation issues.

### Threats

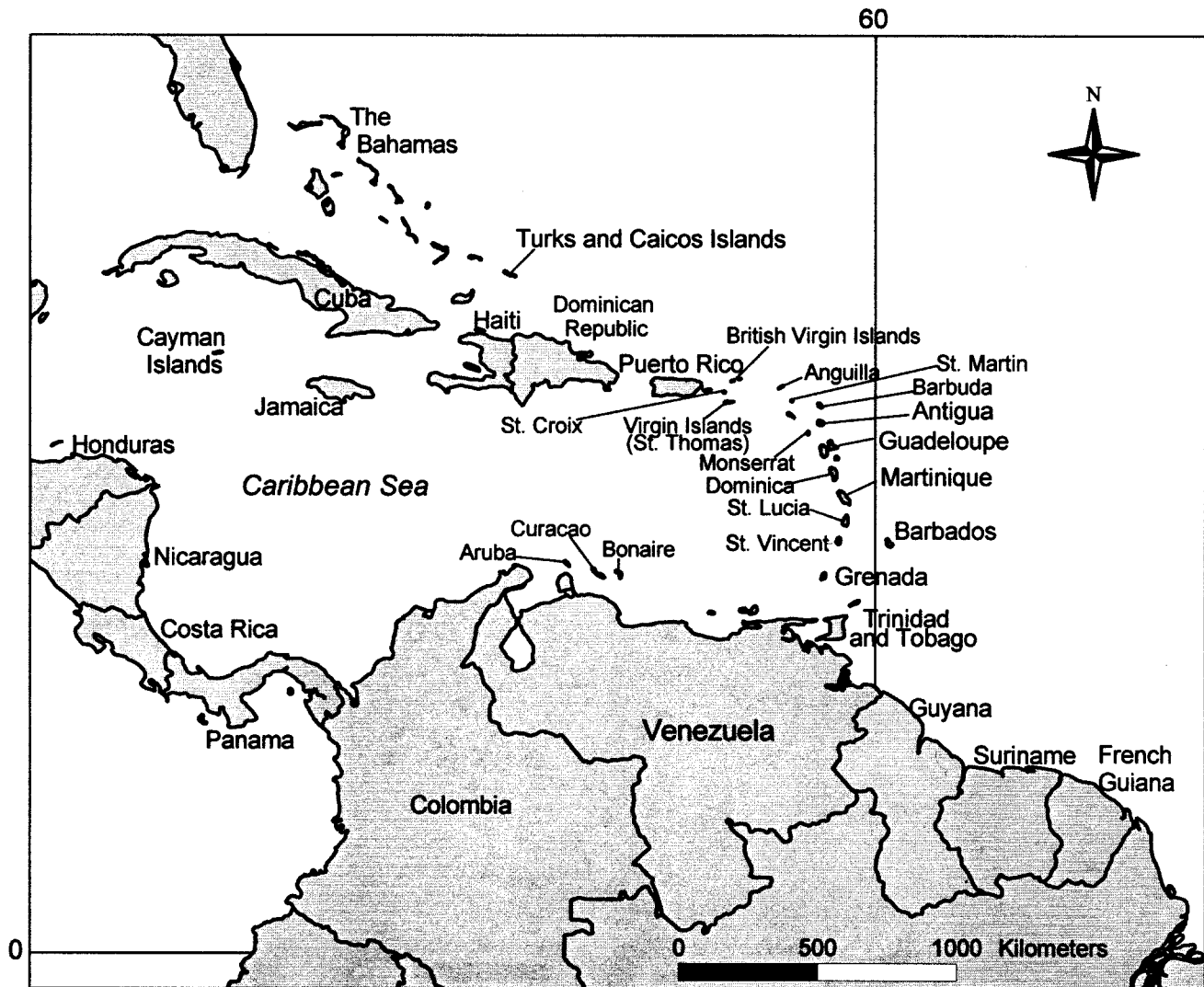
Threats to each species are assessed by evidence of direct take (whaling, harpooning), incidental take (by-catches in nets), pollution, habitat destruction, fragmentation and other degradation, and of collecting for museums or aquaria.

### Conservation status

We summarize in Table 3 the conservation status for each species according to the "Red List" of the IUCN's World Conservation Monitoring Centre (WCMC) and from the list of cetaceans in the appendices of the Convention on International Trade and Endangered Species of Wild Fauna and Flora (CITES).<sup>3</sup>

We agree with Diamond (1988) that to list, for conservation purposes, only those species that are threatened

<sup>3</sup> Updates of these compilations may be found at the WCMC Web site: <http://www.wcmc.org.uk>.



**Figure 2**

Map of the Caribbean region. Main localities cited in the text.

is a strategic mistake because it may mislead people into believing that others may be safely captured. Such a misconception would apply particularly for Venezuela and other areas where our knowledge of population status of many cetacean species does not permit characterizing them as threatened, but it is extremely unlikely that they are abundant and not endangered (but see Anonymous<sup>4</sup>). Thus, we follow procedures established by Brownell et al. (1989) for cetacean listing conserva-

tion specifics by analyzing their status; recommending, where appropriate, that their endangered status be revised in the light of local threats; and summarizing conservation recommendations.

Because of its implications for conservation, we report, when known, the method of capture. The number of individuals recorded as "stranded," "netted," or "harpooned" does not reflect the total number of strandings, accidental netting, or intentional catches for all the species since the method of capture was not recorded for many museum specimens. Some records labeled as "strandings" in the literature are for animals previously caught or injured by people (such as a collision with a ship), then later found stranded. In these cases, when known, we have used the event leading to stranding (Table 2).

<sup>4</sup> Anonymous. 1977. H/SWRI Technical Report 77/104. December 1977. Biological study of the Venezuelan jetfoil route from Puerto La Cruz to Porlamar: Final report. Boeing Aerospace Company. Purchase Contract U-963361-9120. Submitted by Hubbs-Sea World Research Institute, 1700 South Shore Rd., San Diego, California 92109 (714-223-2693), 12 p.



**Table 3**  
Summary of the international conservation status and local threats for Venezuelan cetaceans.

| Species                 | WCMC <sup>1</sup>                    | CITES <sup>2</sup> | Local threats   |
|-------------------------|--------------------------------------|--------------------|---|
| <i>B. borealis</i>      | Endangered/A1abd                     | I                  | None known  |
| <i>B. edeni</i>         | Data deficient/-                     | I                  | None known  |
| <i>B. physalus</i>      | Endangered/A1abd                     | I                  | None known  |
| <i>M. novaeangliae</i>  | Vulnerable/A1ad                      | I                  | Hunted until recently   |
| <i>P. macrocephalus</i> | Vulnerable/A1bd                      | I                  | Hunting occurred. None now                                      |
| <i>I. geoffrensis</i>   | Vulnerable/A1cd                      | II                 | Hunting, live-collecting, habitat disruption, pollution         |
| <i>S. bredanensis</i>   | Data deficient/-                     | II                 | None known  |
| <i>S. fluviatilis</i>   | Data deficient/-                     | I                  | Habitat fragmentation, pollution, hunting                       |
| <i>G. griseus</i>       | Data deficient/-                     | II                 | None known  |
| <i>T. truncatus</i>     | Data deficient/-                     | II                 | Hunting   |
| <i>S. frontalis</i>     | Data deficient/-                     | II                 | Gill nets   |
| <i>S. attenuata</i>     | Lower risk: conservation dependant/- | II                 | Fisheries   |
| <i>S. longirostris</i>  | Lower risk: conservation dependant/- | II                 | Gill nets, firearms   |
| <i>S. clymene</i>       | Data deficient/-                     | II                 | Gill nets   |
| <i>S. coeruleoalba</i>  | Lower risk: conservation dependant/- | II                 | None known  |
| <i>D. capensis</i>      |                                      | II <sup>3</sup>    | Hunting   |
| <i>F. attenuata</i>     | Data deficient/-                     | II                 | None known  |
| <i>P. crassidens</i>    |                                      | II                 | None known  |
| <i>O. orca</i>          | Lower risk: conservation dependant/- | II                 | None known  |
| <i>G. macrorhynchus</i> | Lower risk: conservation dependant/- | II                 | None known  |
| <i>Z. cavirostris</i>   | Data deficient/-                     | II                 | None known. Reports of possible effects from military exercises |

<sup>1</sup> From the "Red List" of the IUCN's World Conservation Monitoring Centre.

<sup>2</sup> From the Convention on International Trade and Endangered Species of Wild Fauna and Flora.

<sup>3</sup> Originally "*Delphinus delphis*."

## Remarks

In this section we summarize the Caribbean distribution, interpret the records and, when appropriate, offer historical notes.

## Bibliographic treatment

When there are multiple literature citations in the text, they are in chronological order. Citations for authors of taxa are not included but can be found in Allen (1881), Simpson (1945), Hershkovitz (1966), and Truitt (1974).

## Quantitative analysis

All procedures were performed using Systat (version 7.01) for Windows™ (Wilkinson and Hill, 1994).

## Results

### Systematic list

**Order CETACEA** Brisson, 1762

**Suborder MYSTICETI** Flower, 1864

**Family BALAENOPTERIDAE** Gray, 1864

**Subfamily BALAENOPTERINAE** (Gray, 1864)

**Brandt, 1872**

**Genus *Balaenoptera*** Lacépède, 1804

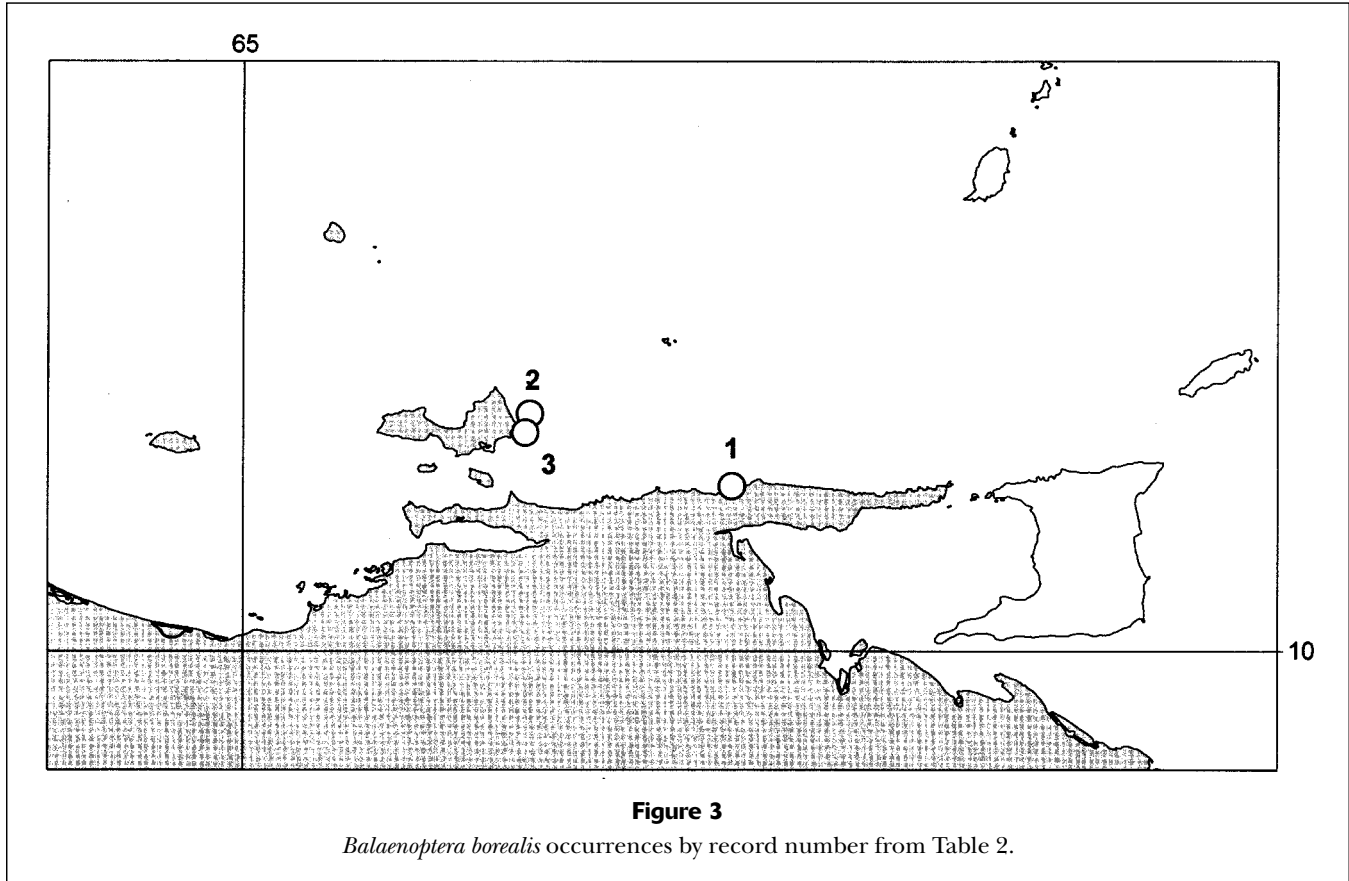
***Balaenoptera borealis*** Lesson, 1828, sei whale

**Spanish common names** Ballena, ballena boba, ballena negra, ballena sardinera, ballena sei, ballenato, rorcual, rorcual boreal, rorcual del norte, rorcual negro, rorcual norteño.

**Proposed Spanish common name** Casinos (1986) called it "Rorcual norteño o de Rudolphi." Vidal (1990) used "ballena sei." We recommend "rorcual sei" to help distinguish members of this genus from other mysticetes.

**Global distribution** Cosmopolitan and pelagic. Mostly temperate and oceanic (Gambell, 1985a).

**Occurrence in Venezuela** Eastern Venezuela (Table 2; Fig. 3).



**Threats** None known for this species in Venezuela.

**Conservation status and recommendations** This species is classified as “Endangered” by the WCMC and listed in Appendix I of CITES (1992). There are only three records for Venezuela, all sightings or taggings from locales where mysticetes are most abundant (Table 2). There are few records for this species in the Caribbean, where it is considered rare (Notarbartolo di Sciarra, 1983). Leatherwood and Reeves (1983) have even questioned its presence in the Caribbean Sea. There are pelagic (“at sea”) records (Slijper et al., 1964; Erdman, 1970; Erdman et al., 1973) as well as coastal ones from Cuba (Varona, 1965, 1974), the Dominican Republic (Mead, 1977; Bonnelly de Calventi, 1994), and the British Virgin Islands (Erdman, 1970). There are only four reliable records for the Gulf of Mexico (Jefferson and Schiro, 1997). Of all these Caribbean records, only Mead’s (1977) can be considered fully reliable.

These records reflect the worldwide distribution of this species and, thus, it must be considered as an occasional visitor rather than a resident of Venezuelan waters. Sei whales were heavily hunted in the past and although there are no precise figures, the general consensus is that the global population is low. Venezuelan coasts are heavily influenced by both South and North

Equatorial currents. Mitchell and Chapman (1977) believe that the *B. borealis* they observed in northern Venezuela were migrating whales from southern hemisphere stock during the austral winter. The dates of observations in Venezuela (February, July, and September) do not allow us to conclude whether the records are better interpreted as animals from the northern or southern stocks.

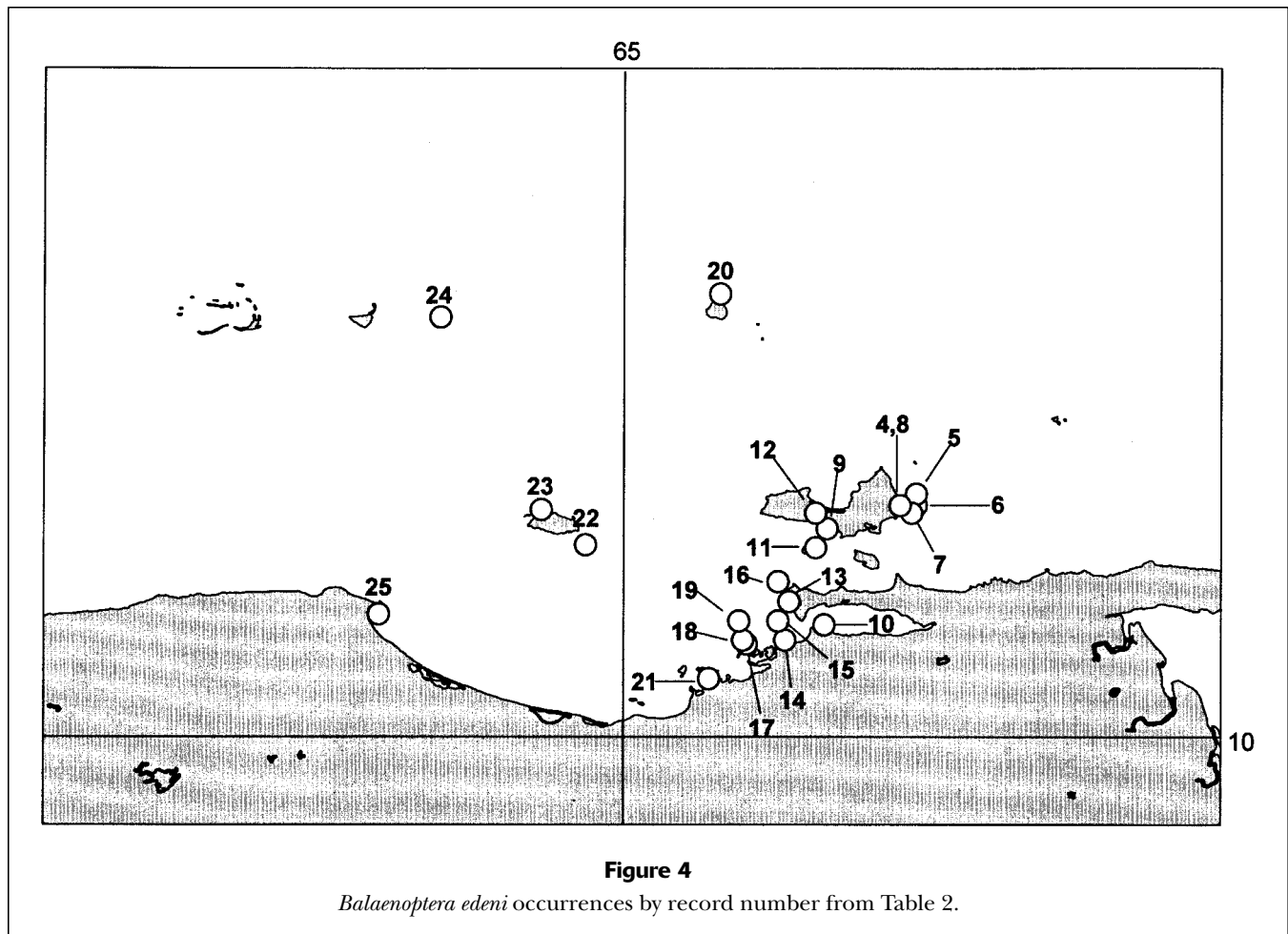
Systematic long-term studies are necessary to ascertain the basic natural history and population size and dynamics of all the cetaceans, but they are especially needed for species like this, whose presence seems occasional at best.

**Remarks** This species is easily confused with *B. edeni*, thus yielding fewer confirmed records than might otherwise be the case.

***Balaenoptera edeni* Anderson, 1878, Bryde’s whale**

**Spanish common names** Ballena, ballena arenquera, ballena caribeña, ballena de arenque, ballena de Bryde, ballena tricrestada, ballena tropical, ballenato, ballenato rorcual, rorcual, rorcual caribeño, rorcual de Bryde, rorcual tropical.

**Proposed Spanish common name** Casinos (1986) used the names “rorcual tropical o de Bryde.” Vidal



(1990) used “ballena de Bryde.” We therefore propose “rorcual de Bryde” while recognizing it violates our principle by using an honorific rather than a descriptive name. Our justification for this departure is that “rorcual” is widely used for the genus *Balaenoptera* and “Bryde” is an almost universal denomination. No other common name has ever been widely used except those so general that they may be confused with names of other balaenopterids.

**Global distribution** Tropical and subtropical waters of the world. Pelagic and coastal. Long migrations are not typical (Cummings, 1985).

**Occurrence in Venezuela** This is by far the most common mysticete in Venezuela. Virtually all the records, however, are only from the eastern part of the country (Table 2; Fig. 4).

**Unconfirmed records** Ernst (1886) claims to have seen a “*B. rostrata*” between the islands of La Tortuga and Margarita in 1873, but we suggest it was probably *B. edeni*.

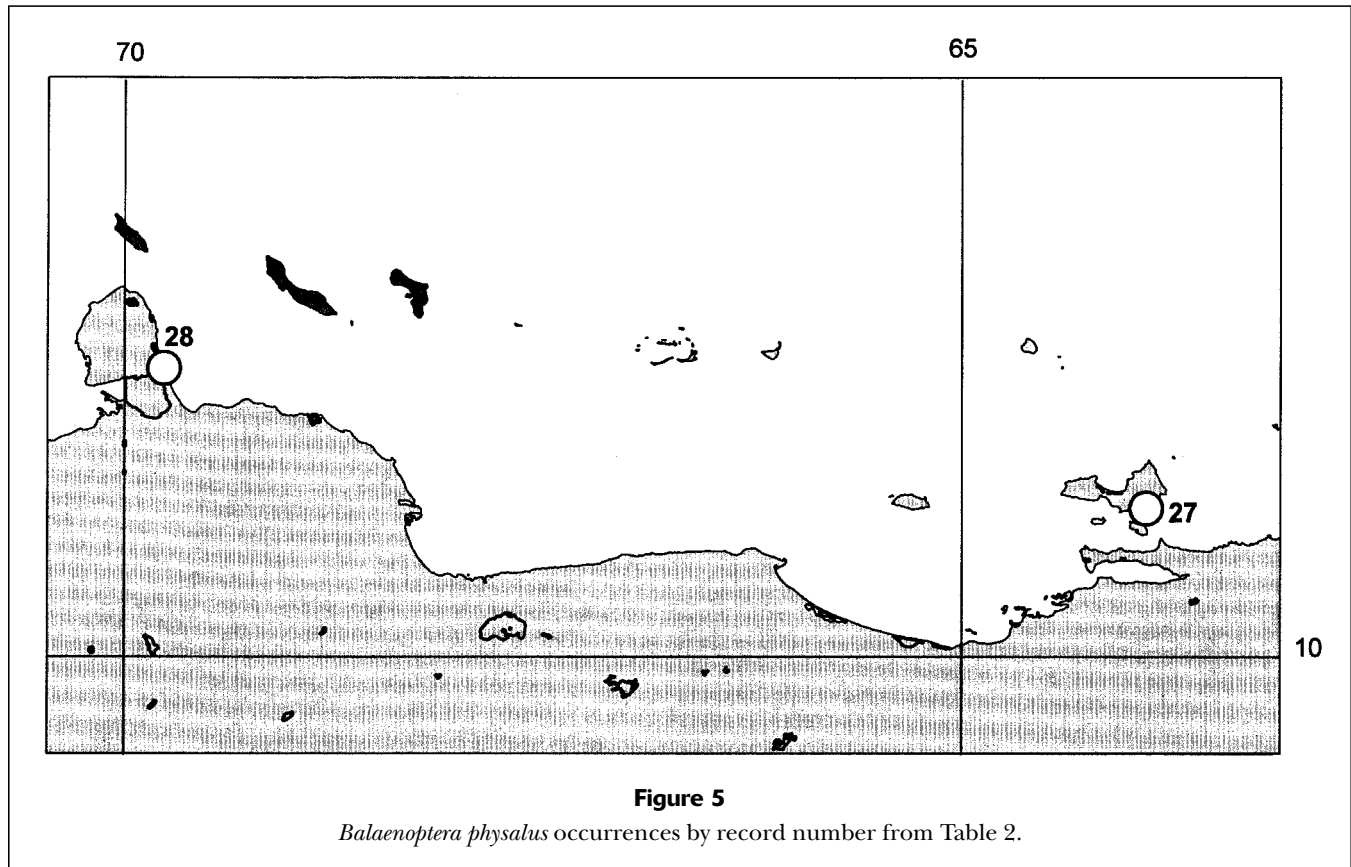
**Threats** None known in Venezuela.

**Conservation status and recommendations** It is classified as “Data Deficient” by the WCMC and is in Ap-

pendix I of CITES. Because this species seems not to have been heavily hunted anywhere, and certainly not in the North Atlantic and the Caribbean, the population may be stable. Of the 23 records for Venezuela, none is associated with captures of any type. This species is not known for long migrations (Cummings, 1985) and records are concentrated between Puerto La Cruz, the Cumaná area, and Margarita Island. Combined with the relatively uniform distribution of records throughout the year (Table 2), this may indicate that there is a resident population in the area.

The species has been recorded for St. Croix (Mignucci-Giannoni, 1996), the Dominican Republic (Bonnelly de Calventi, 1994), Grenada (Soot-Ryen, 1961), Curaçao (Soot-Ryen, 1961; Debrot, 1998; Debrot et al., 1998), Aruba (Agudo and Ponson, 1996), and the Colombian Caribbean (Cuervo Díaz et al., 1986; Prieto Rodríguez, 1988; Vidal, 1990). It is not uncommon in the Gulf of Mexico (Mead, 1977; Jefferson and Schiro, 1997).

Evans et al. (1979) note that local fishermen associate the presence of these whales with the abundance of bait fish, particularly sardines (*Sardinella anchovia*),



and they suggest that many of the whales appear in the late spring and early summer, feed in the area for several months, and then depart to equatorial waters in the winter with a few remaining year-round. Group size varies with season; 55% are seen as single, 27% as pairs, and 18% in groups of three or more (Hoyt, 1984). We found that 78% of the sightings were of a single individual. Groups of up to eight individuals have been seen feeding on different species of fish, e.g., the Atlantic saury (billfish) (*Scomberesox saurus*) (Notarbartolo di Sciarra, 1983; Anonymous<sup>4</sup>).

**Remarks** Our record #8 (Table 2) corresponds to a Bryde's whale being killed by a swordfish (*Xiphias gladius*). Cetacean mortality from swordfish is rare, but not unknown (Jonsgård, 1959).

***Balaenoptera physalus* (Linnaeus, 1758), fin whale**

**Spanish common names** Ballena, ballena boba, ballena de aleta, ballenato, rorcual, rorcual común.

**Proposed Spanish common name** Vidal (1990) called it "ballena de aleta," a direct translation from English. Casinos (1986) employs "rorcual común" and we concur with that choice, a name consistent with those we propose for other members of this genus.

**Global distribution** Cosmopolitan, mostly pelagic. Wintering areas extend from the ice edge southwards to

the Caribbean and the Gulf of Mexico. It exhibits seasonal migrations (Gambell, 1985b).

**Occurrence in Venezuela** One record for the western part and two for the eastern part (Table 2; Fig. 5).

**Threats** None known in Venezuela.

**Conservation status and recommendations** This species is classified as "Endangered" by the WCMC and listed in Appendix I of CITES. The few records for the Caribbean are "at sea" (Slijper et al., 1964) and for Colombia (Prieto Rodríguez, 1988; Vidal, 1990) and the Gulf of Mexico (Jefferson and Schiro, 1997). It is not clear whether sightings in the area correspond to part of their normal migratory patterns or to stray individuals, but they must in any case be considered very rare in the Caribbean.

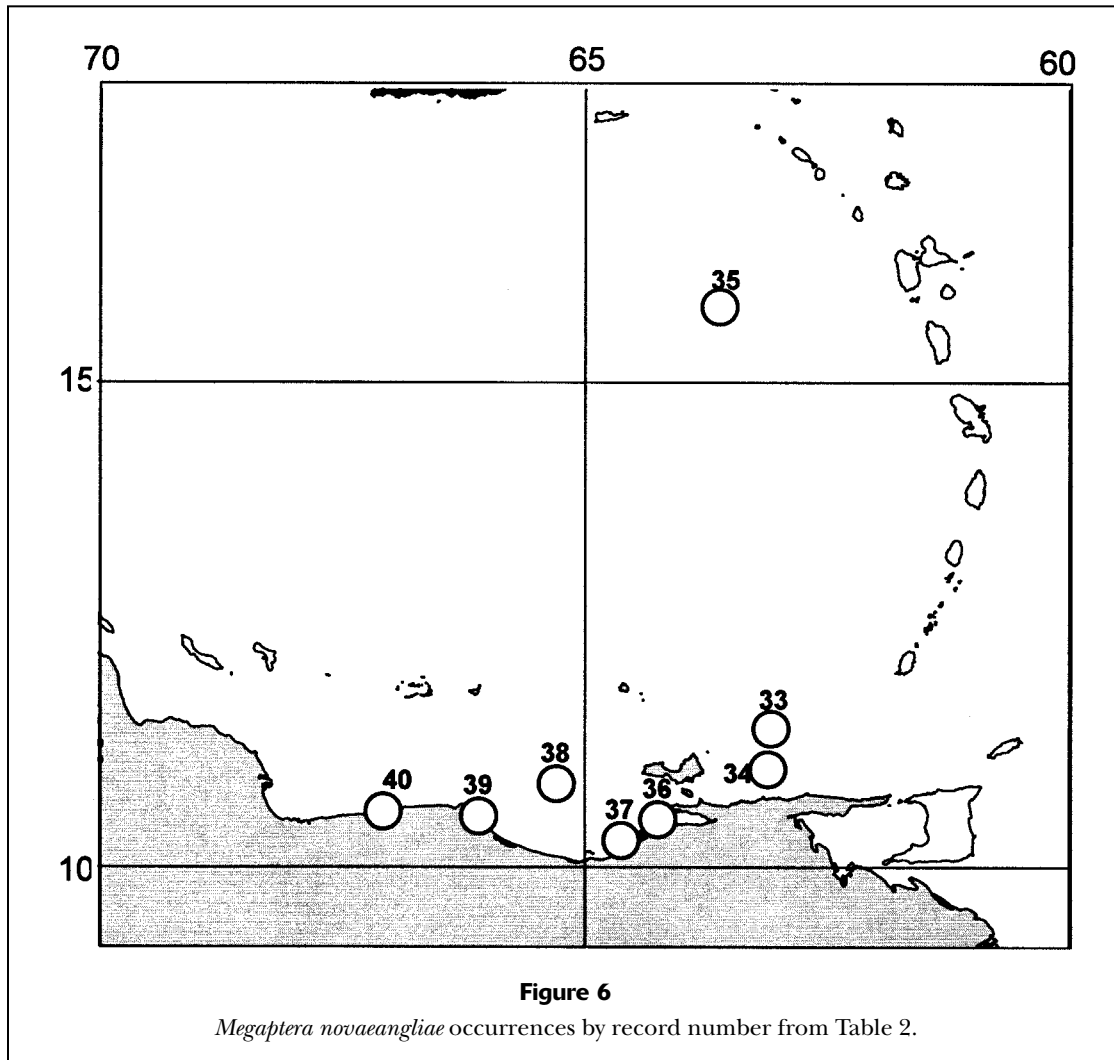
**Subfamily MEGAPTERINAE Gray, 1866**

**Genus *Megaptera* Gray, 1846**

***Megaptera novaeangliae* (Borowski, 1781), humpback whale**

**Spanish common names** Ballena cantora, ballena corcovada, ballena de aleta grande, ballena jorobada, ballenato, guabarte, jorobada, rorcual jorobado, yubarta.

**Proposed Spanish common name** Although "yubarta" is occasionally used (Casinos, 1986), "ballena jorobada" is by far the most widely used common name in Spanish, particularly in Latin America.

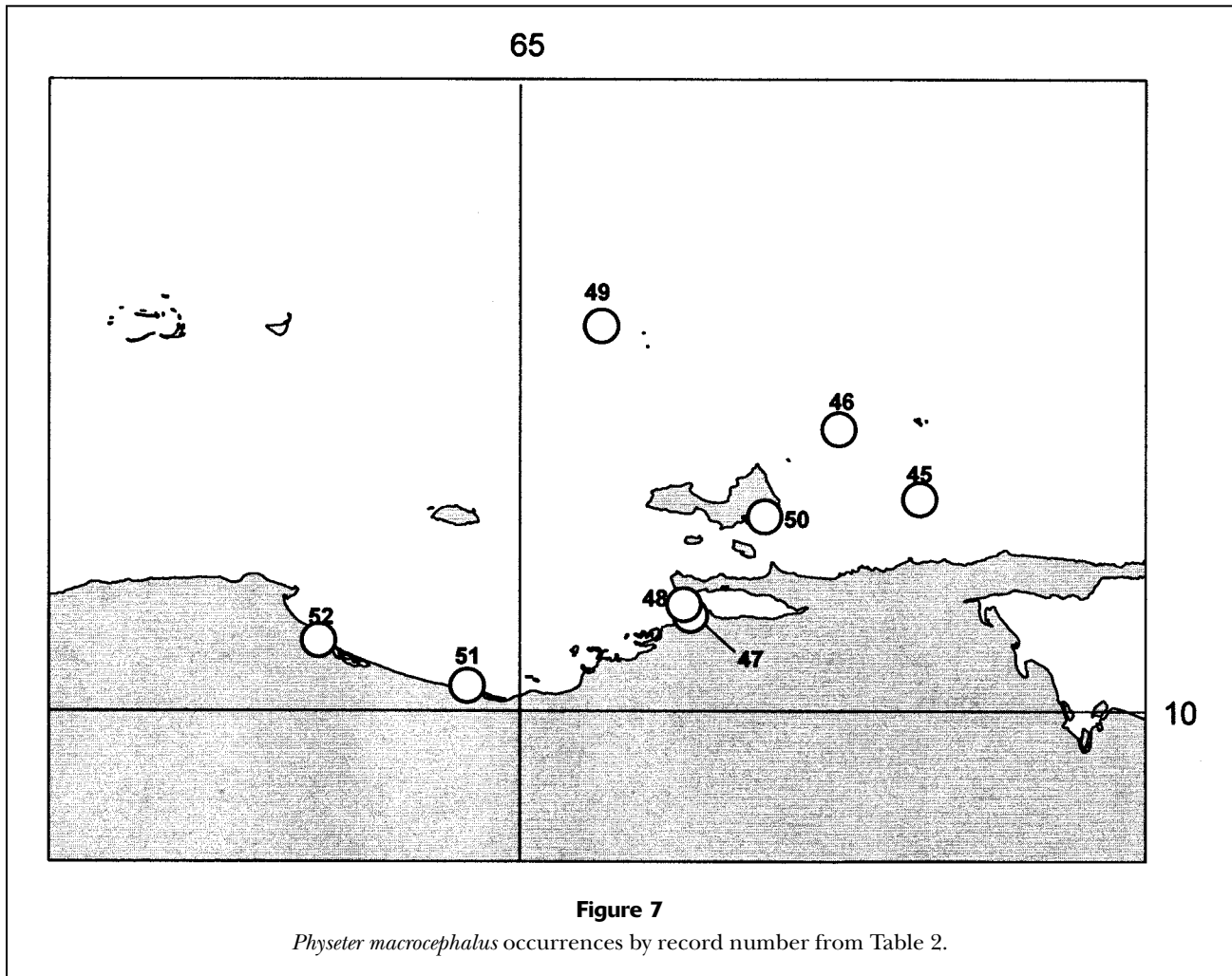


**Global distribution** Cosmopolitan. Mostly coastal with strong seasonal migrations (Winn and Reichley, 1985).

**Occurrence in Venezuela** Four records report only “Venezuela,” but all the others note locales in the central and eastern zones, two in the central coasts, five in the eastern part of the country, and one for Isla de Aves (a Venezuelan island in the northeastern Caribbean) (Table 2; Fig. 6).

**Threats** This species was hunted in and near Venezuelan waters as early as the the 19<sup>th</sup> century, as evidenced by records for 1853 and 1871. Logbooks from whaling ships show that some humpback whales were captured in the eastern waters of Venezuela, particularly between January and March (Townsend, 1935). In early 1960 there was a stranding at Carenero-Buche of an individual with three embedded harpoons of Japanese origin (Romero and Agudo, 1993). In 1977 another was found that had been struck by hydrofoils elsewhere, perhaps the cause of its death (Hudnall, 1978).

**Conservation status and recommendations** It is classified as “Vulnerable” by the WCMC and listed in Appendix I of CITES. There are about 10,000 individuals in the northern North Atlantic, its highest population level anywhere (Smith et al., 1999). It is reported as formerly abundant between Trinidad and northeastern Venezuela during winter (Mitchell and Reeves, 1983). It has coastal feeding and breeding grounds in the eastern Caribbean (Winn et al., 1975; Winn and Reichley, 1985) and has also been recorded for Cuba (Cuní, 1918; Varona, 1974), the Dominican Republic (Bonnely de Calventi, 1994), Puerto Rico (summarized in Mignucci-Giannoni, 1996), Barbuda (Mignucci-Giannoni, 1996), Antigua (Mignucci-Giannoni, 1996), St. Vincent (Caldwell et al., 1971a), Bequia (Lindeman, 1880; Clark, 1887; Brown, 1945 [cited in Caldwell et al. 1971a]; Fenger, 1958; Mitchell, 1965; Adams, 1971; Caldwell et al., 1971a; Price, 1985), between Banaire and Klein Bonaire and in Bonaire (Debrot et al., 1998), Curaçao (Debrot, 1998), and Colom-



bia (Cuervo Díaz et al., 1986; Vidal, 1990). There are nine confirmed records for the Gulf of Mexico (Jefferson and Schiro, 1997). The Venezuelan records are widely dispersed in time, not allowing us to infer its seasonal movements in these waters.

**Suborder ODONTOCETI Flower, 1867**

**Superfamily PHYSETEROIDEA (Gray, 1821) Gill, 1872**

**Family PHYSETERIDAE Gray, 1821**

**Subfamily PHYSETERINAE (Gray, 1821) Flower, 1867**

**Genus *Physeter* Linnaeus, 1758**

***Physeter macrocephalus* Linnaeus, 1758, sperm whale**

**Taxonomic status** There is still some controversy on whether *P. macrocephalus* has precedence over *P. catodon* (Husson and Holthuis, 1974; Schevill, 1986; Holthuis, 1987). We concur with Rice's (1989) interpretation of the International Code of Zoological Nomenclature that *P. macrocephalus* should be the correct name.

**Spanish common names** Ballena de esperma, ballena de espuma, ballena dentada gigante, \*ballenato, \*cachalote, \*chacalote, \*fiseter, guapo.

**Proposed Spanish name** "Cachalote" since it is, by far, the most commonly used name in Spanish.

**Global distribution** Cosmopolitan. Mostly mesopelagic and deep seas (Rice, 1989).

**Occurrence in Venezuela** Twelve records, mostly from eastern Venezuela (Table 2; Fig. 7).

**Unconfirmed record** Ernst (1886) may have seen a *P. macrocephalus* off the coast of Carúpano (Sucre State).

**Threats** Although harpooning has occurred recently in the Lesser Antilles (Rathjen and Sullivan, 1970), no threats are presently known in Venezuela. It has been hunted in Venezuelan waters (Romero et al., 1997b) and there is a report of a hunting ground in the Los Frailes-La Sola-Los Testigos area as late as 1967 (Vila, 1967).

**Conservation status and recommendations** It is classified as "Vulnerable" by the WCMC and listed in Appendix I of CITES. It is found over deep oceanic

waters and along continental slopes, and is the second most common and widely distributed large cetacean in the world (after *O. orca*) (Rice, 1989). Although its distribution is worldwide, some populations may be isolated. It is fairly common in the deeper basins of the Caribbean. It has also been reported for Cuba (de la Torre, 1907; Cuní, 1918; Scaramuzza, 1943; Aguayo, 1954; Varona, 1974; Jefferson and Lynn, 1994), Haiti (Gosse, 1851), the Dominican Republic (Erdman et al., 1973; Bonnelly de Calventi, 1994; Gricks, 1994), Puerto Rico and the Virgin Islands (Erdman, 1970; Erdman et al., 1973; Mignucci-Giannoni, 1996), Anguilla (Gricks, 1994), St. Barthelemy (Gricks, 1994), Barbuda (Mignucci-Giannoni, 1996), Antigua (Mignucci-Giannoni, 1996), Montserrat (Gricks, 1994), Dominica (Watkins et al., 1993; Gricks, 1994), Martinique (Watkins and Moore, 1982), St. Lucia (Watkins and Moore, 1982), St. Vincent (Townsend, 1935; Rathjen and Sullivan, 1970; Wood et al., 1970; Caldwell et al., 1971a; Caldwell and Caldwell, 1975; Watkins and Moore, 1982), Bequia (Brown, 1945 [cited in Caldwell et al., 1971a]; Fenger, 1958; Watkins and Moore, 1982), Barbados (Townsend, 1935; Brown, 1942 [cited in Caldwell et al., 1971a]), Curaçao (van Bree, 1975; Debrot et al., 1998), Colombia-Panama (Palacios et al., 1996), and the Gulf of Mexico (Mullin et al., 1994c; Jefferson and Schiro, 1997).

In the first published report of a cetacean stranding in Venezuela, Codazzi (1841) noted that sometimes sperm whales could be seen in large groups. It may have been hunted as early as the 18<sup>th</sup> century off Venezuelan coasts (Townsend, 1935). Despite being oceanic and having been heavily hunted until recently, its presence in Venezuela is common, but largely limited to the deep waters north of the continental shelf. Although our records report its presence only in summer, it's probable that at least males have extensive north-south seasonal movements.

### Superfamily PLATANISTOIDEA (Gray, 1863)

Simpson, 1945

#### Family INIIDAE Flower, 1867

#### Genus *Inia* d'Orbigny, 1834

#### *Inia geoffrensis* (de Blainville, 1817), boto

**Taxonomic status** The specific and infraspecific taxonomic nomenclature of *Inia* has yet to be fully resolved, with discussion continuing whether all *Inia* populations are a single species. Some authors divide *Inia* into three subspecies depending on geographical distribution: *I. g. geoffrensis* (de Blainville, 1817) for the Amazon, except the upper Madeira river drainage, *I. g. humboldtiana* (Pilleri and Gihl, 1977) for the Orinoco drainage basin, and *I. g. boliviensis* (d'Orbigny, 1834) for the Beni basin (the Madeira River drainage above the Teotonio Rapids) (see Best and da Silva, 1989b). Ac-

cording to Pilleri and Gihl (1977, 1980), the Beni population is a different species, *I. boliviensis* (d'Orbigny, 1834) (but see Casinos and Ocaña, 1979). There is some controversy on whether *I. boliviensis* is a synonym of *I. geoffrensis* (van Bree and Robineau, 1973; Mead and Brownell, 1993). We view it as a single species with three subspecies or differentiated populations (Best and da Silva, 1989a,b; Anderson, 1997).

If Pilleri and Pilleri (1982) are correct in their suggestion that *I. geoffrensis* of the upper Orinoco and Brazo Casiquiare is *I. geoffrensis geoffrensis*, then this subspecies is also in Venezuela.

**Spanish common names** Boto, \*bufeo, bufeo colorado, \*bufete, buto, delfín amazónico, delfín de agua dulce, delfín de río, \*delfín llanero, delfín rosado, delfín rosado del Amazonas, fansa, tonina, tonina de agua dulce, \*tonina de río, \*tonina del Orinoco, toñina.

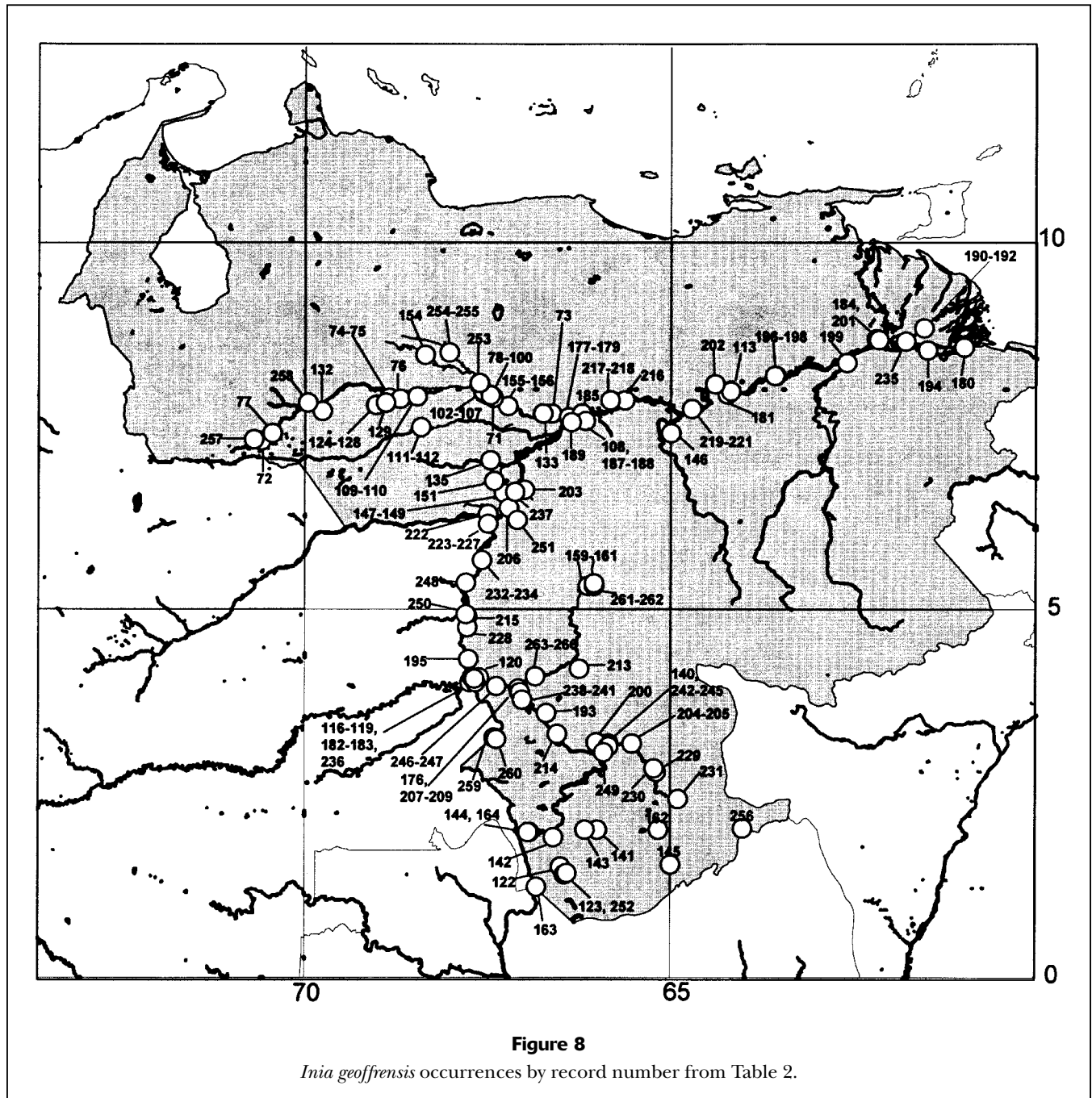
**Indigenous names in Venezuela** Katsali (in the Macusi language), muna (in the Cabre and Maypure languages), orinucna and orinocona (in the Tamanaca language), yufa (in the Guama language), urinugna (in Guayana and Tamanaca languages).

**Proposed Spanish common name** Each country where this species is present has several local vernacular names. Some of those names are the same for the partially sympatric *Sotalia fluviatilis*. The name "delfín" is too generic; "boto" is peculiar to Brazil, and "bufeo" and "bufeo colorado" to Colombia; "bufeo" has been widely used for *S. fluviatilis*. Of all the names used so far, the most distinct would be "tonina de río" because tonina was the first name given by the Spaniards (Romero et al., 1997a) and is still very widely used, and we differentiate it from *Sotalia*, which can be found in marine environments as well.

**Global distribution** Orinoco, Amazon, and Beni watersheds. In all freshwater habitat types in the Orinoco and the Amazon basins, except estuaries, extreme rapids, and waterfalls (Best and da Silva, 1989a).

**Occurrence in Venezuela** Widely distributed in the Orinoco watershed, including the Casiquiare and the Río Negro. There is no geographical or ecological barrier between the populations of the Orinoco and the Amazon drainages (Wallace, 1889; Handley, 1976; Pilleri and Pilleri, 1982; Pilleri et al., 1982; Best and da Silva, 1989a,b; Meade and Koehnken, 1991; Romero et al., 1997a) (Table 2; Fig. 8).

**Habitat and ecology** It is a generalist fish feeder seen most frequently at the junctions of rivers and tributaries (Klinowska, 1991; Meade and Koehnken, 1991; McGuire and Winemiller, 1998), consistent with observations in the Amazon basin (Magnusson et al., 1980). They are most abundant in whitewater rivers draining the Venezuelan llanos (savannas), at intermediate levels in clearwater rivers draining the upland shield areas, and least abundant in blackwater-clearwater rivers



draining lowland shield areas (Meade and Koehnken, 1991). It was reported that a lower jaw of *I. geoffrensis* was found on Margarita Island (Trebba and van Bree, 1974). It probably represents the remains of an individual washed out from the Orinoco delta or it may have been left behind by a Margarita Island fisherman's by-catch taken from the Orinoco delta.

According to Meade and Koehnken (1991), it can be found in the Orinoco drainage either as solitary individuals (32% of the observations) or in groups of two

to six. McGuire and Winemiller (1998) found a mean number of dolphins per sighting of two, with a range between one and eight animals. Combining this information with records from the Apure River (Schnapp and Howroyd, 1990, 1992), 42% of observations were of solitary individuals. In the Amazon, however, most sightings (81%) were of solitary individuals (Magnusson et al., 1980).

**Conservation status** It is classified as "Vulnerable" by the WCMC and listed in Appendix II of CITES.



**Threats** As described below, the species has been threatened by captures, habitat destruction, deforestation, pollution, and live-captures.

**Captures** The Tamanaco Indians, the original inhabitants of the Orinoco watershed, captured it for human consumption (Gilij, 1782) and it has been widely used by Venezuelan fishermen since the 19<sup>th</sup> Century or earlier. Botos were also hunted by the Mapoyos (Chaffanjon, 1889) and Ernst (1884) mentions tympanic bullae of this species—bones measuring only ca. 4 cm × 6 cm × 8 cm (Kasuya, 1973)—as being among the “commercial products” at the 1883 Venezuelan National Exposition. Harpooning may occur, but seems to be rare. Harpoons employed in hunting dolphins on the eastern Venezuelan coast are manufactured in Puerto Ayacucho on the upper Orinoco River (Romero and Agudo, 1993), so the weaponry is available inland as well. Trebbau (1975) mentions the use of harpoons and nets in capturing *Inia*. He says that “Apure fishermen do not have many superstitions regarding dolphins (although the blubber is said to be an excellent remedy for asthma), and it was consequently easy to hire fishermen for aid [*sic*] in capture.” We have also heard of reports of this species being captured for local consumption in Portuguesa State (Romero et al., 1997b). These dolphins are occasionally captured in nets as by-catches and usually released, but sometimes they become entangled and die.

**Habitat disruption** The Guárico River Dam is responsible for eliminating its upstream population (Pilleri, 1979). Upstream effects by dams may be due to the resulting isolation of freshwater dolphin populations, thus increasing many risks associated with fragmenting threatened populations and their habitats (e.g., Green and Minkowski, 1977), including reduction in genetic variability (Klinowska, 1991). The Guri Dam on the Caroní River, a tributary of the Orinoco, has caused apparent depletion of this species in the lower reaches (Perrin and Brownell, 1989). Such downstream effects may be a product of reduction in the freshwater flow coming out of dams. This creates increases in salinity, causing declines in migratory fish, a critical food supply for the *Inia* (Reeves and Leatherwood, 1994; for ecological imbalances at Guri, see Weibezahn, 1994). More river modifications are planned in the near future for the Orinoco, Apure, and Meta rivers (Reeves and Leatherwood, 1994).

**Deforestation** Soil erosion consequent to deforestation increases turbidity and may produce silting, thus directly and indirectly altering the floral and faunal composition of rivers. In addition, some fish that constitute the main diet of river dolphins rely on fallen seeds and fruits from trees whose bases are inundated when the river floods every year (Vidal, 1993). If these trees perish or are removed, an important link in the food chain is destroyed. The rate of deforestation in Venezuela is high (Romero, 1992a).

**Pollution** Pesticides have been found in the milk of Orinoco River dolphins (Gewalt, 1978). High levels of mercury have been found in fish in the Orinoco basin as a consequence of gold-mining activities (Nico and Taphorn, 1994). During March and April of 1995, the Venezuelan press reported the death of numerous fish and *Inia* at Caño Cunavichito of the Apure watershed (Rizk, 1995). There was speculation that the massive die-off was a consequence of chemical pollution. Water pollution at high levels is widespread in Venezuela (Romero, 1992a).

**Live-captures** Collections have been made for many aquarium exhibits, e.g., Sea World Aquarium at San Diego, the Shedd Aquarium in Chicago, the Duisburg Zoo in Germany, and the Acuario J. V. Seijas of Valencia, Venezuela (Trebbau, 1975; Ostenrath, 1976; Pilleri et al., 1979; Brownell, 1984; Collet, 1984; Sylvestre, 1985), including the only albino cetacean reported for Venezuela (Gewalt, 1978). In general, they fare poorly in captivity (Caldwell et al., 1989). The only place in Venezuela where this species has been kept for long periods of time is the Acuario J. V. Seijas of Valencia, Carabobo State, which captured 10 individuals between 1975 and 1986 of which eight died (Boede Wantzelius, 1990). Ingestion of foreign objects thrown by visitors is implicated as the cause of death, but an inadequate diet may have contributed to this high mortality rate. Only one birth has been registered there. At least one *Inia* was kept in Moron, Carabobo State, for a limited time (Trebbau, 1975). The report of one in El Pinar Zoo (Pilleri and Gihl, 1977) is erroneous. A request to the U.S. Fish and Wildlife Service to permit importation for the Dallas Aquarium in 1998 was withdrawn due to lack of population studies and serious questions concerning the capture, handling, maintenance, and transport of these dolphins in Venezuela.

**Remarks** Several naturalists encountered this species in Venezuela before it was described by de Blainville in 1817. In the diaries of an expedition to the Santo Domingo, Apure, and Orinoco rivers in 1647, Fray Jacinto de Carvajal (de Carvajal, 1648) mentions this species, using vernacular names. He notes “tonina” and “bufeo” in groups in the Apure and Orinoco rivers.

Pehr Löfling traveled the Orinoco in 1754 and 1755 and then wrote the (still unpublished) manuscript *Ycithiologia Orinocensis sive Cathalogus Piscium sui in hoc Fluvio piscantur*. An examination of the manuscript (Romero et al., 1997a) reveals a very detailed description of what we know today as *I. geoffrensis*, including two drawings that leave no doubt that he encountered *Inia*.

Shortly after Löfling, a third early naturalist, Filippo Salvatore Gilij, traveled the Orinoco. His description, based on encounters between 1757 and 1766, is as follows: “It is not an amphibian and it is very different from the manatee. The Spaniards call this animal the

Orinoco tonina. But do not mistake the Orinocoan tonina for our tuna by confusing it with the Italian name of *tonno*. I have seen it many times, but never in its entirety. It can be seen only during quiet and calm weather, and then, when happy and partying, the upper half of its body gets out of the water, the other half remaining sunk. It resembles a sea cow. Since I have never seen it closely, I can not give further detailed information. From what I have heard, it is good to eat; its taste is not that different from manatee. Only the guamos, perhaps because manatee is not available, eat its meat” (Gilij, 1780; Paolillo and Romero, 1989).

Alexander von Humboldt is the fourth naturalist who mentions this species for Venezuela, based on his travels in the Orinoco and Apure rivers in 1800. On 28 March, while at San Fernando, he wrote: “It is a very extraordinary phenomenon to see cetacea at such distance from the coast. The Spaniards of the Missions designate them, as they do the porpoises of the ocean, by the name of *toninas*. The Tamanacs call this species *orinucnas*. They are three or four feet long; and bending their back, and pressing with their tail on the inferior strata of the water, they expose to view a part of the back and of the dorsal fin. I did not succeed in obtaining any, though I often engage Indians to shoot at them with their arrows. Father Gilij asserts that the Guamos eat their flesh. Are these cetacea peculiar to the great rivers of South America, like the manati, which, according to Cuvier, is also a fresh water cetaceous animal? Or must we admit that they go up from the sea against the current, as the beluga sometimes does in the rivers of Asia? What would lead me to doubt this last supposition is that we saw toninas above the great cataracts of the Orinoco, in the Rio Atabapo. Did they penetrate into the centre of equinoctial America from the mouth of the Amazon, by communication of that river with the Rio Negro, the Casiquiare, and the Orinoco? They are found here at all seasons, and nothing seems to denote that they make periodical migrations like salmon” (von Humboldt, 1814). Later in his narratives, while traveling along the Upper Orinoco, von Humboldt writes: “In the thickest [*sic*] part of the forest we were astonished by an extraordinary noise. On beating the bushes, a shoal of toninas (fresh-water dolphins) four feet long, surrounded our boat. These animals had concealed themselves beneath the branches of a *fromager*, or *Bombax ceiba*. They fled across the forest, throwing out those spouts of compressed air and water which have given them in every language the name of ‘blowers.’ How singular was this spectacle in an inland spot, three or four hundred leagues from the mouths of the Orinoco and the Amazon! I am aware that the pleronectes (dabs) of the Atlantic go up the Loire as far as Orleans; but I am, nevertheless, of opinion that the dolphins of the Temi, like those of the Ganges, and the skate (raia) of the Ori-

noco, are of a species essentially different from the dolphins and skates of the ocean” (von Humboldt, 1814).

Hershkovitz (1963) contends that von Humboldt saw *Sotalia fluviatilis* instead of *I. geoffrensis* because “The comparatively small size and notably developed dorsal fins of the dolphins described by von Humboldt are characteristic of the genus *Sotalia*. That von Humboldt may have observed *Inia* as well is probable but not evident from his journal.” Hershkovitz may be correct for dolphins observed by von Humboldt in the Manzanares River (see Discussion section), but we disagree with his conclusion regarding the dolphins seen in the Apure and the Orinoco rivers. *Inia*’s dorsal fin (rather a ridge) is not as well developed as *Sotalia*’s, but in both species it is clearly visible every time an animal surfaces. There is no passage in von Humboldt’s descriptions of his observations in these rivers that is consistent with Hershkovitz’s characterization of “notably developed dorsal fins.” Furthermore, von Humboldt’s (1814) observations were in the Apure River at San Fernando, i.e., the area with the most records of *Inia*, and where *Sotalia* has never otherwise been recorded by an experienced observer. Thus, we presume that the dolphins seen by von Humboldt at the Apure and Orinoco rivers were *Inia* and not *Sotalia*.

## **Superfamily DELPHINOIDEA (Gray, 1821) Flower, 1864**

### **Family DELPHINIDAE Gray, 1821**

#### **Subfamily STENINAE (Fraser and Purves, 1960) Mead, 1975**

#### **Genus *Steno* Gray, 1846**

#### ***Steno bredanensis* (G. Cuvier in Lesson, 1828), rough-toothed dolphin**

**Spanish common names** Delfín bastardo, delfín de dientes ásperos, delfín de dientes rugosos, delfín de hocico estrecho, delfín de pico largo, esteno, tonina.

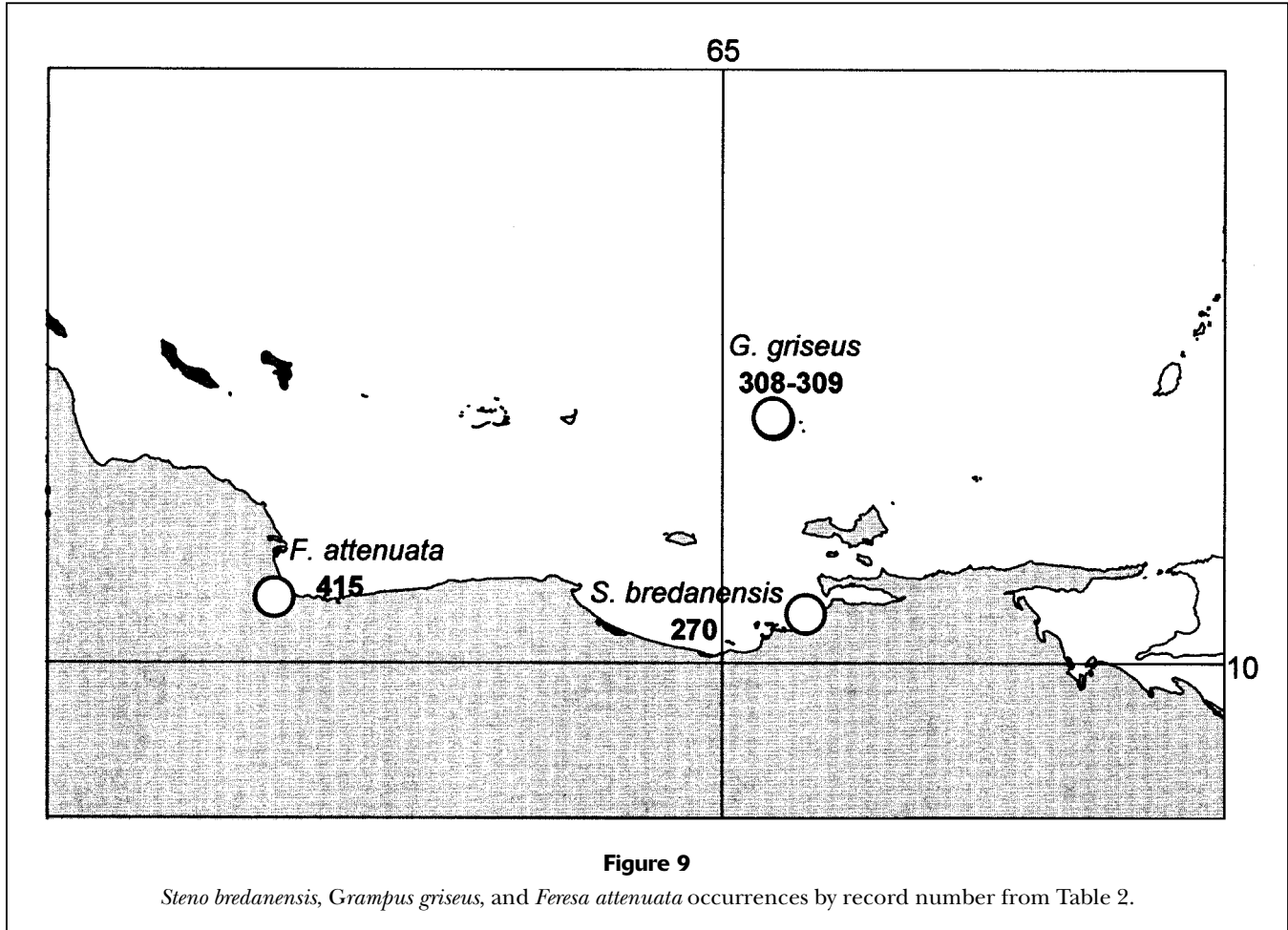
**Proposed Spanish common name** Casinos (1986) and Vidal (1990) use the name “delfín de dientes rugosos.” We propose keeping that descriptive name.

**Global distribution** Tropical and warm-temperate seas of the world; mostly pelagic (Miyazaki and Perrin, 1994).

**Occurrence in Venezuela** Only one in the eastern part of the country (Table 2; Fig. 9).

**Threats** There are no known threats in Venezuela.

**Conservation status and recommendations** It is classified as “Data Deficient” by the WCMC and is in Appendix II of CITES. As is the case with most oceanic species of delphinoids, the distribution of this deep diver is poorly known. It is uncommon in the Caribbean. It has been recorded for Cuba (True, 1889; León and Aguayo, 1945; Aguayo, 1954; Varona, 1974; Gricks, 1994), Haiti (Bonnely de Calventi, 1994), Puerto Rico (Mignucci-Giannoni, 1996), Barba-



dos (Mignucci-Giannoni, 1996), St. Vincent (Caldwell et al., 1971a; Caldwell and Caldwell, 1975; Gricks, 1994), the Grenadines (Gricks, 1994), and Colombia (Prieto Rodríguez, 1988; Vidal, 1990), with a mass stranding in Belize (Perkins and Miller, 1983). There are 21 verifiable records for the Gulf of Mexico (Mullin et al., 1994c; Jefferson and Schiro, 1997). It is likely to occur in most, if not all, tropical and subtropical waters (Miyazaki and Perrin, 1994). Ernst (1891) was the first to record this species for Venezuela under the then commonly used name of *Steno rostratus*.

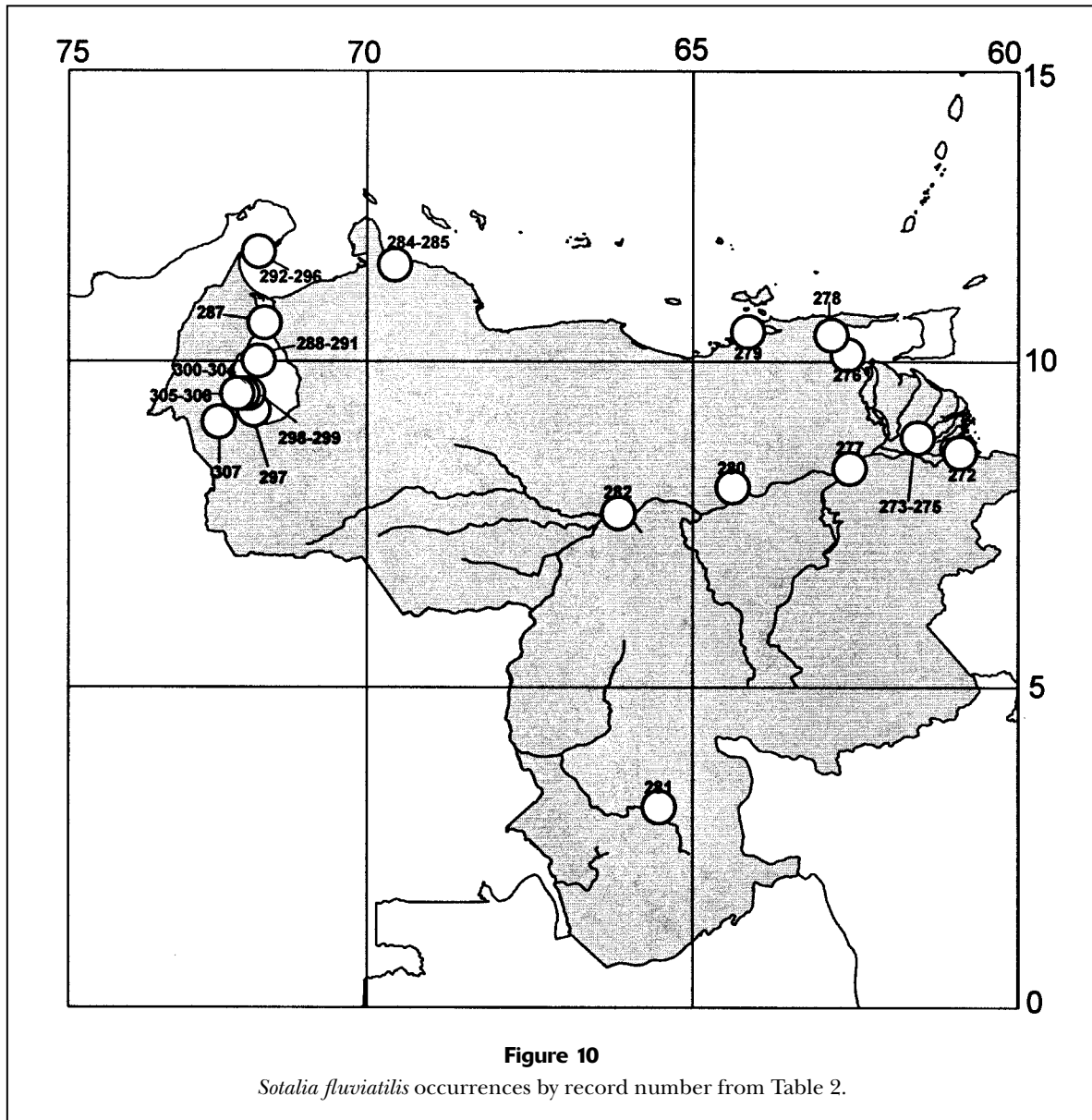
#### Genus *Sotalia* Gray, 1866

##### *Sotalia fluviatilis* (Gervais and Deville, 1853), *tucuxi*

**Taxonomic status** Originally, under what is today the genus *Sotalia*, up to five different species were described: *S. brasiliensis* van Bénédén, 1875 (coastal waters of eastern South America), *S. fluviatilis* (Gervais, 1853) (in the Amazon River and tributaries and in the Tocantins River), *S. guianensis* (van Bénédén, 1864) (coastal waters of the Guayanas and adjacent areas), *S. pallida* (Gervais, 1855) (in the Amazon River, its

tributaries, and Tocantins River), and, *S. tucuxi* (Gray, 1856) (Amazon River, its tributaries, and Tocantins River). There are three proposed arrangements for this genus:

- 1) The genus should be divided into two species: *S. fluviatilis* (Gervais, 1853) for the river forms (i.e., *S. fluviatilis*, *S. pallida*, and *S. tucuxi*) and *S. guianensis* (van Bénédén, 1864) for the coastal form (i.e., *S. guianensis* and *S. brasiliensis*) (Rice, 1977; Borobia et al., 1991).
- 2) The genus is monospecific (*S. fluviatilis*) with two subspecies, *S. fluviatilis fluviatilis* (Gervais, 1853) for the river form and *S. fluviatilis guianensis* (van Bénédén, 1864) for the marine coastal one.
- 3) It is monospecific but with two distinct populations or stocks (river and marine) that are not differentiated at the subspecific level. The last arrangement is most accepted today (for discussion see da Silva and Best, 1994), and we adopt this conservative approach, using *S. fluviatilis* as the name for both marine and river Venezuelan populations.



We agree with van Bree (1974) that, contrary to Hershkovitz (1963), Gervais is the only author and the 1853 description is valid. This species therefore must be cited as *Sotalia fluviatilis* (Gervais, 1853).

**Spanish common names** Bufo gris, bufeo loquillo, bufeo negro, \*bufete (middle Orinoco), bufo blanco, bufo negro, \*bufón (Lake Maracaibo), cuchuska, \*delfín blanco (Orinoco delta and nearby creeks), delfín deltáico, delfín de estuario amazónico, delfín de estuario americano, delfín de Guayana, delfín de río, delfín del Amazonas, delfín del Lago de Maracaibo, \*tonina de río, tucuxi.

**Proposed Spanish name** Although this species presents problems similar to those outlined for *I. geoffrensis*, “bufeo” seems to be a sufficiently distinctive and broadly used name to stand as the Spanish common name.

**Global distribution** Marine form: western Central and South American coasts from Nicaragua ( $14^{\circ}35'31''\text{N}$ ,  $83^{\circ}14'54''\text{W}$ ) (Carr and Bonde, 2000) to the Florianópolis region ( $27^{\circ}35'\text{S}$ ,  $48^{\circ}34'\text{W}$ ), Santa Catarina State, Brazil (da Silva and Best, 1994). The only island record is from Trinidad (van Bree, 1975). Freshwater form: Orinoco and Amazon watersheds (Borobia et al., 1991).

**Occurrence in Venezuela** The marine form occurs mostly in western Venezuela while the river form occurs mostly in the Orinoco delta (Table 2), making them allopatric in Venezuela (Fig. 10).

**Doubtful records** BOLIVAR: 130 km from the mouth of the Orinoco River (Hershkovitz, 1963). APURE: San Fernando de Apure and Río Atabapo (Hershkovitz, 1963, 1966, based on his interpretation of von Hum-

boldt's narrations). AMAZONAS: Brazo of Canal del Casiquiare (Borobia, 1990), Baría and Pasimoni rivers, tributaries of the Casiquiare River (Pilleri, 1979). Confluence of the Padamo and Mavaca rivers at the Orinoco, Upper Orinoco, Amazonas State, Caura and upper parts of the Orinoco (Trebbau and van Bree, 1974, no evidence).

**Habitat and ecology** It is usually found in groups of two to five (Meade and Koehnken, 1991). Turbidity and pH do not seem to affect the distribution of the river form, but rapids do. They prefer deep fresh waters (Meade and Koehnken, 1991) and do not enter flooded areas (da Silva and Best, 1994). The marine form prefers shallow waters (Leatherwood et al., 1976; Borobia et al., 1991; da Silva and Best, 1994).

**Threats** The records suggest a discontinuous distribution along Venezuelan coasts, with one group in Lake Maracaibo and another in the Paria/Orinoco Delta region. Its distribution along the Orinoco River may not be discontinuous. Given the high level of pollution along the Venezuelan coasts (Romero, 1992a), and the fact that most Venezuelan coasts are deep (Romero, 1990), i.e., not ideal habitat for this species, we believe that *S. fluviatilis* is not only rare, but is possibly endangered. In 1974, van Bree (1974) did not see them in the Orinoco. Northridge (1984) reported that they are taken by gill nets at river mouths. Agudo et al. (1994) reported accidental netting in Lake Maracaibo. This species has been reported from four nominally protected areas in Venezuela, namely Ciénagas del Cataumbo National Park, Marius National Park (Delta Amacuro State), Turuépano National Park, and the Alto Orinoco-Casiquiare biosphere reserve. These areas lack active management and law enforcement, however, and therefore may be considered "paper parks" (Romero, 1992a,b).

**Conservation status and recommendations** It is classified as "Data Deficient" by the WCMC and is in Appendix I of CITES.

**Remarks** Von Humboldt (1814) may have been the first to note this species for Venezuela, well before its scientific naming by Gervais in 1853. Referring to people who bathe at the Manzanares River, von Humboldt states that "The company were under no apprehensions from the babas, or small crocodiles, which are now extremely scarce, and which approach men without attacking them. These animals are three or four feet long. We never met with them in the Manzanares, but with a great number of dolphins (toninas), which sometimes ascend the river in the night, and frighten the bathers by spouting water" (von Humboldt, 1814). This observation of dolphins swimming upstream, taken together with an earlier section of this passage referring to the area as an estuary, makes it likely that he encountered *Sotalia*.

**Subfamily DELPHININAE (Gray, 1821) Flower, 1867**  
**Genus *Grampus* Gray, 1828**

***Grampus griseus* (G. Cuvier, 1812), Risso's dolphin**

**Spanish common names** calderón gris, delfín de Risso, delfín gris, fabo calderón.

**Proposed Spanish common name** Although Vidal (1990) used "delfín de Risso," we concur with Casinos (1986) in using the most descriptive name of "calderón gris."

**Global distribution** Pan-globally in tropical and temperate seas, generally over waters deeper than 1,000 m (Klinowska, 1991; Kruse et al., 1999).

**Occurrence in Venezuela** The only two records are from La Blanquilla island off the central coasts of Venezuela (Table 2; Fig. 9).

**Threats** It has accidentally been captured with seine nets (Romero et al., 1997b).

**Conservation status** It is classified as "Data Deficient" by the WCMC and is in Appendix II of CITES.

**Remarks** There are few records from the Caribbean and it does not seem to be a very common cetacean for the area. It has been reported for Cuba (Cumí, 1918; Varona, 1974), Puerto Rico (Mignucci-Giannoni, 1996), St. Croix (Erdman, 1970), St. Vincent (Caldwell et al., 1971a; Caldwell and Caldwell, 1975; Gricks, 1994), the Grenadines (Gricks, 1994), Aruba (Agudo and Ponson, 1996), and Colombia (Cuervo Díaz et al., 1986; Prieto Rodríguez, 1988; Vidal, 1990). Romero et al. (1991) first recorded this species for Venezuela. It is very common, however, in the Gulf of Mexico (Mullin et al., 1994c; Jefferson and Schiro, 1997). Given its distinctive appearance, we believe that the difference in number of records between the Caribbean and the Gulf represents a real, but puzzling, difference in abundance.

**Genus *Tursiops* Gervais, 1855**

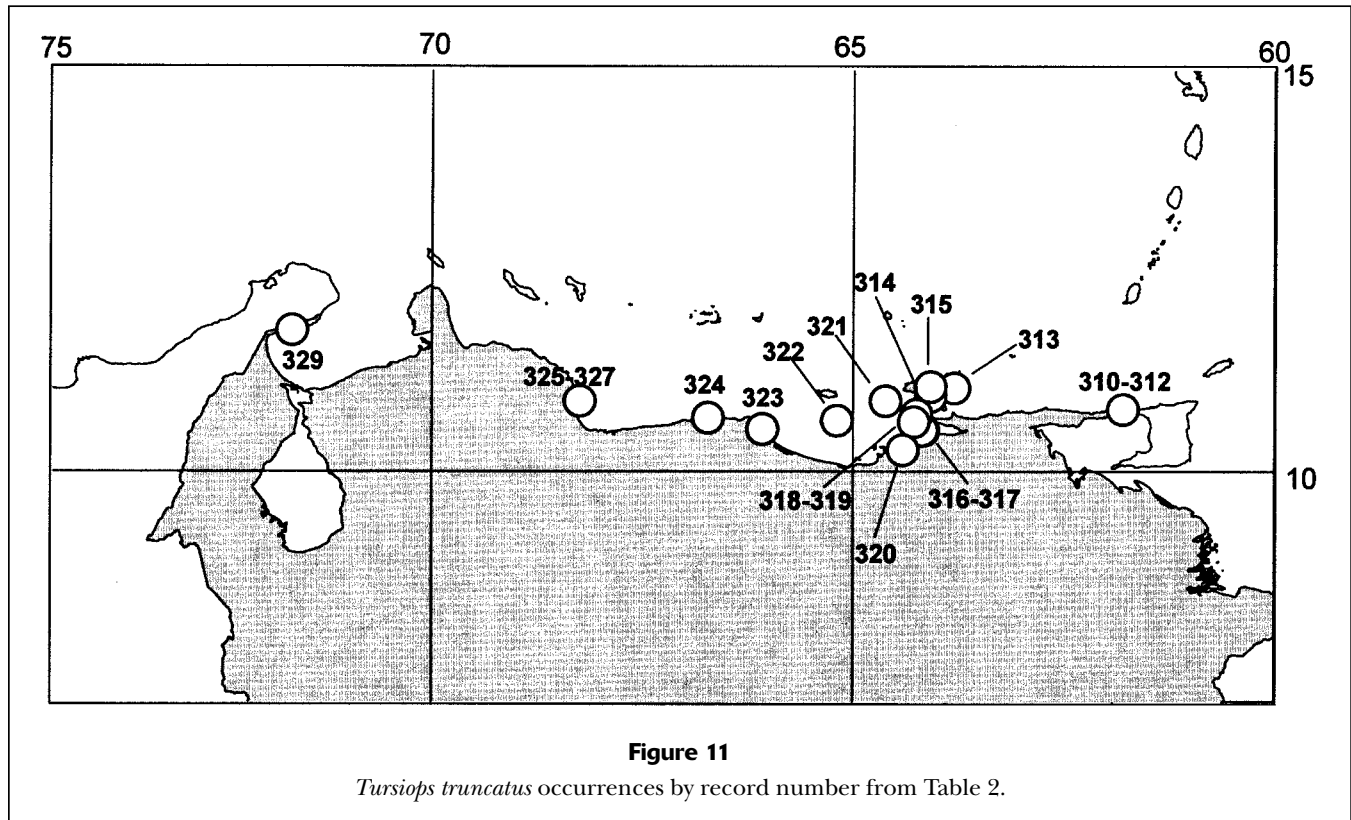
***Tursiops truncatus* (Montagu, 1821), bottlenose dolphin**

**Spanish common names** Bufeo, delfín mular, delfín nariz de botella, delfín negro, delfín pico de botella, \*guamachín (Sucre and other northeastern States), mular, \*negro (Sucre), pez mular, tursión, tonina, tonino (Sucre State).

**Proposed Spanish common name** Casinos (1986) called it "mular," a common name in Spain but foreign for Latin America. Vidal (1990) called it "tonina." Many Venezuelan fishermen call it "guamachín," a name restricted in usage to the eastern part of Venezuela. We propose the use of "tursión," a name clearly distinct from others.

**Global distribution** Cosmopolitan except for polar regions; common throughout continental shelves; mostly coastal (Klinowska, 1991; Wells and Scott, 1999).

**Occurrence in Venezuela** Throughout Venezuelan coasts but particularly in the eastern region (Table 2; Fig. 11).



**Threats** This species has been harpooned and incidentally taken in nets along Venezuelan coasts, but to a lesser extent than *D. capensis* (see Romero et al., 1997b for a summary).

**Conservation status** It is classified as “Data Deficient” by the WCMC and is in Appendix II of CITES.

**Remarks** They can be found scattered in shallow waters in Venezuela (Evans et al., 1979) and it is not unusual to find them elsewhere in the Caribbean, with reports from Cuba (True, 1889; Cuní, 1918; Aguayo, 1954; Varona, 1974), the Dominican Republic (Bonnely de Calventi, 1994), Puerto Rico (Erdman, 1970; Erdman et al., 1973; Mignucci-Giannoni, 1996), the Virgin Islands (Erdman, 1970), Barbados (Turner, 1912), St. Vincent (Caldwell et al., 1971a; Caldwell and Caldwell, 1975), Trinidad (Bacon, 1975; van Bree, 1975), Curaçao (Debrot, 1998), Bonaire and Curaçao (Debrot et al., 1998), Aruba (Agudo and Ponson, 1996), Colombia (Prieto Rodríguez, 1988; Vidal, 1990), the western Caribbean (Palacios et al., 1996), and Belize (Jefferson and Lynn, 1994). It is very common in the Gulf of Mexico (Mullin et al., 1994c).

#### Genus *Stenella* Gray, 1866

#### *Stenella frontalis* (G. Cuvier, 1829), Atlantic spotted dolphin

**Spanish common names** Ballenero\* (NE of the Paria peninsula), delfín de dientes afilados, delfín man-

chado, delfín manchado del Atlántico, delfín moteado, delfín moteado común, delfín moteado del Atlántico, delfín moteado endémico, delfín pardo, delfín pintado, estenela moteada, moteado, prodelfín, tonina, tonina moteada, tonino.

**Proposed Spanish common name** Vidal (1990) uses “delfín manchado del Atlántico” and we propose to maintain that name.

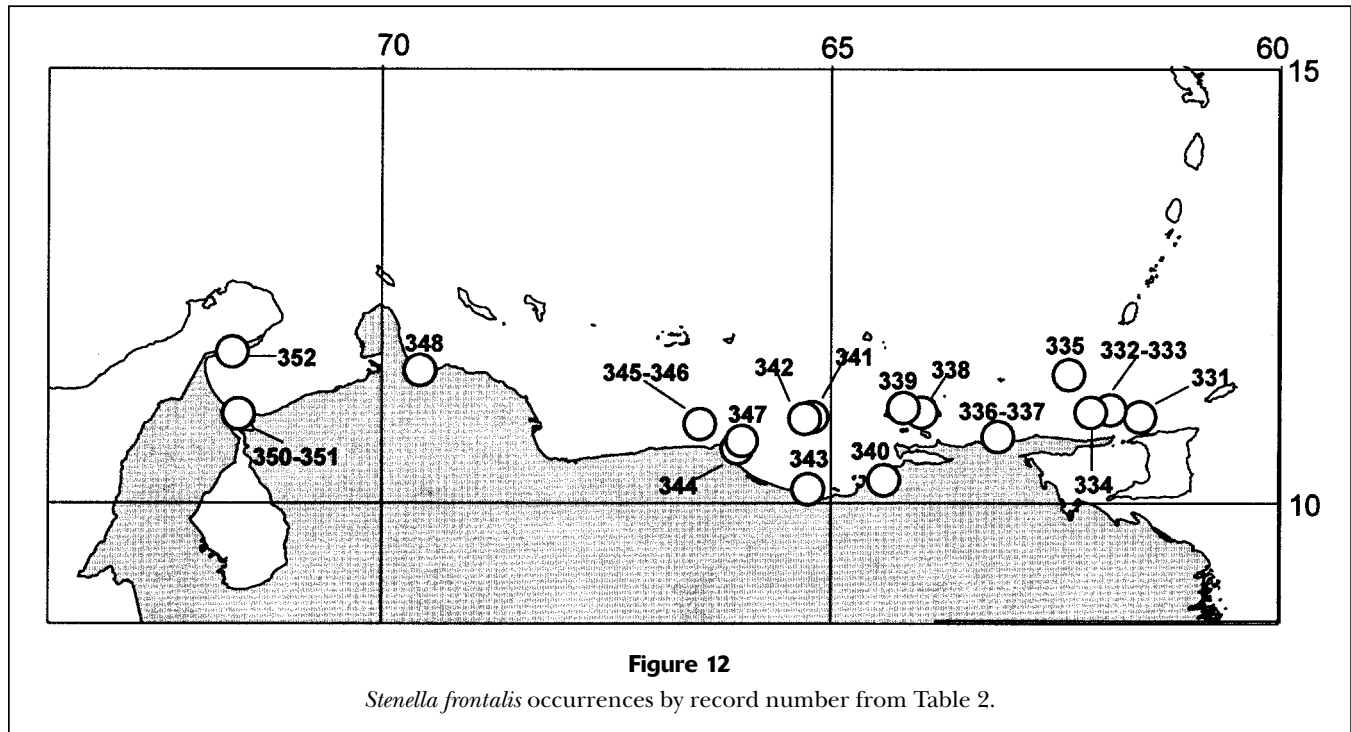
**Global distribution** Tropical and warm-temperate Atlantic. Mostly coastal (Perrin et al., 1994a).

**Occurrence in Venezuela** Throughout all the coastal areas and offshore as well (Table 2; Fig. 12).

**Threats** It is captured incidentally in gill nets in Venezuela and hunted for shark bait and human consumption (Romero et al., 1997b).

**Conservation status** It is classified as “Data Deficient” by the WCMC and is in Appendix II of CITES.

**Remarks** It is very common in the Caribbean (Perrin et al., 1987), with reports from Haiti (Mignucci-Giannoni, 1996), the Dominican Republic (Bonnely de Calventi, 1994), Puerto Rico and the U.S. Virgin Islands (Mignucci-Giannoni, 1996), Barbuda and Antigua (Gricks, 1994), Dominica and St. Lucia (Bonnely de Calventi, 1994), St. Vincent (Caldwell et al., 1971a), Trinidad (Mitchell, 1970), Aruba (Agudo and Ponson, 1996), Colombia (Prieto Rodríguez, 1988; Vidal, 1990), the western Caribbean (Palacios et al., 1996), and Pan-



ama (Caldwell and Caldwell, 1966; Perrin et al., 1994a). It is also common in the Gulf of Mexico (Mills and Rademacher, 1996; Jefferson and Schiro, 1997). In January 1998, a massive stranding (>100) was reported for Isla de la Tortuga (Bolaños and Boher, 1998), the largest stranding event ever reported for Venezuela.

***Stenella attenuata* (Gray, 1846), pantropical spotted dolphin**

**Taxonomic status** The justification for this name instead of *Steno attenuatus* (Gray, 1846) can be found in Perrin (1990a) and ICZN (1991).

**Spanish common names** Bufe manchado, delfín de antifaz, delfín manchado, delfín manchado pantropical, delfín moteado, delfín moteado de antifaz, delfín moteado pantropical, delfín moteado tropical, delfín pintado, estenela moteada pantropical, tonina, tonino pintado.

**Proposed Spanish common name** We concur with Vidal (1990) in naming it “delfín manchado pantropical.”

**Global distribution** Pantropical and some subtropical waters. Coastal and pelagic (Perrin and Hohn, 1994).

**Occurrence in Venezuela** The only record is from the eastern region of Venezuela (Table 2).

**Threats** None known in Venezuela. A severed head was found floating by Curaçao fishermen (12°8'N; 69°0'W, near Venezuelan waters), however, in July 1991. Curaçao fishermen do not customarily kill dolphins (Debrot and Barros, 1994; LeDuc et al., 1997).

**Conservation status** It is classified as “Lower Risk: Conservation Dependant” by the WCMC and is in Appendix II of CITES.

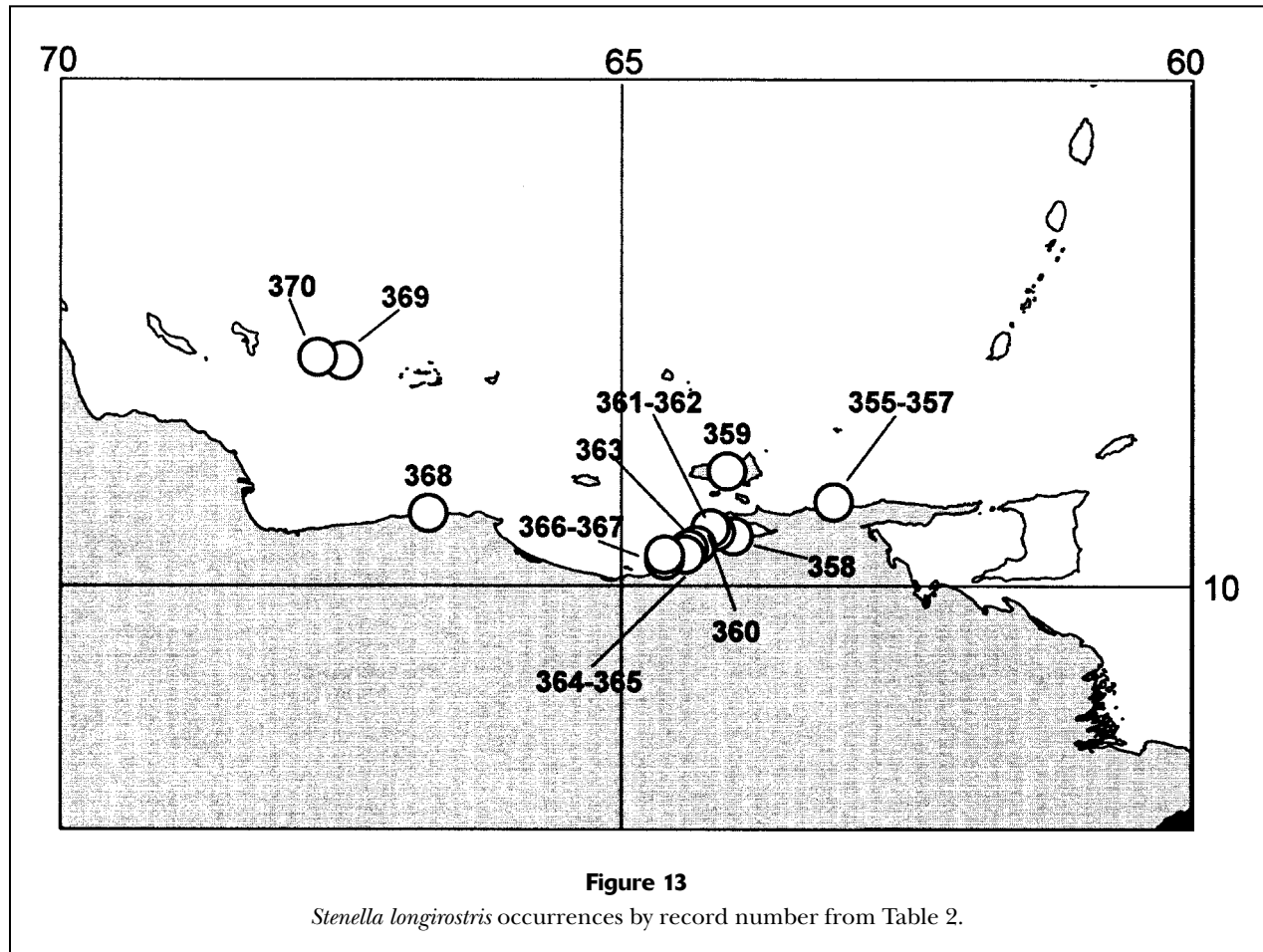
**Remarks** In the Atlantic it is primarily an animal of the high seas and oceanic islands. It has also been reported for Dominica (Gricks, 1994), St. Vincent (Perrin et al., 1987; Gricks, 1994), the Grenadines (Gricks, 1994), other Lesser Antilles (Caldwell et al., 1971a), Klein Curaçao and Curaçao (LeDuc et al., 1997; Debrot et al., 1998), several localities of the open Caribbean Sea (Jefferson and Lynn, 1994), the Colombian Caribbean (Cuervo Díaz et al., 1986; Vidal, 1990), and the western Caribbean (Palacios et al., 1996). It seems more common in the Gulf of Mexico than in the Caribbean (Jefferson and Schiro, 1997). The confusing taxonomy of the *Stenella* species-complex, clarified only recently (Perrin et al., 1987), has made it difficult to reliably identify the species and assess its Caribbean distribution.

***Stenella longirostris* (Gray, 1828), spinner dolphin**

**Taxonomic status** Based on Perrin (1990b) and Perrin and Gilpatrick (1994), the subspecies for Venezuela should be *S. longirostris longirostris* (Gray, 1828).

**Spanish common names** Delfín churumbelo, delfín girador, delfín hilador, delfín de hocico largo, delfín tornillo, delfín tornillón, delfín volteador, estenela giradora, falso delfín, tonina, volteador.

**Proposed Spanish common name** Casinos (1986) called this species “delfín de hocico largo,” which is not



a very good descriptive reference since many dolphins have long snouts. We concur with Vidal (1990) who used the term “delfín girador” in reference to the spinning behavior of this species.

**Global distribution** Tropical and subtropical seas of the world. Coastal and pelagic (Perrin and Gilpatrick, 1994), although coastal records are usually from locations with deep waters close to shore.

**Occurrence in Venezuela** In the eastern and central waters of the country (Table 2; Fig. 13).

**Threats** It is incidentally captured in gill nets and its meat is occasionally used for shark bait and human consumption (Agudo, 1990). Remains have been found at fishing camps in the Archipiélago Las Aves, Isla de Barlovento (van Halewijn and van Bree, 1972). For a summary of human utilization, see Romero et al. (1997b).

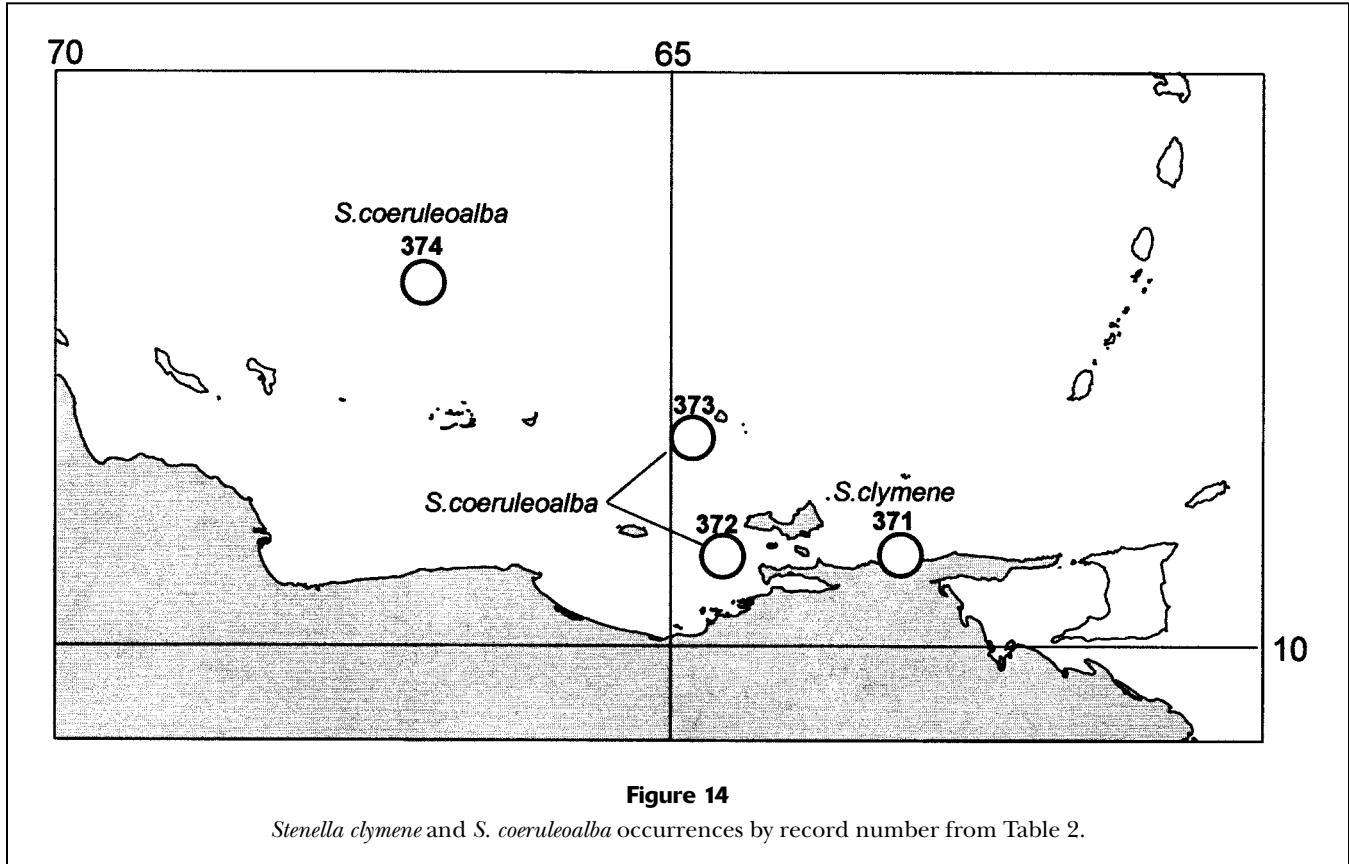
**Conservation status** It is classified as “Lower Risk” by the WCMC and is in Appendix II of CITES.

**Remarks** It is fairly common in Venezuela. It has also been reported in the Bahamas (Varona, 1974), Cuba (Perrin et al., 1981), Puerto Rico (Erdman et al., 1973), Dominica (Gricks, 1994), St. Vincent (Caldwell et al.,

1971a; Gricks, 1994), the Grenadines (Gricks, 1994), Bonaire (Debrot et al., 1998), Curaçao (Debrot and Barros, 1994; Debrot, 1998; Debrot et al., 1998), and the Caribbean in general (Jefferson and Lynn, 1994; Palacios et al., 1996). There are 17 verified records for the Gulf of Mexico (Jefferson and Schiro, 1997).

It is possible that the dolphins seen by von Humboldt (1814) on November 18, 1799, off the coast of the Península de Araya, an area where spinner dolphins are common, were *S. longirostris*. He described his sighting as follows: “Bands of porpoises followed our bark. Fifteen or sixteen of these animals swam at equal distances from each other. When turning on their backs, they struck the surface of the waters, which seemed like flames issuing from the depth of the oceans. Each band of porpoises, ploughing the surface of the waters, left behind it a track of light, the more striking as the rest of the sea was not phosphorescent.” Perrin and Gilpatrick (1994) mentioned a similar description by Antoine-Joseph Pernety in 1769 as possibly the first published reference to the spinner dolphin.





***Stenella clymene* (Gray, 1850), Clymene dolphin**

**Spanish common names** Delfín celador, delfín clymene, delfín de yelmo, delfín tornillo hocico corto, delfín volteador hocico corto, tonina.

**Proposed Spanish common name** Since other common names may confuse this species with *Stenella longirostris*, we concur with Casinos (1986) in using the name “delfín de yelmo.”

**Global distribution** Tropical and subtropical Atlantic (Perrin and Mead, 1994). It is primarily pelagic (Jefferson et al., 1993).

**Occurrence in Venezuela** The only record is for the eastern region of Venezuela (Table 2; Fig. 14).

**Threats** The only record is for an individual incidentally captured in gill nets in Venezuelan waters and utilized for longline shark bait and human consumption (Agudo, 1990; Romero et al., 1997b).

**Conservation status** It is classified as “Data Deficient” by the WCMC and is in Appendix II of CITES.

**Remarks** There is a paucity of records for this species worldwide, perhaps because its specific status was not recognized until 1981. The few records for the Caribbean are from St. Vincent and Curaçao (Perrin et al., 1981; Watkins and Moore, 1982) whereas there are 50 reliable records for the Gulf of Mexico (Mullin et al., 1994b; Jefferson and Schiro, 1997).

***Stenella coeruleoalba* (Meyen, 1833), striped dolphin**

**Spanish common names** Delfín a rayas, delfín azul, delfín blanco, delfín blanco y azul, delfín de betas, delfín listado, delfín rayado, estenela, estenela listada, tonina.

**Proposed Spanish common name** We concur with Casinos (1986) and Vidal (1990) in naming this species “delfín listado.”

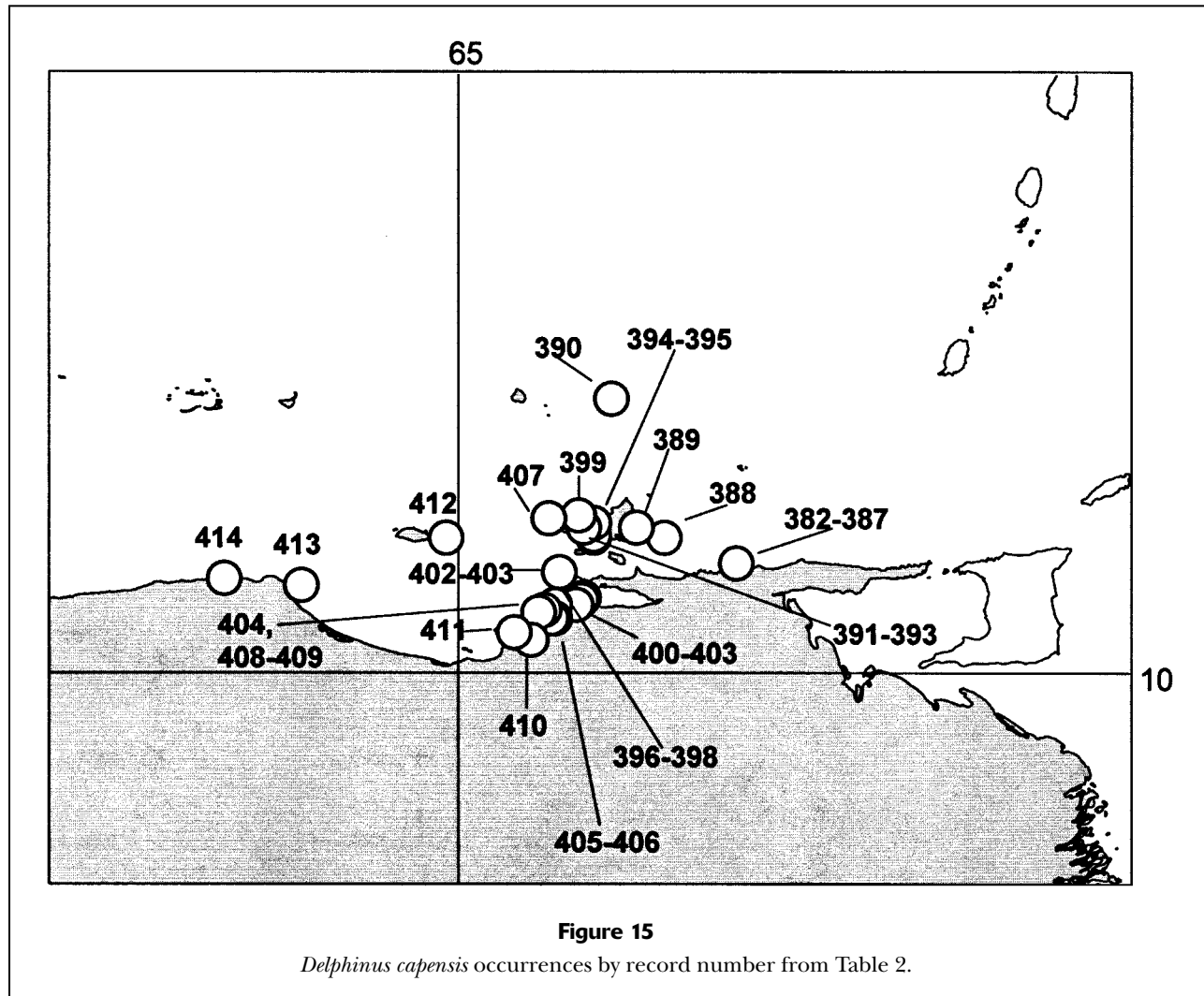
**Global distribution** Tropical and temperate seas of the world. Mostly off the continental shelf (Perrin et al., 1994d).

**Occurrence in Venezuela** All the records are from islands or pelagic (Table 2; Fig. 14).

**Threats** None known in Venezuela.

**Conservation status** It is classified as “Lower Risk” by the WCMC and is in Appendix II of CITES.

**Remarks** It has been reported from Jamaica (True, 1889; Gricks, 1994), the U.S. Virgin Islands and St. Croix (Mignucci-Giannoni, 1996), St. Vincent (Gricks, 1994), Bonaire and Curaçao (van Bree, 1975; Debrot and Barros, 1994; Debrot et al., 1998), and the Colombian Caribbean (Cuervo Díaz et al., 1986; Vidal, 1990), as well as in several locations of the open Caribbean Sea (Jefferson and Lynn, 1994). It is not uncommon in the Gulf of Mexico with 27 verified records (Jefferson and



Schiro, 1997). We would expect more reports from Venezuela than the records indicate.

### Genus *Delphinus* Linnaeus, 1758

#### *Delphinus capensis* Gray, 1828, long-beaked common dolphin

**Spanish common names** Delfín común, delfín de mar, \*tonina, \*tonina de mar (northeastern Venezuela), \*tonino.

**Proposed Spanish common name** “Delfín común” because it is widely used and applies perfectly to the geographical distribution and abundance of this species.

**Global distribution** Mostly from tropical and temperate oceans of the world. Coastal and pelagic (Evans, 1994).

**Occurrence in Venezuela** Almost always in the eastern part of the country (Table 2; Fig. 15).

**Threats** Ernst (1884) mentions artisanal use of this species as a source of oil for lamps and for sealing wood-

en ships. Van Halewijn and van Bree (1972) reported finding remains of *D. capensis* in a Margarita fishing camp. This is the dolphin usually taken by harpoon in local fisheries of Venezuela (Romero et al., 1997b), where local populations may be threatened by these actions.

**Conservation status and recommendations** Because its taxonomy has been revised recently (it used to be considered *D. delphis*), there are no status listings. Given the large numbers of these animals taken by Venezuelan fishermen (Romero et al., 1997b), we propose that it should be classified as “Vulnerable” by the WC-MC and placed in the Appendix II of CITES.

**Remarks** Although the overall population distribution remains poorly known because of past confusion with *D. delphis* (Rice, 1998), our examination of specimens leads us to conclude that this species is common along the eastern coasts of Venezuela where it has been seen in groups of up to 1,000 animals (Evans et al., 1979). There are no records, however, for the western part of

the country. This is consistent with its general distributions in the western Atlantic (Rice, 1998). It has been reported from other parts of the Caribbean (Erdman, 1970; Varona, 1974; van Bree, 1975; Watkins and Moore, 1982), but is not known to occur in the Gulf of Mexico (Jefferson and Schiro, 1997). This is the only species of Venezuelan cetacean for which the parasite fauna has been studied (Mignucci-Giannoni et al., 1998a).

**Subfamily GLOBICEPHALINAE (Gray, 1866) Gill, 1872**

**Genus *Feresa*, 1827**

***Feresa attenuata* Gray, 1874, pygmy killer whale**

**Spanish common names** Ballena asesina pigmea, orca pigmea.

**Proposed Spanish common name** “Orca pigmea,” the name most commonly used (Casinos, 1986; Vidal, 1990).

**Global distribution** This is a pantropical species (Ross and Leatherwood, 1994; Rice, 1998).

**Occurrence in Venezuela** Only one record for western Venezuela (Table 2; Fig. 9).

**Unconfirmed records** We received a report of an observer who claimed seeing one animal at sea (Romero et al., 1991), but this is an extremely difficult species to identify by simple visual observation.

**Threats** None known for Venezuela.

**Conservation status and recommendations** It is classified as “Data Deficient” by the WCMC and is in Appendix II of CITES.

**Remarks** This is a very uncommon species for the Caribbean, with one record each for Puerto Rico (Rodríguez-López and Mignucci-Giannoni, 1999), the British Virgin Islands (Mignucci-Giannoni, 1996), Dominica (Gricks, 1994), and St. Vincent (Caldwell and Caldwell, 1971a; Caldwell et al., 1971a; Gricks, 1994). Cuervo Díaz et al. (1986) believe it can be found in the Colombian Caribbean. There are 19 reliable records for the Gulf of Mexico (Jefferson and Schiro, 1997).

**Genus *Pseudorca* Reinhardt, 1862**

***Pseudorca crassidens* (Owen, 1846), false killer whale**

**Spanish common names** Delfín chato, orca bastarda, orca falsa.

**Proposed Spanish common name** “Delfín chato” does not seem appropriately descriptive. Casinos (1986) employed the name “orca bastarda” while Vidal (1990) used “orca falsa.” We propose the use of “orca falsa” although “orca bastarda” is also unambiguous.

**Global distribution** In all tropical and temperate oceans of the world. Mostly in deep water and offshore areas (Odell and McClune, 1999).

**Occurrence in Venezuela** The few records are widespread, although this is the only cetacean in Venezuela

for which there are more records from the central coasts than the eastern coasts (Table 2; Fig. 16).

**Threats** None known in Venezuela even though one was harpooned by a tuna boat at Los Roques archipelago after it became entangled in fishing nets (Romero et al., 1997b).

**Conservation status and recommendations** It is not classified by the WCMC, but it is in Appendix II of CITES. We propose that it be classified as “Data Deficient” until we learn more about its population status.

**Remarks** An infrequent species with very few records: Cuba (Cuní, 1918; Aguayo, 1954; Varona, 1974; Gricks, 1994), Puerto Rico (Mignucci-Giannoni, 1996), Dominica (Gricks, 1994; Notarbartolo di Sciara, personal observ.), St. Vincent (Caldwell et al., 1971a; Caldwell and Caldwell, 1975; Gricks, 1994), the Grenadines (Gricks, 1994), Tobago (Bruyns, 1969), and the western Caribbean (Palacios, 1996). There are 27 reliable records for the Gulf of Mexico (Mullin et al., 1994c; Jefferson and Schiro, 1997). Miller (1921) published the first record for this species in Venezuela.

**Genus *Orcinus* Fitzinger, 1860**

***Orcinus orca* (Linnaeus, 1758), killer whale**

**Spanish common names** Ballena asesina, delfín gigante, espadarte, espolarte, moscote, orca.

**Proposed Spanish common name** “Orca,” because of its almost universal use.

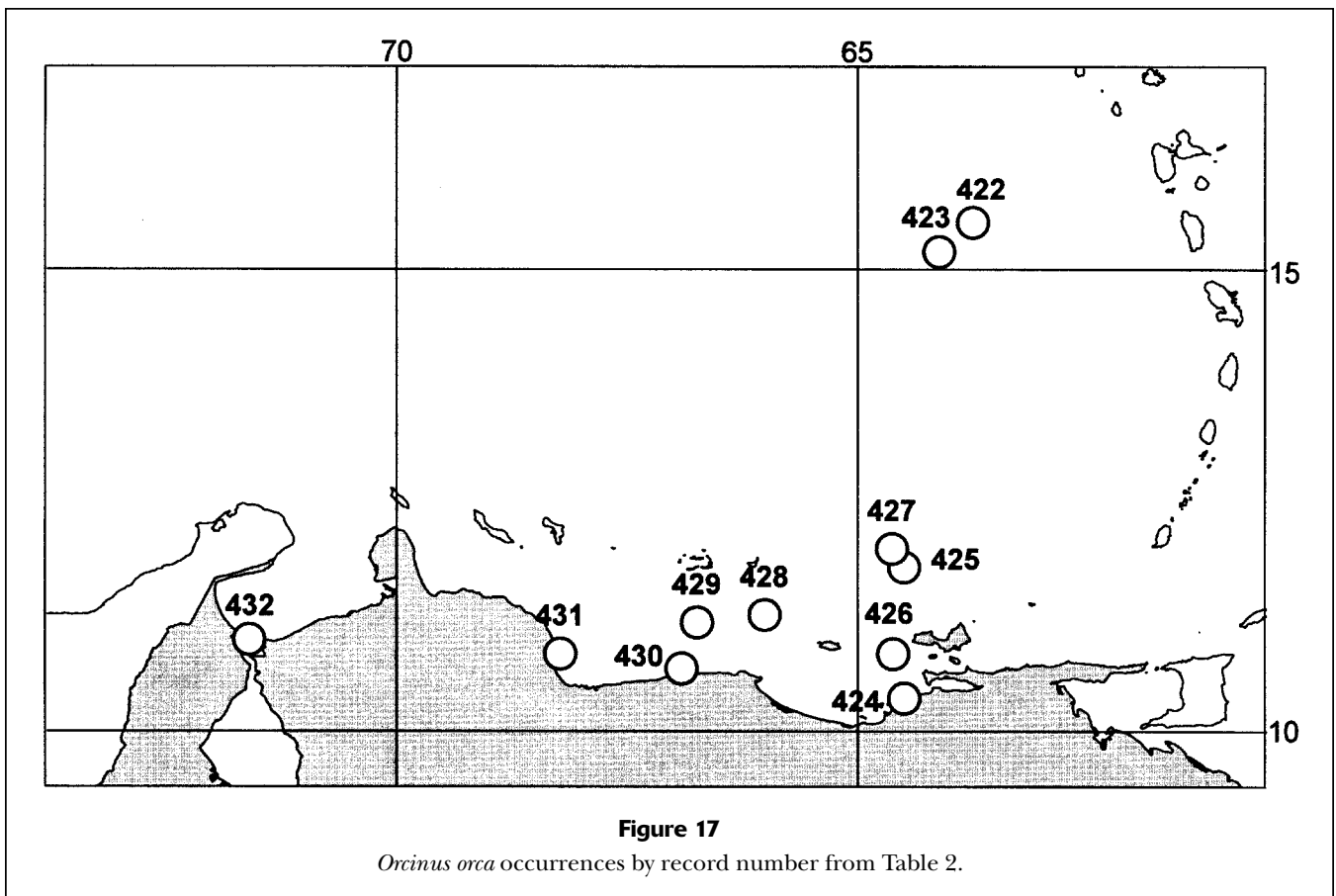
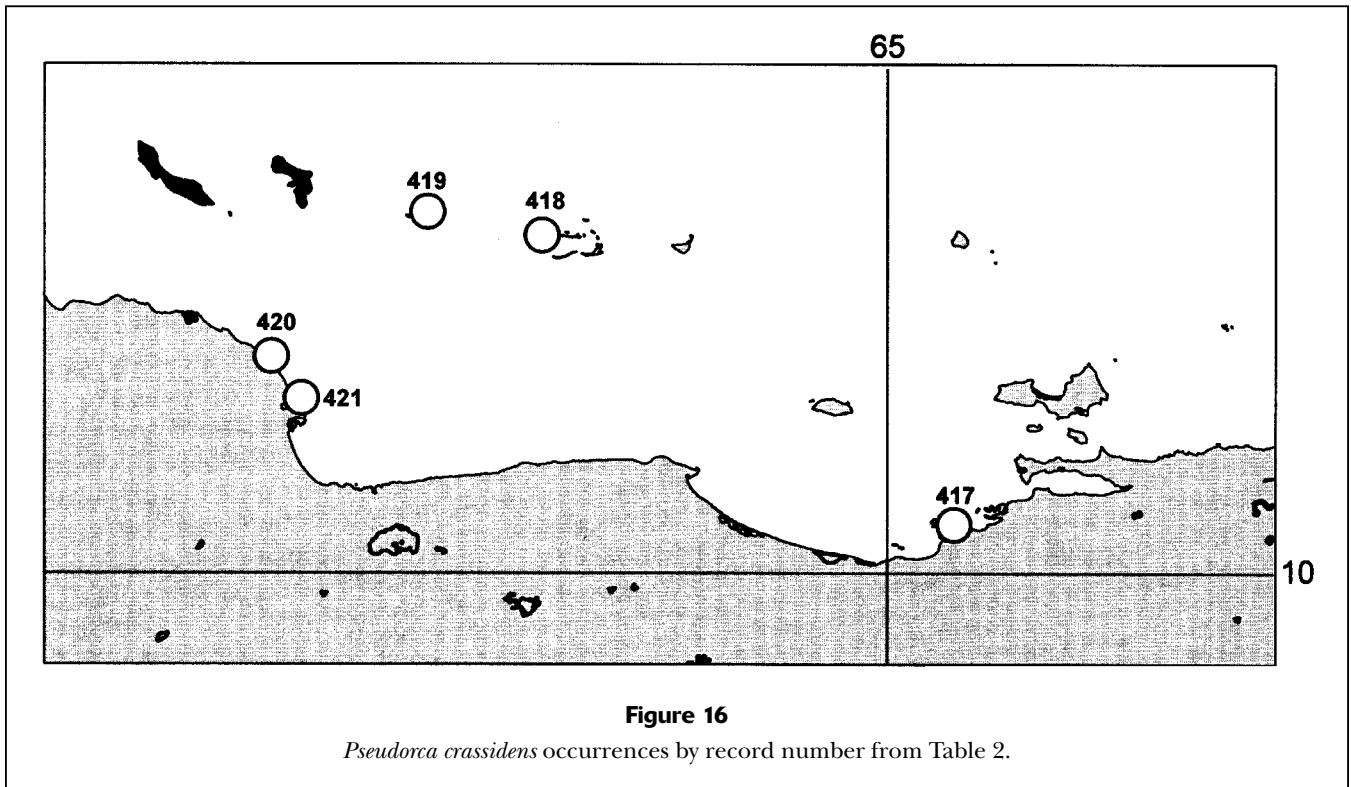
**Global distribution** In all oceans. It is the world’s most widely distributed mammal (Dahlheim and Heyning, 1999).

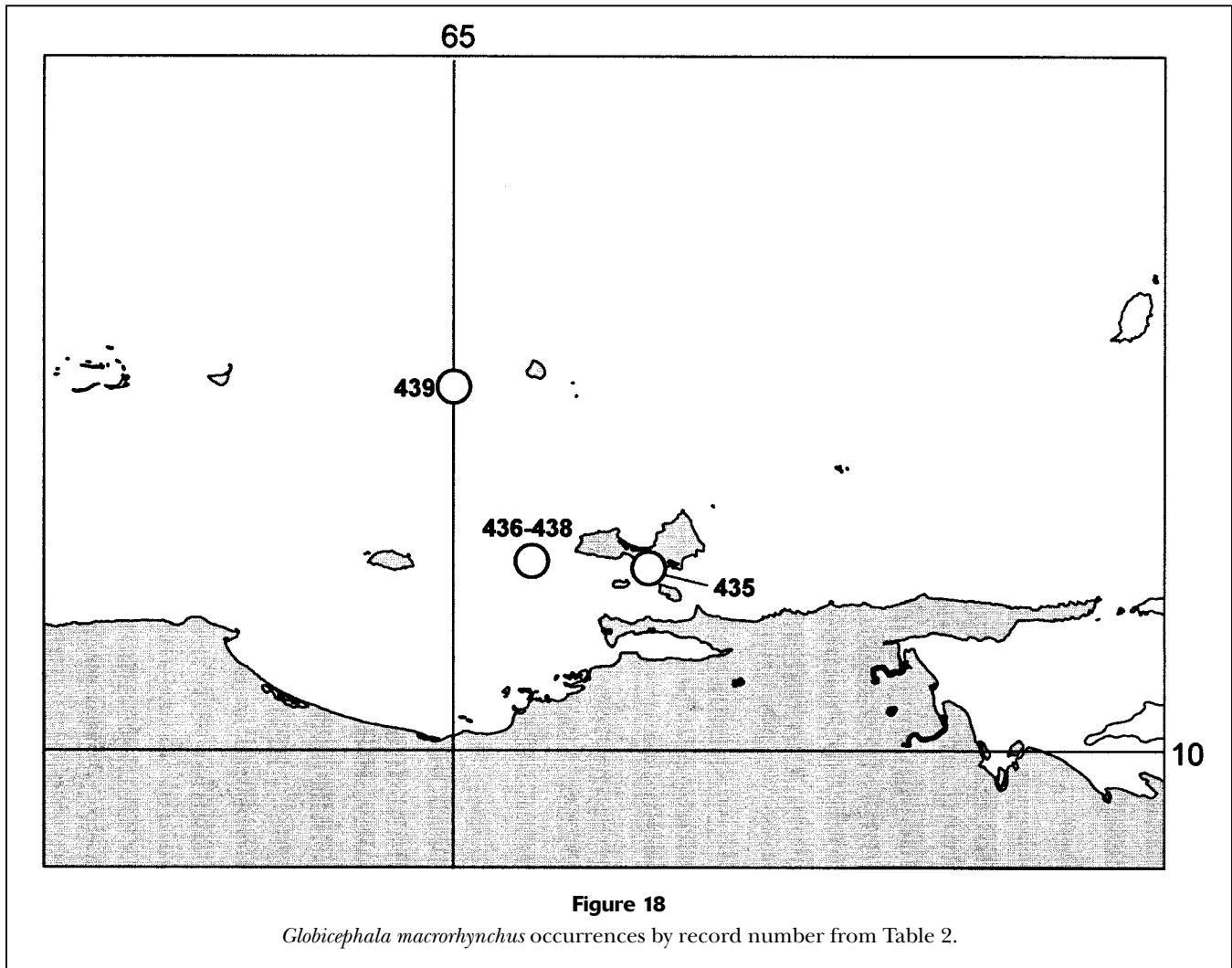
**Occurrence in Venezuela** Widespread (Table 2; Fig. 17).

**Threats** None known in Venezuela.

**Conservation status** It is classified as “Lower Risk: Conservation Dependant” by the WCMC and is in Appendix II of CITES.

**Remarks** Although very common in temperate waters, it is also common in these tropical waters. There are many records for Venezuela, particularly from the nearby oceanic islands, but relatively few for other parts of the Caribbean. There are also reports for the Bahamas (Varona, 1974; Backus, 1961), Cuba (Cuní, 1918), Isla Culebra (18°13’N, 65°09’W) (Erdman, 1970), the Dominican Republic (Bonnely de Calventi, 1994), Dominica (Gricks, 1994), St. Vincent (Caldwell et al., 1971a; Caldwell and Caldwell, 1975; Gricks, 1994) north to St. Thomas (Erdman, 1970), Bonaire (Debrot et al., 1998), and Curaçao (Debrot, 1998). Notarbartolo di Sciara observed a picture of a local specimen in the Natural History Museum of Port of Spain, Trinidad. There are few reliable records for the Gulf of Mexico, where it is considered relatively rare (Mullin et al., 1994c; Jefferson and Schiro, 1997; O’Sullivan and Mullin, 1997).





### Genus *Globicephala* Lesson, 1828

#### *Globicephala macrorhynchus* Gray, 1846, short-finned pilot whale

**Spanish common names** Ballena cabeza de olla, ballena piloto, ballena piloto de aleta corta, cachalote, calderón, calderón de aletas cortas, calderón de aletas pectorales cortas, calderón negro, calderón tropical, \*golfin (Sucre and Nueva Esparta States), ballena piloto de aleta corta.

**Proposed Spanish common name** Vidal's (1990) name of "calderón de aletas pectorales cortas," besides being a literal translation from English, is extremely long for a common name; Casinos' (1986) "calderón tropical" or "calderón de aleta" are imprecise since other *Globicephalinae* are tropical and all have distinctive fins. We propose the simplest term: "calderón."

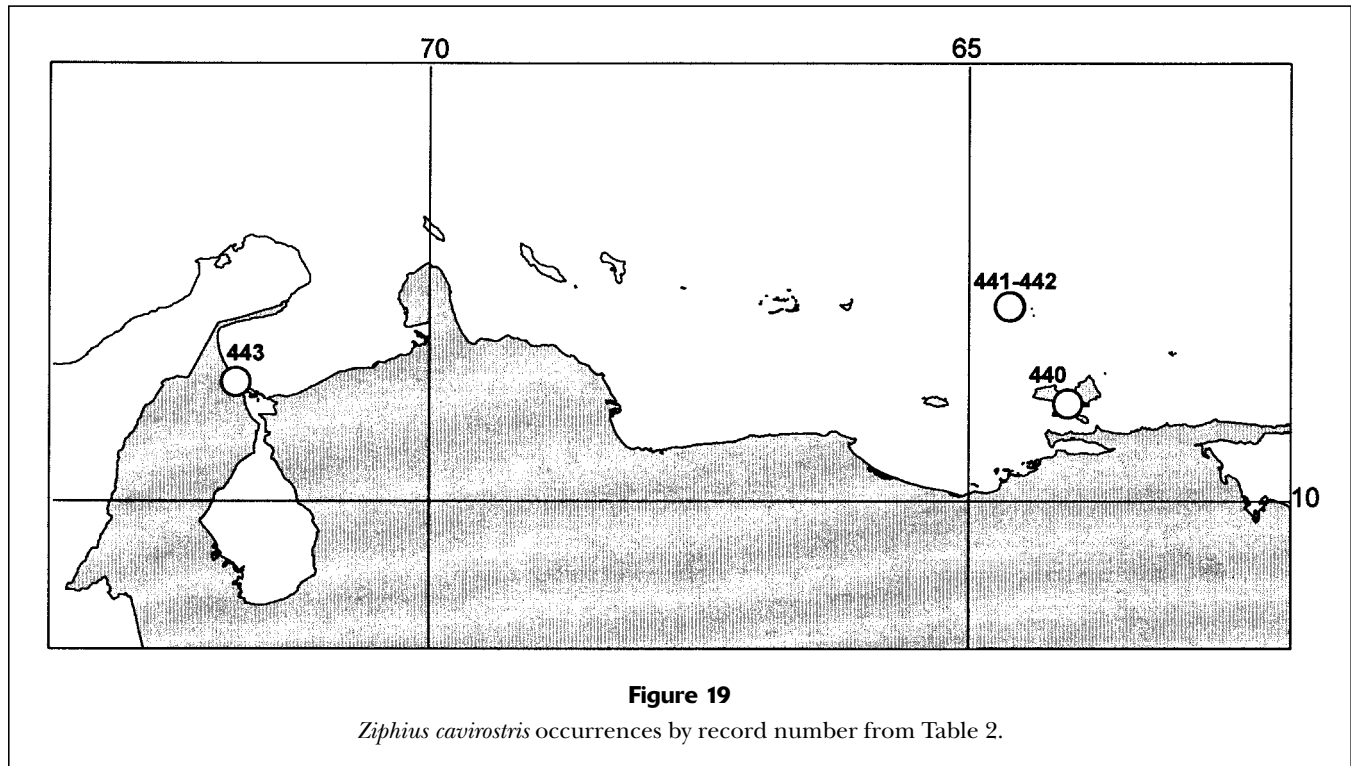
**Global distribution** Mostly pelagic in tropical and warm-temperate waters (Bernard and Reilly, 1999).

**Occurrence in Venezuela** Eastern waters (Table 2; Fig. 18).

**Threats** None known in Venezuela.

**Conservation status** It is classified as "Lower Risk: Conservation Dependant" by the WCMC and is in Appendix II of CITES.

**Remarks** It is extremely common in the Caribbean, with records from Cuba (De La Torre, 1887; Cuní, 1918; León and Aguayo, 1945; Aguayo, 1954; Varona, 1974; Mitchell, 1975), Jamaica (Mignucci-Giannoni, 1996), Martinique (Klinowska, 1991; Mignucci-Giannoni, 1996), Haiti (Caldwell and Erdman, 1963; Casinos, 1986), the Dominican Republic (Bonnely de Calventi, 1994), Puerto Rico (Caldwell and Erdman, 1963; Erdman, 1970; Erdman et al., 1973; Mignucci-Giannoni, 1996), the Virgin Islands (Caldwell and Erdman, 1963; Mignucci-Giannoni, 1996), Anguilla (Mignucci-Giannoni, 1996), Nevis (Caldwell et al., 1970; Caldwell et al., 1971a; Watkins and Moore, 1982), Antigua (Mignucci-Giannoni, 1996), Guadeloupe (True, 1889; Caldwell and Erdman, 1963; van Bree, 1975), Dominica (Caldwell and Erdman, 1963; Caldwell et al., 1971a; Varona, 1974; van



Bree, 1975; Reeves, 1988), St. Lucia (Morice, 1958; Caldwell and Erdman, 1963; van Bree, 1975; Watkins and Moore, 1982; Reeves, 1988), St. Vincent (Brown, 1945, 1947 [cited in Caldwell et al., 1971a]; Hickling, 1950 [cited in Caldwell et al., 1971a]; Fenger, 1958; Morice, 1958; Caldwell and Erdman, 1963; Caldwell et al., 1971a; Caldwell and Caldwell, 1971b; Rathjen and Sullivan, 1976; van Bree, 1975; Watkins and Moore, 1982; Price, 1985; Mignucci-Giannoni, 1996), between Bonaire and Klein Bonaire (Debrot et al., 1998), Curaçao (Debrot, 1998; Debrot et al., 1998), Aruba (Debrot et al., 1998; also mistakenly reported as *Pseudorca crassidens* in Agudo and Ponson, 1996), Colombia (Casinos and Bou, 1980; Cuervo Díaz et al., 1986; Vidal, 1990), and Mexico (Yucatán peninsula) (Morales Vela and Olivera Gómez, 1993). There are also numerous records from the Gulf of Mexico (Jefferson and Schiro, 1997).

**Superfamily ZIPHIOIDEA (Gray, 1865) Fraser and Purves, 1960**

**Family ZIPHIIDAE Gray, 1865**

**Genus *Ziphius* G. Cuvier, 1823**

***Ziphius cavirostris* G. Cuvier, 1823, Cuvier's beaked whale**

**Spanish common names** Ballena de Cuvier, ballena hociocuda, ballena pico de ganso, ballena picuda, ballena picuda de Cuvier, ballenato de Cuvier, \*cochino marino (Zulia), \*serpa (northeastern Venezuela), \*zerpa (northeastern Venezuela), zifio común, zifio de Cuvier.

**Proposed Spanish common name** There is a great deal of confusion surrounding vernacular names for this species. Vidal's (1990) and Casinos' (1986) denominations of "ballena picuda de Cuvier" and "ballenato de Cuvier," respectively, perpetuate the popular misassignment of this species to the mysticetes. We propose the use of "zifio común," a truly vernacular name in many Spanish-speaking countries and a very distinct one.

**Global distribution** Cosmopolitan except for polar waters. Mostly pelagic (Heyning, 1989a).

**Distribution in Venezuela** The few records are sparse (Table 2; Fig. 19).

**Threats** No threats are presently known in Venezuela, but in Bonaire, off Venezuela, four decomposed bodies washed ashore on an island following an underwater explosion related to military exercises (van Bree and Kristensen, 1974; Simmonds and López-Jurado, 1991).

**Conservation status** It is classified as "Data Deficient" by the WCMC and is in Appendix II of CITES.

**Remarks** This is a rarely observed species known mostly from strandings, the most numerous reported for any of the beaked whales (Heyning, 1989a). It apparently avoids vessels by diving, thus making sightings rare. It is not an infrequent species in the general area since it has also been reported for the nearby islands of Bonaire (van Bree and Kristensen, 1974), Aruba (Agudo and Ponson, 1996), and Curaçao (van Bree et al., 1973; Debrot and Barros, 1994; Debrot et al., 1998) as well as in adjacent waters (8°02'N, 14°05'W, van Bree et al., 1973).

The reports for other Caribbean locations are numerous and widespread: Cuba (Aguayo, 1954; Varona, 1964; Erdman, 1970; Ubeda, 1971 [cited in Mignucci-Giannoni, 1996]; Varona, 1974), the Bahamas (Varona, 1974; Gricks, 1994), Grand Cayman (Mignucci-Giannoni, 1996), the Dominican Republic (Bonnely de Calventi, 1994), Puerto Rico (Erdman, 1961, 1962; Moore, 1968; Erdman, 1970; Erdman et al., 1973; Varona, 1974; Mignucci-Giannoni, 1996), the U.S. and British Virgin Islands (Mignucci-Giannoni, 1996), St. Martin (van Bree et al., 1973; van Bree and Kristensen, 1974), Barbados (Caldwell et al., 1971a,b; Mignucci-Giannoni, 1996), St. Vincent (Caldwell et al., 1971b; Caldwell and Caldwell, 1975; Gricks, 1994), and Colombia (Prieto Rodríguez, 1988; Vidal, 1990). It is also reported for the Gulf of Mexico (Jefferson and Schiro, 1997).

Tello (1979) first reported it for Venezuela but did not cite any source for his information. None of the literature he reviewed mentions it for Venezuela, so we are unclear about the basis for his report. Casinos (1981) reported the first confirmed Venezuelan specimen.

## Discussion

### Quantitative analyses

The records summarized here represent individual records of occurrences by species and by locality. As such, there is little meaningful analysis that can be performed because not only do they not represent any kind of statistically valid sampling (such as an appropriate census or survey), but they are also certainly affected by a variety of biases, generally of unknown magnitude and direction. The likelihood of a record being produced can be independently affected by geographical habits of both the species and the observers, the behavior and recognizability of the species and their propensity to be captured or stranded, observers' inclinations and capabilities to describe and record, etc. Undoubtedly there are also strong interactions among these and other variables, affecting the presence or absence of records at different locations.

Nevertheless, there are a few summary analyses that may be useful to compare with other similar compilations of cetacean records in other areas affected by the same factors. These need to be viewed with considerable caution, however, because such factors as observers' recording inclinations, species' habits, etc., may vary greatly by geographical location. Comparisons among species may also be of some value, but, once again, they must be viewed with caution. Such simple figures as the number of records for each species are strongly affected by many factors that have no specific relationship with the species' relative abundance. For example, number of potential observers in areas animals frequent, ease of

observing, diving depth and surfacing habits of species, etc., all affect the number of records produced.

### Sources of records: sightings vs. strandings

The origin of records in Venezuela is summarized in Table 4. Looking only at the total number of records for Venezuela (i.e., 443) independent of the number of individual animals reported, we find that there are nearly five times more that correspond to sightings than to strandings (4.67:1). This figure contrasts sharply with results obtained in a similar analysis for Great Britain, where the ratio of sighting to stranding records was 1.25:1 (Evans, 1980). Our figure is conservative in that we have classified records that combine sightings and strandings into the stranding category. If we adopt the most conservative approach and assign the 62 records of collection specimens—virtually all resulting from animals that were captured or stranded—to strandings, we reduce our ratio to 2.24:1, still almost double the result for Great Britain.

There are at least two reasonable interpretations of this difference. First, it is possible that strandings along the Venezuelan coast are unusual occurrences with respect to the overall abundance of cetaceans in its waters. This explanation is consistent with the results of a recent report for cetaceans of the Leeward Dutch Antilles (Bonaire, Curaçao, and Aruba), the geographically closest possible non-Venezuelan comparison. It yielded a 3.12:1 ratio of sightings to strandings ( $n = 70$ , Debrot et al., 1998), a result closer to our findings for Venezuela reported in this paper than that reported for Great Britain. It is therefore possible that there is a difference in the probability of being stranded on the British Isles than in this region, a circumstance that could arise from a variety of behavioral, health, meteorological, or oceanographic origins.

The second interpretation is that strandings on the coasts of Great Britain occur in the same low proportion as we found for Venezuela, but are much more likely to be observed and/or recorded. This explanation is supported by the long-standing tradition of reporting a stranded cetacean (a "royal fish") in the U.K., by the existence of stranding networks there for which there are no parallels in Venezuela, and possibly by the persistence of remains in the British climate due to a slower rate of decomposition. There is, nevertheless, no certain way to distinguish between the alternative explanations of an actual difference in strandings, a reporting difference, or some combination of both.

### Species differences

Records of *I. geoffrensis* account for almost half the total (49%, Table 4). Records of *D. capensis* (9%) and *S. fluviatilis* (8%) are the next most frequent.

**Table 4**  
Types of cetacean records for Venezuela by species.

| Species                 | Sightings <sup>1</sup> | Strandings <sup>2</sup> | Hunting/incidental capture <sup>3</sup> | Museum specimen <sup>4</sup> | Total records |
|-------------------------|------------------------|-------------------------|---|------------------------------|---------------|
| <i>B. borealis</i>      | 3                      |                         |   |                              | 3             |
| <i>B. edeni</i>         | 12                     | 9                       | 1                                       |                              | 22            |
| <i>B. physalus</i>      |                        | 3                       |   |                              | 3             |
| <i>M. novaeangliae</i>  | 5                      | 3                       | 4                                       |                              | 12            |
| <i>P. macrocephalus</i> | 7                      | 2                       | 2                                       | 1                            | 12            |
| <i>I. geoffrensis</i>   | 162                    | 1                       | 25                                      | 28                           | 216           |
| <i>S. bredanensis</i>   | 1                      | 1                       |   |                              | 2             |
| <i>S. fluviatilis</i>   | 17                     | 10                      | 2                                       | 8                            | 37            |
| <i>G. griseus</i>       | 1                      |                         | 1                                       |                              | 2             |
| <i>T. truncatus</i>     | 4                      | 6                       | 4                                       | 6                            | 20            |
| <i>S. frontalis</i>     | 6                      | 5                       | 3                                       | 9                            | 23            |
| <i>S. attenuata</i>     | 1                      |                         |   |                              | 1             |
| <i>S. longirostris</i>  | 13                     |                         | 3                                       | 1                            | 17            |
| <i>S. clymene</i>       |                        |                         | 1                                       |                              | 1             |
| <i>S. coeruleoalba</i>  | 3                      |                         |   |                              | 3             |
| <i>D. capensis</i>      | 14                     | 8                       | 11                                      | 7                            | 40            |
| <i>F. attenuata</i>     |                        | 1                       |   |                              | 1             |
| <i>P. crassidens</i>    | 2                      | 3                       | 1                                       |                              | 6             |
| <i>O. orca</i>          | 9                      | 1                       |   | 1                            | 11            |
| <i>G. macrorhynchus</i> | 5                      | 2                       |   |                              | 7             |
| <i>Z. cavirostris</i>   | 1                      | 2                       |   | 1                            | 4             |
| Total                   | 266                    | 57                      | 58                                      | 62                           | 443           |

<sup>1</sup> Sightings include photographic, videotape, tagging (capture/release) records, and unspecified reports.

<sup>2</sup> Strandings that are not a result of hunting or incidental capture; also includes records within which both sighting and stranding are reported; includes stranding records where the remains may eventually become a museum specimen.

<sup>3</sup> Includes records where both sighting and capture are reported, strandings of wounded animals, and those instances when a hunted or captured animal may eventually become a museum specimen.

<sup>4</sup> Only specimens whose records do not indicate that cause of death was stranding, hunting, or incidental capture.

These results illustrate the confounding of species abundance and likelihood of observers to record. There is little doubt that *D. capensis* is the most common marine cetacean in Venezuela, so it is not surprising that reports are numerous. The abundance of *I. geoffrensis* and *S. fluviatilis*, on the other hand, is comparatively low (see earlier Results, Systematic List), but they inhabit river or coastal areas with good visibility and/or high human population density, and are thus very likely to be over-represented in the records. Note that species represented by only a single record, namely *S. attenuata*, *F. attenuata*, and *S. clymene*, may, in parallel fashion, either be rare in Venezuelan waters, may be very difficult to correctly identify, or may have habits that, in conjunction with the habits of human observers, do not make them likely to be recorded. *B. edeni* is the most common mysticete in the records, with strandings and sightings contributing about equally to the number of reports. This may reflect that aggregations in its spring and summer feeding areas coincide with intense fishing activity (both whales and fishermen are frequent in these productive eastern waters); it is also an area frequented

by commercial boat traffic. In addition, we suggest that the stranding of a whale is considered more noteworthy and hence more likely to be recorded than that of a small delphinid.

Debrot et al. (1998) examined records for the Leeward Dutch Antilles, the group of islands north of the western Venezuelan coast. They also found the most common species of mysticete to be *B. edeni*. The most common odontocete for those islands is *S. longirostris* (10% of their records) and they have no records for *D. capensis*. We found *S. longirostris* to be reported for Venezuelan waters at comparable levels (nearly 9% of our records of marine species), but *D. capensis* is our most frequently reported marine cetacean in Venezuela. Its absence from their records might at first seem surprising, but it is important to note that all of our records for this species are concentrated in the eastern part of the country, far from their area of study. It should also be noted that although *D. capensis* is not uncommon in the Caribbean (Heyning and Perrin, 1994; Rice, 1998), it is very rare in the Gulf of Mexico (Jefferson and Schiro, 1997). Thus, it is quite pos-



**Table 5**  
Annual distribution of marine records of cetaceans for Venezuela.

| Species                 | Month |    |     |    |    |    |     |      |    |    |    |     |
|-------------------------|-------|----|-----|----|----|----|-----|------|----|----|----|-----|
|                         | I     | II | III | IV | V  | VI | VII | VIII | IX | X  | XI | XII |
| <i>B. borealis</i>      |       | 1  |     |    |    |    | 1   |      | 1  |    |    |     |
| <i>B. edeni</i>         |       | 1  | 2   | 1  | 2  | 1  | 1   | 4    | 4  | 1  | 3  |     |
| <i>B. physalus</i>      |       | 1  |     |    |    |    |     | 1    |    |    |    |     |
| <i>M. novaeangliae</i>  | 2     | 3  | 3   | 3  | 1  |    |     |      | 1  | 1  |    | 1   |
| <i>P. macrocephalus</i> | 1     |    | 1   |    |    |    |     | 2    | 1  |    |    |     |
| <i>S. bredanensis</i>   |       |    |     |    |    |    |     | 1    |    |    |    |     |
| <i>S. fluviatilis</i>   |       | 5  | 4   | 3  | 3  | 2  |     |      |    |    | 1  |     |
| <i>G. griseus</i>       |       |    |     |    |    |    |     | 2    |    |    |    |     |
| <i>T. truncatus</i>     |       |    | 4   | 3  | 1  |    | 1   |      | 3  |    |    |     |
| <i>S. frontalis</i>     | 1     | 4  | 1   | 1  | 1  | 1  |     | 2    | 3  |    |    |     |
| <i>S. attenuata</i>     |       |    |     |    |    |    |     |      |    |    |    |     |
| <i>S. longirostris</i>  |       | 1  |     | 1  | 1  |    |     | 5    |    | 2  | 3  |     |
| <i>S. clymene</i>       |       |    |     |    |    |    |     | 1    |    |    |    |     |
| <i>S. coeruleoalba</i>  |       |    | 1   |    |    |    | 1   | 1    |    |    |    |     |
| <i>D. capensis</i>      | 3     | 7  | 1   |    | 3  | 3  | 1   | 3    | 3  | 2  | 1  | 1   |
| <i>F. attenuata</i>     |       | 1  |     |    |    |    |     |      |    |    |    |     |
| <i>P. crassidens</i>    |       |    | 1   |    |    | 1  | 1   | 1    |    |    |    |     |
| <i>O. orca</i>          | 1     |    | 1   |    |    |    | 1   | 1    |    | 2  |    |     |
| <i>G. macrorhynchus</i> |       |    |     |    |    | 1  |     |      |    | 1  |    |     |
| <i>Z. cavirostris</i>   |       |    |     |    |    |    | 1   |      |    | 1  |    |     |
| Total                   | 8     | 24 | 19  | 12 | 12 | 9  | 8   | 24   | 16 | 10 | 8  | 2   |

**Table 6**  
Annual distribution of freshwater cetacean records for Venezuela (excludes marine or estuarine records for these species).

| Species               | Month |    |     |    |    |    |     |      |    |    |    |     |
|-----------------------|-------|----|-----|----|----|----|-----|------|----|----|----|-----|
|                       | I     | II | III | IV | V  | VI | VII | VIII | IX | X  | XI | XII |
| <i>I. geoffrensis</i> | 4     | 7  | 17  | 26 | 31 | 10 | 4   | 8    | 6  | 15 | 8  | 2   |
| <i>S. fluviatilis</i> | 3     | 1  | 2   | 1  | 1  | 1  | 2   | 2    | 1  | 6  | 1  | 1   |
| Total                 | 7     | 8  | 19  | 27 | 32 | 11 | 6   | 10   | 7  | 21 | 9  | 3   |

sible that this delphinid has narrow local geographical ranges and habitat preferences.

### Seasonal variation

Table 5 reveals an uneven bimodal annual distribution of records for marine cetaceans in Venezuela ( $H_0$ =uniform;  $X^2=69.8$ ,  $df=11$ ,  $p<0.001$ ). Debrot et al. (1998) did not find a particular pattern of abundance for cetacean species in the Leeward Dutch Islands. The reason for that may be that those waters, unlike the eastern waters of Venezuela where most of the cetacean records are from, are not greatly affected by the seasonal changes in the discharges of the Orinoco and Amazon rivers.

Table 6 shows an uneven bimodal annual distribution of records for the freshwater records of cetaceans in Venezuela. It also exhibits a non-uniform annual distribution ( $X^2=40.2$ ,  $df=11$ ,  $p<0.001$ ).

The temporal records for *I. geoffrensis* reflect an interaction between its ecology and human activity. Most records occurred between March and May from drainage areas experiencing the peak of the dry season. When water levels are low, access is easiest for observers and freshwater dolphins are most visible. Most of the records for the rainy season (June–November), however, originate from the Orinoco River and its delta, a very large drainage system whose water volume is less affected by seasonal precipitation.

The few freshwater records for *S. fluviatilis* reveal a rather homogeneous distribution ( $X^2=12.9$ ,  $df=11$ ,  $p>0.05$ ). This is consistent with the non-migratory nature of the species and the fact that most records originated from coastal outlets or riverine areas that do not experience major seasonal variations in human population or activity.

Although both marine and freshwater annual distributions are bimodal, their patterns do not coincide (Pearson's  $r=0.112$ , Spearman's  $\rho=0.428$ ;  $p>0.05$ ). There is an August–September dip in records for the freshwater records whereas at the same time the marine records are at their second annual peak. Both exhibit a minimum for the December–January period, the time of year that is a traditional “fishermen’s holiday” (Romero et al., 1997b). The paucity of winter records reflects at least partial dependence of the number of records on human activity, but if that alone accounts for the low numbers, we would expect a relatively greater effect on marine species than is shown. This illustrates, once again, the difficulty of interpreting records of this kind as unambiguously reflecting either the natural history of the animals or the biases of human reporting.

### Spatial distribution

Any interpretation of geographical variation must be considered in light of the distribution of fish, the common prey both for fishermen and for most cetaceans. An abundance of sighting and capture records from any locality certainly indicates presence of a species, but a paucity or absence of records could be attributed to an absence of fishing boats rather than definitely indicating the absence of a cetacean species.

There clearly are seasonal locale-dependent variations in the abundance of fish and they can be expected to affect the seasonal location of their predators. The mysticetes, as well, undoubtedly have seasonal movements, their prey perhaps influenced by the same patterns of nutrient enrichment that affect fish. The periodic enrichment in the eastern Caribbean results from the presence of continental waters that come from the Orinoco delta, enter through the Dragon’s Mouth as well as the pass between Trinidad and Tobago, and produce an upwelling of enriched waters at about 63°W. This is evident between July and October, the months of greatest discharge from the Orinoco River (Monente, 1997).

This upwelling and its effect on fish abundance is reflected in 60% of the fishing take occurring off the eastern coasts, Anzoátegui, Sucre, and Nueva Esparta (Gómez Gaspar, 1996). The Orinoco also has tremendous influence in the Paría Gulf, particularly during the rainy season (May–November). Additional geographical influences arise from the littoral lagoons and the Amazon River.

**Table 7**

Summary of confirmed and expected cetacean species for Venezuela (see text for each species for evidence).

| Species                 | Confirmed | Possibility |
|-------------------------|-----------|-------------|
| <i>B. acutorostrata</i> |           | Unlikely    |
| <i>B. borealis</i>      | X         |             |
| <i>B. edeni</i>         | X         |             |
| <i>B. physalus</i>      | X         |             |
| <i>M. novaeangliae</i>  | X         |             |
| <i>P. macrocephalus</i> | X         |             |
| <i>K. breviceps</i>     |           | Likely      |
| <i>K. sima</i>          |           | Very likely |
| <i>I. geoffrensis</i>   | X         |             |
| <i>S. bredanensis</i>   | X         |             |
| <i>S. fluviatilis</i>   | X         |             |
| <i>G. griseus</i>       | X         |             |
| <i>T. truncatus</i>     | X         |             |
| <i>S. frontalis</i>     | X         |             |
| <i>S. attenuata</i>     | X         |             |
| <i>S. longirostris</i>  | X         |             |
| <i>S. clymene</i>       | X         |             |
| <i>S. coeruleoalba</i>  | X         |             |
| <i>D. capensis</i>      | X         |             |
| <i>L. hosei</i>         |           | Likely      |
| <i>P. electra</i>       |           | Likely      |
| <i>F. attenuata</i>     | X         |             |
| <i>P. crassidens</i>    | X         |             |
| <i>O. orca</i>          | X         |             |
| <i>G. macrorhynchus</i> | X         |             |
| <i>M. densirostris</i>  |           | Likely      |
| <i>M. europaeus</i>     |           | Very likely |
| <i>Z. cavirostris</i>   | X         |             |

The records of cetaceans in Venezuelan marine waters also show a distinct pattern. Of the 165 marine records with longitude noted, 119 (72%) are from 63°05'W through 65°26'W, with the remainder tapering off as locality records are examined to the east and to the west (mean 64.9°W, SD=2.0; median 64.4°W, range 61.6°–72.9°W). This is consistent with the productivity of Venezuelan waters, which is high at this longitude, due largely to the influence of periodic enrichment by sediments from the Orinoco and Amazon rivers, and diminishes in both easterly and westerly directions (Monente, 1997). Similar studies carried out with planktivorous fish have also shown consistency with such productivity patterns (Romero et al., 2000).

### Conservation status

At least seven of the cetacean species confirmed for Venezuela should be considered “Threatened” (i.e., *I. geoffrensis* and those with CITES status “I”; Table 3).

The principal risk is hunting, but incidental captures, live-collecting, and habitat disruption are also serious concerns (Romero et al., 1997b).

### Current knowledge and expected species

There are 83 species of cetaceans in the world (Rice, 1998). In this paper we confirm the presence of 21 of them in Venezuelan waters from a variety of records, but systematic, long-term efforts have not been made to survey the cetacean fauna in this area. Almost without exception, the records summarized here are the result of opportunistic and incidental rather than systematic and intentional observations and identifications of stranded or captured animals. We believe that an additional seven species of cetaceans will be added to this list based on their distribution in adjacent waters and on other locality reports, although some may be occasional visitors or strays rather than residents. They are listed below in the systematic order offered by Perrin et al. (1994b).

***Balaenoptera acutorostrata* Lacépède, 1804, minke whale** This is a cosmopolitan species that can be found in both coastal and pelagic waters. Although there are two reports for Venezuela, we consider them to be doubtful. The report for Margarita Island (Cervigón and Velázquez, 1981) could be *B. edeni*. The report from the area between Isla La Tortuga and Margarita in 1873 (Ernst, 1877, 1886) is inconclusive as to species. The minke whale has been reported for the Bahamas (Varona, 1974), the Dominican Republic (Bonnely de Calventi, 1994; Gricks, 1994), Anguilla (Leatherwood et al., 1976), Antigua and Guadeloupe (Gricks, 1994), and the Gulf of Mexico (Jefferson and Schiro, 1997), but these localities are distant from Venezuelan waters. The confirmed record nearest to Venezuelan waters is from Surinam (Slijper et al., 1964; Husson, 1978). If a minke whale is found in Venezuela, it is likely to have strayed from its usual environs.

***Kogia breviceps* (Blainville, 1838), pygmy sperm whale** This is another cosmopolitan species (except for polar waters), mostly neritic and also pelagic (Caldwell and Caldwell, 1989). It has been reported for the Colombian Caribbean (Prieto Rodríguez, 1988; Vidal, 1990) and elsewhere in the Caribbean, including Cuba (León and Aguayo, 1945; Aguayo, 1954; Varona, 1974; Caldwell and Caldwell, 1975; Gricks, 1994), Puerto Rico (D.S. Erdman in Caldwell and Caldwell, 1989; Gricks, 1994; Mignucci-Giannoni, 1996), the U.S. Virgin Islands (Mignucci-Giannoni, 1996), the Dominican Republic (Bonnely de Calventi, 1994), Dominica (Gricks, 1994), St. Vincent (Caldwell and Caldwell, 1975, 1989), and in the Gulf of Mexico (Jefferson and Schiro, 1997). Notarbartolo di Sciara has repeatedly sighted it off Martinica.

With these occurrences throughout nearby waters, we expect it to be an occasional visitor to Venezuelan territorial waters.

***Kogia sima* (Owen, 1866), dwarf sperm whale** This is a pelagic species found in tropical and warm-temperate oceans of the world (Caldwell and Caldwell, 1989). Although there are fewer records for the Caribbean in general for this species than for *K. breviceps*, we expect it to be present in Venezuelan waters since it has been reported for the nearby island of Klein Curaçao (Debrot and Barros, 1992), in Aruba (Debrot et al., 1998), and in the Colombian Caribbean (Cuervo Díaz et al., 1986; Muñoz-Hincapié et al., 1998). It has also been reported for Cuba (León and Aguayo, 1945), Puerto Rico (Mignucci-Giannoni, 1996), St. Vincent (Caldwell et al., 1973; Caldwell and Caldwell, 1975) and the Gulf of Mexico (Jefferson and Schiro, 1997).

***Lagenodelphis hosei* Fraser, 1956, Fraser's dolphin** This is an uncommon pantropical and mostly pelagic species (Perrin et al., 1994c). Most reports are from the high seas, particularly around oceanic islands, with relatively few from strandings. It has been found in Puerto Rico (Mignucci-Giannoni et al., 1999), Dominica (Gricks, 1994; Watkins et al., 1994), St. Vincent (Caldwell et al., 1976; Gricks, 1994) and the Grenadines (Gricks, 1994). Cuervo Díaz et al. (1986) believe it to be present in the Colombian Caribbean. There are seven verified records for the Gulf of Mexico (Jefferson et al., 1993). As is the case for most oceanic small cetaceans, little is known about it, so there is no basis even for speculating about its distribution in Venezuelan waters.

***Peponocephala electra* (Gray, 1846), melon-headed whale** This is a pantropical and pansubtropical pelagic species (Perryman et al., 1994). Mignucci-Giannoni (1996) mistakenly reported it for Venezuela. A sighting off Klein Bonaire and a stranding report for Curaçao (Debrot et al., 1998) lead us to believe that it should be found in Venezuelan waters. It has also been reported for Puerto Rico (Mignucci-Giannoni et al., 1998b) and St. Vincent (Caldwell et al., 1976; Watkins et al., 1997), and Notarbartolo di Sciara has observed it several times off the west coast of Dominica (see also Watkins et al., 1997). Cuervo Díaz et al. (1986) believe it to be present in the Colombian Caribbean. According to van Bree (1975), it "may occur" in the southern Caribbean. There are 12 reliable records for the Gulf of Mexico (Barron and Jefferson, 1993; Mullin et al., 1994a).

***Mesoplodon densirostris* (de Blainville, 1817), Blainville's beaked whale** Found in tropical and warm-temperate seas of the world, it is mostly pelagic in deep seas, but is also occasionally coastal. It has the widest

global distribution of all the *Mesoplodon* species (Mead, 1989). We have not been able to confirm the only report for Venezuela from the waters around Margarita Island, given by Susach and cited in Casinos (1986). Its presence for Venezuelan waters is possible since it has been reported both for the Caribbean (Mead, 1989) and the Gulf of Mexico (Jefferson and Schiro, 1997). It has been reported for the Bahamas (Gricks, 1994), Cuba (Varona, 1974), Grand Cayman Island (Gricks, 1994; Mignucci-Giannoni, 1996), and Puerto Rico (Mignucci-Giannoni, 1996). Cuervo Díaz et al. (1986) believe it to be present in the Colombian Caribbean. According to Klinowska (1991), "any country within the general distribution area could produce records in future." Van Bree (1975) believes that it "may occur" in the southern Caribbean.

***Mesoplodon europaeus* (Gervais, 1855), Gervais' beaked whale** It is found in tropical and warm-temperate waters of the Atlantic, much more frequently in the western than in the eastern Atlantic (Mead, 1989). Its presence in Trinidad (Fraser, 1955), Aruba (Agudo and Ponson, 1996), Bonaire (Debrot et al., 1998), and Curaçao (Debrot and Barros, 1992; Debrot, 1998) make it likely that it also frequents Venezuelan waters. It has also been reported for several locations in the Caribbean: the Bahamas (Gricks, 1994), Cuba (Aguayo, 1954; Rankin, 1956; Varona, 1970, 1974; Gricks, 1994), Jamaica (Rankin, 1953, 1954; Lewis, 1954; Rankin, 1955; Caldwell, 1964; Gricks, 1994), the Dominican Republic (Bonnely de Calventi, 1994), St. Croix (Mignucci-Giannoni, 1996), Trinidad and Tobago (Gricks, 1994), and also for the Gulf of Mexico (Jefferson and Schiro, 1997).

## Conclusions

Our results show that the number of marine cetacean records in Venezuelan waters reflects a geographical distribution that is congruent with areas of high productivity. The seasonal nature of those records also reflects seasonal variations of productivity. These results are interpreted to be consistent with recently published results for marine cetaceans of the Leeward Dutch Islands (Debrot et al., 1998), the geographically closest comparison. The absence of *D. capensis* from those islands may reflect narrow local ranges.

Systematic surveys, long term population studies, and behavioral studies tracking individual animals are all needed to provide an accurate picture of the distribution and abundance of cetaceans not only in Venezuelan waters but worldwide. The results of such studies would also permit evaluating how well our methods of compiling and analyzing records fairly

reflects the actual spatial and temporal distribution and abundance of cetaceans. Such results would permit evaluating what biases are present in *ad hoc* records so that other similar compilations can be better interpreted.

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**Appendix 1**

Institutions, alphabetically by abbreviation, and their locations.

| Abbreviation | Institution  | Location                           |
|--------------|--|------------------------------------|
| AMNH         | American Museum of Natural History   | New York, NY, USA                  |
| ASOEVEFAS    | Asociación de Estudiantes de Veterinaria por la Fauna Silvestre, Universidad del Zulia                     | Maracaibo, Venezuela               |
| CAS          | California Academy of Sciences   | San Francisco, CA, USA             |
| CN           | Universitat Zoologisk Museum, Copenhagen   | Copenhagen, Denmark                |
| CVTLUZ       | Colección de Vertebrados Terrestres, Centro de Biología, Facultad de Humanidades, Universidad del Zulia    | Maracaibo, Zulia State, Venezuela  |
| EBRG         | Museo de la Estación Biológica de Rancho Grande  | Maracay, Aragua State, Venezuela   |
| EDM          | E.D. Mitchell, private collection  |                                    |
| FMNH         | Field Museum of Natural History  | Chicago, IL, USA                   |
| IC           | Israel Cañizales, private collection   | Maracaibo, Venezuela               |
| ICNB         | Instituto de Ciencias Naturales de Bogotá  | Bogotá, Colombia                   |
| LACM         | Los Angeles County Museum  | Los Angeles, CA, USA               |
| LBCS         | Laboratorio de Biología, Colegio Saieciano, Sarriá   | Caracas, Venezuela                 |
| MBLUZ        | Museo de Biología de la Universidad del Zulia  | Maracaibo, Zulia State, Venezuela  |
| MBUCV        | Museo de Biología de la Universidad Central de Venezuela   | Caracas, Venezuela                 |
| MCIBLUZ      | Museo del Centro de Investigaciones Biológicas, Facultad de Humanidades y Educación, Universidad del Zulia | Maracaibo, Venezuela               |
| MCIMAR       | Museo del Centro de Investigaciones Marinas del la Universidad Experimental Francisco de Miranda           | Coro, Venezuela                    |
| MCN or MCNC  | Museo de Ciencias Naturales (d.b.a. Fundación Museo de Ciencias)   | Caracas, Venezuela                 |
| MCNUSB       | Museo de Ciencias Naturales de la Universidad Simón Bolívar  | Caracas, Venezuela                 |
| MDMBR        | Museo del Mar de Boca de Río, Universidad de Oriente   | Boca del Río, Margarita, Venezuela |
| MDMCU        | Museo del Mar  | Cumaná, Venezuela                  |
| MEDIMAR      | Museo de la Estación de Investigaciones Marinas de Margarita, Fundación La Salle                           | Punta de Piedras, Venezuela        |
| MHNLS        | Museo de Historia Natural La Salle   | Caracas, Venezuela                 |
| USNM         | United States National Museum  | Washington, DC, USA                |
| ZMA          | Zoologisch Museum, University of Amsterdam   | Amsterdam, Holland                 |