

Coastal fisheries of Latin America and the Caribbean



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Fishing boat with bottom nets for hoki in Tierra del Fuego, Argentina (courtesy of Miguel S. Isla); landing products in Holbox, Quintana Roo, Mexico (courtesy of Mizue Oe); artisanal boat operating in Santa Marta, Colombia (courtesy of Mario Rueda); artisanal fisher fishing octopus in Yucatán, Mexico (courtesy of Manuel Solís); lobster boat with traps in Cuba (Centro de Investigaciones Pesqueras de Cuba); artisanal boat operating in Santa Marta, Colombia (courtesy of Mario Rueda).

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Dedication

This document is dedicated to the memory of our colleague and friend **Bisessar Chakalall**, former Fishery Officer in the Subregional Office for the Caribbean (SLC) and Secretary to the Western Central Atlantic Fishery Commission (WECAFC). Bisessar was an extraordinary human being who gave testimony to the values he believed in. He was brilliant and humble; dynamic and parsimonious; structured and spontaneous. He was an honest, generous and committed person. He had profound interest in understanding others, their culture and context, and a genuine interest in improving the well-being of fishing communities. Bisessar knew when to listen and when to speak out with his ideas and suggestions. He conducted himself with the passion and wisdom to intelligently explore life in all its dimensions. Bisessar was an excellent and unique friend. His human legacy remains in our hearts and minds.

Preparation of this document

The idea of preparing a state-of-the-art document examining the assessment and management of coastal fisheries in Latin America and the Caribbean grew naturally out of the CoastFish conference of 2004 (see www.mda.cinvestav.mx/eventos/Coastfish/english/welcome). This interdisciplinary conference, held in Mérida, Mexico, brought together individuals from many different institutions and organizations across the region, covering a wide range of perspectives, in order to contribute to a better understanding of coastal small-scale fisheries. The focus was on fishery assessment and management, taking into account biological, socio-economic and policy issues, aiming to examine the extent of information available for different countries and to identify the gaps in knowledge and management. The goal ultimately was to use this understanding to determine desirable directions for future fishery research, as well as governance and management approaches to moving towards sustainable fisheries in the region. This goal remains valid for this document as well.

This document has been prepared as an initiative of the editors – S. Salas, R. Chuenpagdee, A. Charles and J.C. Seijo – in cooperation with a strong set of authors writing about coastal fisheries in twelve countries across Latin America and the Caribbean. Writing and compilation of the document were supported by the European Union through the project Integrating Multiple Demands on Coastal Zones with Emphasis on Aquatic Ecosystems and Fisheries (INCOFISH). The Food and Agriculture Organization of the United Nations (FAO) coordinated the final proofreading, publishing and distribution. References in this document follow international bibliographic standards rather than FAO house style.

Abstract

The importance of fisheries for coastal communities and livelihoods in Latin America and the Caribbean (LAC) is well documented. This is particularly the case for ‘coastal fisheries’, including subsistence, traditional (artisanal) and advanced artisanal (or semi-industrial) varieties. There are, however, major gaps in knowledge about these fisheries, and major challenges in their assessment and management. Therein lies the key theme of this document, which seeks to contribute to a better understanding of coastal fisheries in the LAC region, as well as to generate discussion about ways to move towards sustainable fisheries. The document includes three main components. First, an introductory chapter provides an overview of general trends in the fisheries of the LAC countries, as well as some of the key challenges they are facing in terms of sustainability. Second, a set of twelve chapters each reporting on the coastal fisheries of one country in Latin America and the Caribbean, collectively covering fisheries of each main subregion: the Caribbean islands (Barbados, Cuba, Dominican Republic, Grenada, Puerto Rico, Trinidad and Tobago), North and Central America (Costa Rica, Mexico) and South America (Argentina, Brazil, Colombia, Uruguay). All these country-specific chapters follow an integrated approach, to the extent possible, covering aspects ranging from the biological to the socio-economic. Third, the final component of the document contains a synthesis of information from the countries examined, an analysis of the main issues and challenges faced by the various fisheries, an outline of policy directions to improve fisheries management systems in the LAC region, identification of routes toward more integrated approaches for coastal fisheries management, and recommendations for ‘ways forward’ in dealing with fishery assessment and governance issues in the region.

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2. Coastal fisheries of Argentina

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1. INTRODUCTION

Over centuries the coasts of Argentina were inhabited by aboriginal peoples that, mostly towards the south, harvested marine resources. The archaeological record shows evidence of consumption of mammals, amphibians, molluscs and fishes along Patagonian shores. The gathering methods and knowledge of these early fishers were not, however, incorporated by the colonial society, contrary to what was the case in Peru and Chile, which became leading countries with regard to artisanal fishing activities. It is perhaps because of this, together with prevalent policies that prioritized agriculture and husbandry, that fishing and fishers are perceived as exotic (Mateo Oviedo, 2003).

Over recent decades, because of the loss of employment opportunities in traditional sectors of the economy and in industrial fisheries, as well as population growth in coastal areas, groups of artisanal fishers have sprouted in many areas where they did not operate before. Small-scale fishing is becoming a permanent way of life for many of these new fishers.

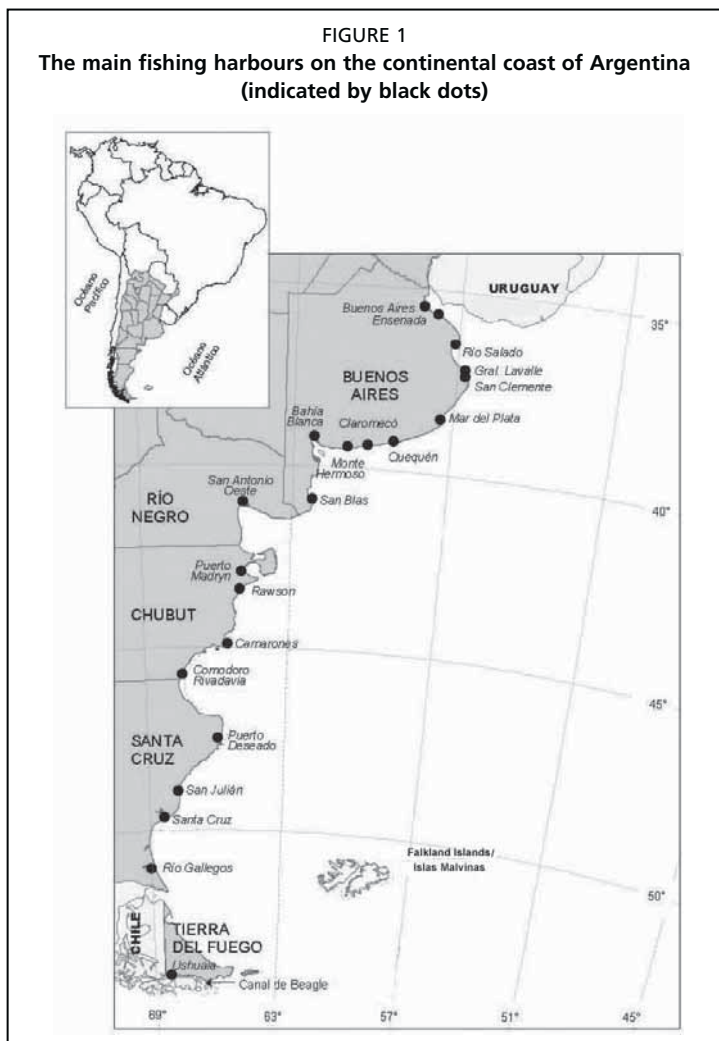
The first difficulty encountered while trying to describe and analyse the artisanal sector is its definition. A comparative look at how 'artisanal fisheries' are defined indicates that recurrent criteria are: size of the boats, gross tonnage, fishing gear and socio-economic considerations. Fishing operations that are considered 'artisanal' in some countries do not qualify as such in others. The same happens even within Argentina, a country with an extended coastline and divergent regional realities.

An economical anthropology perspective singles out additional factors that help the characterization: property of the means of production, production of merchandise, management of economical activities, division of labour, degree of association, etc. (García-Allut, 2002).

As used in Argentina, the term 'artisanal' encompasses a wide spectrum, from coastal gathering to inshore fleets. This chapter deals with coastal gatherers, beach seiners and boats of variable dimensions ranging, according to García-Allut (2002), from 'strictly artisanal' to 'semi-industrial'.

Argentina, located at the southern end of the Americas, has one of the largest shelf areas in the world (about 1 million km²) and an extended coastline (4 000 km). The eastern and western boundaries of the shelf are, respectively, the continental slope and the coastline (Figure 1). The northern and southern boundaries are jurisdictional. Resources harvested by small-scale and artisanal fishers are shared with other jurisdictions: to the north with Uruguay in the Argentine-Uruguayan Common Fishing Zone between the two countries (ZCPAU), and to the south with Chile.

These settings imply that, geographically, Argentina is a maritime country yet, because of the way its population is distributed, it is effectively a continental country. Four provinces out of five with a maritime border (the exception being Buenos Aires) conform the Patagonian region, where coastal urban settlements are far apart from each other (Figure 1). This configuration highlights the significance of gulfs, bays and estuaries in the development of coastal activities.



Water masses above the continental shelf are characterized by the mixing between water of subantarctic origin, flowing in mostly between the Falkland Islands/Islas Malvinas and Tierra del Fuego, and waters diluted by continental runoff and originating in the Magellan Strait. These water masses of mixed origin are altered by heat interchange with the atmosphere (Piola and Rivas, 1997).

Balech (1986) showed that by late September or October the water of northern origin flows south, off Buenos Aires Province and westward of the Falkland Islands/Islas Malvinas Current, reaching as far south as Valdés Peninsula (42° south latitude) by mid- or late-December. This phenomenon is very important because of its effect on coastal fisheries (Balech, 1986; Perrotta *et al.*, 2001).

In the Patagonian region, between 42° and 47° south latitude, a series of frontal systems of variable intensity develop towards late spring (late November)

and during the summer (December–February), favouring the establishment of spawning grounds with good conditions for the development of the eggs and larvae of several fish species (Sánchez and Ciechomski, 1995; Ehrlich *et al.*, 2000).

The northern end of Patagonia (41° to 43° south latitude) has three gulfs that harbour fishing activities of regional significance: San Matías (shared by the Río Negro and Chubut Provinces) and San José and Nuevo (Chubut Province). The three are shaped as extensive basins deeper than the adjacent shelf (Rivas and Beier, 1990). Waters are more saline than in the adjacent shelf, and temperature variation is comparatively high. San José Gulf is the smallest of these three and its high productivity was highlighted by Charpy-Roubaud *et al.* (1978).

2. DESCRIPTION OF FISHERIES AND FISHING ACTIVITIES

Argentina is, by its Constitution, a representative and federal republic formed by 23 provinces and a federal district, all autonomous states endowed with political and administrative powers. The Argentina Constitution establishes executive, legislative and judiciary branches and does not contain specific language relative to fisheries or maritime jurisdictions, but assigns to the legislature and the executive authority regarding treaties, navigation, customs and ports.

Several agencies in the federal administration have a say in fishing-related subjects: the National Service of Agricultural Quality and Health (SENASA, within the Ministry of Economy and Production) certifies processing plants; the Undersecretary of Fisheries (within the Secretary of Agriculture, Husbandry and Fishing) elaborates and coordinates the execution of policies for the promotion and regulation of fishing activities; and the Prefectura Naval (the coast guard) keeps track of the vessel registry, cares for the security of navigation, grants credentials to crews (deckhands, skippers, divers, etc.) and patrols the coastal zone.

The Federal Fishing Act of 1998 (Ley Federal de Pesca, No. 24922) states that living aquatic resources from lakes and rivers, gulfs and inshore areas (from the coastline to 12 nautical miles offshore) are under provincial jurisdiction. Outside this boundary, waters within the exclusive economic zone (EEZ) and the continental shelf are in the federal domain (Article 4). The Act establishes that the application authority at the national level is the Undersecretary of Fisheries, and that a Federal Fisheries Council defines national fishing policy and research priorities. The Council is integrated by a representative from each maritime province, the Undersecretary of Fisheries, and delegates from the Undersecretary of Natural Resources and Sustainable Development, the Ministry of Foreign Affairs and the federal executive.

In addition, Act 20645 of 1974 establishes a common fishing zone with Uruguay. Regulations adopted for coastal resources and some pelagic resources within this zone must be discussed in the ambit of two bi-national commissions, the Joint Technical Commission for the Maritime Front (CTMFM) and the Managing Commission for the La Plata River (CARP).

At the regional level, coastal resources are managed by the provinces through their respective agencies (secretaries, undersecretaries, etc.), which often have overlapping mandates, both with each other within provincial administrations and with federal agencies. Governmental structures are usually organized on functional grounds with little horizontal linkage (e.g. between agencies dealing with fisheries, the environment, health, etc.).

The agency in charge of planning and execution of scientific and technical programmes at the federal level is the National Institute for Fisheries Research and Development (INIDEP), which depends on the Secretary of Agriculture, Husbandry, Fisheries and Food (Act 21673 of 1977). Its mission is to plan, execute and develop research projects, including surveys, assessments and development, aquaculture technology, fishing gear, technological processes and fisheries economics, according to guidelines and priorities defined by the application authority.

Scientific and technical support for management at the regional level is provided by other research centres, which interact to variable degrees with provincial fisheries administrations and with INIDEP. Some examples are: the National University of Mar del Plata in Buenos Aires Province; the Institute of Marine and Fisheries Biology 'Almirante Storni' in Río Negro Province; the National Patagonic Center (CENPAT), a regional branch of the National Council for Scientific and Technical Research (CONICET) and the National University of Patagonia in Chubut; a technical school for fishers (FOCAPEM) in Santa Cruz; and the Austral Center for Scientific Research (CADIC, as CENPAT, a branch of CONICET) in Tierra del Fuego.

Artisanal fishing units, as defined here, include coastal gatherers, commercial divers, beach seiners and small boats (usually less than 10 m long) deploying a variety of gear types (gill and tangle nets, longlines, hook-and-line, traps). Inshore fleets include two other size-brackets of vessels, shorter and longer than 18 m (Table 1). Small inshore vessels (10–18 m) are usually known as the *rada/ría* (roughly meaning coves and estuaries) fleet, which rarely operate beyond the 50 m isobath. Most of these boats have wooden hulls, are relatively old (50 years on average), and have minimal navigation and detection equipment. Holding capacity ranges from 4 to 14 tonnes and they have no cold-storage capacity. Crews can be up to 10 fishers. This fleet operates from most Argentine fishing harbours, with its epicentre in Mar del Plata, both in terms of landings and number of boats (Lasta *et al.*, 2001). It is busy all year round and is socially dynamic. Larger vessels (longer than 18 m) operate further offshore during the autumn, targeting hake. According to the typology proposed by García-Allut (2002), the *rada/ría* fleet falls in the semi-industrial category, and is thus included in this overview. Larger vessels operating in the inshore fishery are not. In addition, Table 2 summarizes the fishing activities discussed in this section.

TABLE 1
Composition of the inshore fleet of Argentina, by harbour

Harbour (from north to south) ¹	Province	Number of registered boats in the inshore fleet		Annual catch (average) in recent years (tonnes)
		<i>Rada/Ría</i> (semi-industrial)	Coastal (industrial) ²	
General Lavalle	Buenos Aires	19	3	4 147
Mar del Plata	Buenos Aires	68	48	81 852
Quequén	Buenos Aires	12	7	21 416
Bahía Blanca	Buenos Aires	10	5	19 000
San Antonio Oeste	Río Negro	4	6	10 610
Puerto Madryn	Chubut	–	1	1 805
Rawson	Chubut	26	22	10 642
Caleta Córdova	Chubut	7	1	3 781
Caleta Olivia	Santa Cruz	16	4	8 279
San Julián	Santa Cruz	–	5	28
Ushuaia	Tierra del Fuego	3	2	191

Source: from Lasta *et al.*, 2001.

¹ See Figure 1.

² This fleet is not included in our review.

TABLE 2
Summary of information on artisanal fisheries of Argentina

Type of fisheries	Target resources	Region/province	Gear	Boats	Number of fishing units	Crew	Annual landings ¹
Coastal shellfish gathering	Blue and ribbed mussels, snails, clams	San José Gulf	Hand	N/A	Largest concentration in the community of El Riacho, Chubut (25 permit holders)	Family groups	Not recorded
	Blue mussels, clams, limpets, snails	Beagle Channel	Hand	N/A	Few, exact number unknown		Not recorded
Coastal octopus gathering (<i>pulpeo</i>)	Tehuelche octopus	Río Negro and Chubut	Short gaffs	N/A	Unknown	Family groups	21 tonnes recorded in Río Negro in 2003. Not recorded in Chubut; in 2002 one processing plant (Harengus S.A) bought 17 tonnes
	Red octopus	Chubut, north of Santa Cruz	Long gaffs	N/A	20–30 in the main producing area (Camarones)	Individuals	Not recorded

TABLE 2 (CONTINUED)

Type of fisheries	Target resources	Region/ province	Gear	Boats	Number of fishing units	Crew	Annual landings ¹
Intertidal gill and tangle nets	Silversides, Patagonian blenny, leatherjack, Patagonian cod	Coves ('riás) and bays, of Santa Cruz and the Atlantic coast of Tierra del Fuego	Gillnets and tangle nets	N/A, occasionally assisted by rowboats	Unknown	3	Not recorded
Beach seining	Silversides, Patagonian blenny, flounders	San Matías and San José Gulfs, Atlantic coast of Tierra del Fuego	Beach seines	3–5 m rowboats (fibreglass, plastic or wood)	4–5 in San Matías. About 50 permit holders in San José/Nuevo Gulfs	2–3	San Matías: 24.6 tonnes of silversides and 14.6 tonnes of Patagonian blenny were recorded in 2003 Chubut: one processing plant (Harengus S.A.) bought ca. 180 tonnes of silversides and 1 tonne of Patagonian blenny in 2003
Demersal artisanal fishery employing powered boats	White croaker, leatherjack, stripped weakfish, Brazilian codling, smoothhound shark	Partido de La Costa (Buenos Aires Province)	Bottom gill and tangle nets	Inflatable or semi-rigid boats with outboard motors, up to 7 m long	Unknown	1–2	Not recorded
	Hoki, kinclip, Patagonian cod, southern hake	Beagle Channel (Tierra del Fuego)	Bottom tangle nets (100–120 mm stretched mesh)	Artisanal boats, less than 10 m	Number of tangle nets varies annually from 20 to 200	1–2	Not recorded
	Stiletto and Argentine shrimp, tope shark, white croaker, stripped whitefish	Bahía Blanca, Ing. White, Monte Hermoso (Buenos Aires Province)	Passive bottom nets intersecting tidal currents, with 30 mm mesh in the cod-end; tangle nets, handlines	Boats with inner engines (up to 16 m), boats with outboard motors (up to 7 m), rowboats (up to 6 m)	About 130 boats	1–3	45 tonnes of Argentine shrimp and 40 tonnes of stiletto shrimp recorded in 2002
	Stiletto and Argentine shrimp	Rawson (Chubut Province)	Beam trawl, 4 m wide beam	Boats up to 10 m, made of wood, iron or fibreglass	About 20 boats	3–4	

TABLE 2 (CONTINUED)

Type of fisheries	Target resources	Region/ province	Gear	Boats	Number of fishing units	Crew	Annual landings ¹
Commercial diving	Scallops, blue and ribbed mussels, clams, snails	San Matias and San José Gulfs	Air compressors and hookah	Boats up to 7 m (average), with outboard motors; some with echo-sounder, radio and minimal safety devices	8 boats in San Matias; 20 in San José	3–4	1 241 tonnes recorded in San Matias in 2001; 700 tonnes (600 tonnes of scallops) recorded in San José in 2003
	Blue and ribbed mussels, sea urchin, ascidians	Beagle Channel		Same as above	5 boats	3–4	85 tonnes of sea urchin reported in 1996 (usually less than 1 tonne); 7 tonnes of mussels reported in 1999
Artisanal longlining	Hake, tope shark, cock fish, seven-gilled shark, rays, rockfish, sandperch	San Matias and Nuevo Gulfs	Longlines, 2 000-3 000 hooks each	Boats with outboard motors, less than 10 m	22 boats in San Matias; 5 in Nuevo Gulf in 2002	3	1 032 tonnes recorded in 2003 in San Matias Gulf; 34 tonnes in Nuevo Gulf in 2001 and 2002 (experimental fishery)
Semi-industrial pelagic fishery	Mackerel, anchovy	Mar del Plata	'Lampara', a hand-thrown purse seine	'Rada/ria' inshore fleet; boats 10–18 Mostly wooden boats, 50 years old on average. Equipped with rafts, radio, radar and echo-sounder	The 'rada/ria' inshore fleet has 166 registered boats	Up to 10	900 tonnes of anchovy and 100 tonnes of mackerel landed in 2003
Trap fishery utilizing inshore powered boats	Red porgy, sandperch, rockfish, wreckfish	Mar del Plata Quequén Canal Beagle	Large basket traps	Same as above	7 boats	2–5	No data
	Kinclip, southern hake, Patagonian cod, sharks, rays	Beagle Channel	Iron-made traps				
	King crab, false king crab, octopus (occasional bycatch)	Beagle Channel	Truncated cone traps (1.2–1.5 m high, 1.6 m basal diameter)	Boats up to 15 m, with 205 hp engines	12 boats in 1994–2000, down to 6 in 2000–2004	2	32 tonnes of king crab in 1994; 392 tonnes of false king crab in 1996

¹ In most cases landings are either not recorded or grossly under-reported. Some figures (whether total or partial) are presented, however, to give the reader a rough idea of the dimension of the fishery.

2.1 Coastal shellfish gathering

Coastal gathering of shellfish along the seashores occurs at low tide, by hand or with the help of handheld devices, with regional variations that are related to the specific resources harvested. Species most commonly found in the catch of commercial fisheries are summarized in Table 3.

TABLE 3
Main species caught in the artisanal fisheries of Argentina

Scientific name	Common Spanish name	Common English name	Gear	Province ¹
Bivalve molluscs				
<i>Aequipecten tehuelchus</i>	Vieira tehuelche	Tehuelche scallop	Commercial diving	RN, Ch
<i>Ameghinomya antiqua</i>	Almeja rayada	Etched clam	Coastal gathering; commercial diving	Ch
<i>Amiantis purpurata</i>	Almeja púrpura	Purple clam	Coastal gathering; commercial diving	RN
<i>Aulacomya ater</i>	Cholga	Ribbed mussel	Coastal gathering; commercial diving	RN, Ch, SC, TdF
<i>Donax hanleyanus</i>	Berberecho	Beach clam	Coastal gathering	BA
<i>Eurhomalea exalbida</i>	Almeja blanca	White clam	Coastal gathering	TdF
<i>Mesodesma mactroides</i>	Almeja amarilla	Yellow clam	Coastal gathering	BA
<i>Mulinia edulis</i>	Almeja marrón	Brown clam	Coastal gathering	TdF
<i>Mytilus edulis chilensis</i>	Mejillón	Blue mussel	Coastal gathering; commercial diving	TdF
<i>Mytilus edulis platensis</i>	Mejillón	Blue mussel	Coastal gathering; commercial diving	RN, Ch
<i>Panopea abbreviata</i>	Almeja panopea	Geoduck	Commercial diving	RN, Ch
Gastropod molluscs				
<i>Adelomelon ancilla</i>	Piquilhue	Piquilhue voluta	Coastal gathering	TdF
<i>Buccinanops globosum</i>	Caracolillo	Beach snail	Coastal gathering	Ch
<i>Buccinanops gradatum</i>	Caracol picante	Hot snail	Coastal gathering; commercial diving	Ch
<i>Fissurella oriens</i> , <i>Patinigera deaurata</i> , <i>P. magellanica</i>	Lapas	Limpets	Coastal gathering	TdF
<i>Odontocymbiola magellanica</i>	Caracol rojo	Red volute	Coastal gathering; commercial diving	Ch
<i>Zidona dufresnei</i>	Caracol tigre	Tiger volute	Commercial diving	RN
Cephalopod molluscs				
<i>Enteroctopus megalocyathus</i>	Pulpo Colorado o dormilón	Red octopus	Coastal gathering; commercial diving	RN, Ch, SC
<i>Loligo gahi</i> , <i>L. sanpaulensis</i>	Calamarete	Longfin squid	Beach seine (n.targ.) ²	Ch
<i>Octopus tehuelchus</i>	Pulpito	Tehuelche octopus	Coastal gathering	RN, Ch

TABLE 3 (CONTINUED)

Scientific name	Common Spanish name	Common English name	Gear	Province ¹
Crustaceans				
<i>Artemesia longinaris</i>	Camarón	Stiletto shrimp	Tide-intersecting nets; beach seine	BA, Ch
<i>Lithodes santolla</i>	Centolla	Southern king crab	Traps	TdF
<i>Ovalipes trimaculatus</i>	Cangrejo nadador, pancora		Beach seine (n.targ.)	Ch
<i>Paralomis granulosa</i>	Centollón	False king crab	Traps	TdF
<i>Platyxanthus patagonicus</i>	Cangrejo buey	Rock crab	Beach seine (n.targ.)	Ch
<i>Pleoticus muelleri</i>	Langostino	Argentine shrimp	Tide-intersecting nets	BA
Echinoderms				
<i>Loxechinus albus</i>	Erizo	Chilean sea urchin	Commercial diving	TdF
Tunicates				
<i>Pyura chilensis</i>	Piure	Ascidian	Commercial diving	TdF
Chondrichthies³				
<i>Callorhynchus callorhynchus</i>	Gallo	Cock fish	Longline (n.targ.); beach seine (n.targ.)	RN, Ch
<i>Dasyatis</i> sp., <i>Myliobatis</i> sp.	Chuchos	Sting rays	Longline (n.targ.)	RN, Ch
<i>Dipturus chilensis</i> , <i>Sympterygia bonapartii</i>	Rayas	Rays	Longline (n.targ.); beach seine (discard)	RN, Ch
<i>Galeorhinus galeus</i>	Cazón, cazón vitamínico	Tope shark	Tide-intersecting nets; longline; beach seine (n.targ.)	BA; Ch
<i>Mustelus schmitti</i>	Gatuzo	Patagonian smoothhound	Tangle nets; tide-intersecting nets	BA, Ch
<i>Notorhynchus cepedianus</i>	Gatopardo	Seven-gilled shark	Longline (n.targ.)	RN, Ch
<i>Squalus acanthias</i>	Espineto	Spiny dogfish	Longline (n.targ.)	RN
Osteichthies				
<i>Acanthistius brasiliensis</i>	Mero	Rockfish	Traps, longline (n.targ.)	BA, RN, Ch
<i>Cynoscion guatucupa</i>	Pescadilla de red	Stripped weakfish	Tangle nets	BA
<i>Eleginops maclovinus</i>	Róbalo	Patagonian blenny	Gill and tangle nets; beach seine	RN, Ch, SC, TdF
<i>Engraulis anchoita</i>	Anchoíta	Anchovy	Lampara; beach seine (n.targ.)	BA, Ch
<i>Genypterus blacodes</i>	Abadejo	Pink cuskeel	Longline (n.targ.), Traps	RN, Ch, TdF
<i>Macruronus magellanicus</i>	Merluza de cola	Hoki	Beach seine; tangle nets	TdF
<i>Merluccius australis</i>	Merluza austral	Southern hake	Gill and tangle nets; beach seine	SC, TdF

TABLE 3 (CONTINUED)

Scientific name	Common Spanish name	Common English name	Gear	Province ¹
<i>Merluccius hubbsi</i>	Merluza	Argentine hake	Longline	RN, Ch
<i>Micropogonias furnieri</i>	Corvina rubia	White croaker	Tangle nets	BA
<i>Mugil platanus</i>	Lisa	Mullet	Beach seine (n.targ.)	Ch
<i>Notothenia</i> (s.l.) spp.	Nototeniás	Notothenias	Pre-hispanic beach seine (discard)	Ch, TdF
<i>Odontesthes</i> spp. (4 species)	Pejerreyes	Silversides	Beach seine	RN, Ch, SC, TdF
<i>Odontesthes smitti</i>	Manila, pejerrey cola amarilla	Manila silverside	Gill and tangle nets	RN, Ch, SC, TdF
<i>Oncopterus darwini</i>	Lenguado	Flounder	Beach seine (discard)	Ch
<i>Oncorhynchus mykiss</i>	Trucha arco iris	Steelhead	Sport	SC
<i>Pagrus pagrus</i>	Besugo	Red porgy	Traps	BA
<i>Paralichthys</i> spp.	Lenguados	Flounders	Tide-intersecting nets; longline (n.targ.); beach seine (discard)	BA, RN, Ch
<i>Parona signata</i>	Palometa	Parona leatherjack	Gill and tangle nets; beach seines	SC, TdF
<i>Percophis brasiliensis</i>	Pez palo	Brazilian flathead	Tide-intersecting nets; beach seine (n.targ.)	BA, Ch
<i>Polyprion americanus</i>	Chernia	Wreckfish	Traps	BA
<i>Pomatomus saltatrix</i>	Anchoa de banco	Blue fish	Beach seine (n.targ.)	Ch
<i>Pseudoperca semifasciata</i>	Salmón de mar	Sandperch	Traps; longline (n.targ.)	BA, RN, Ch
<i>Salilota Australis</i>	Bacalao criollo	Patagonian cod	Gill and tangle nets	SC, TdF
<i>Salmo trutta</i>	Trucha marrón	Brown trout	Sport	SC
<i>Scomber japonicus</i>	Caballa	Chub mackerel	Lampara; beach seine (n.targ.)	BA, Ch
<i>Seriolella porosa</i>	Savorín	Silver warehou	Beach seine (n.targ.)	RN, Ch
<i>Stromateus brasiliensis</i>	Pampanito	Butterfish	Beach seine (discard)	RN, Ch
<i>Trachurus lathami</i>	Jurel	Horse mackerel	Beach seine (n.targ.)	Ch
<i>Urophycis brasiliensis</i>	Brótola	Brazilian codling	Tangle nets	BA

¹ Provinces listed are those for which a fishery (large or small) has been reported. Many species occur also in provinces for which a fishery has not been recorded. BA: Buenos Aires; RN: Río Negro; Ch: Chubut; SC: Santa Cruz; TdF: Tierra del Fuego.

² Non-target (n.targ.) species are generally kept and marketed, and may fetch a high price (even higher than target species).

³ Names of fishes follow Cousseau and Perrotta (2000).

Bivalves and gastropods: In Buenos Aires Province, bivalves are shovelled along exposed sandy beaches. Traditionally, this fishery targeted primarily the yellow clam* (*almeja amarilla*), but because the populations collapsed, the fishery now targets beach clams (*berberechos*). However, the yellow clam sustained a significant fishery that started in the 1940s, with landings reaching a maximum of 1 073 tonnes in 1953 (Dadón, 2001, 2002). When catches declined because of a dramatic increase in effort, the fishery was closed in 1956. It reopened with a 45-tonne quota in 1957, and closed again for ten years in 1958, and it has remained closed to a commercial fishery ever since. A daily bag limit (2 kg/person) has been allowed for personal consumption, as clams are valued by tourists. Although recreational gathering is the only harvesting that has been allowed for decades, the yellow clam populations have continued to decline. This is due to a variety of reasons, including growing pressure from recreational harvesters and illegal commercial fishing. In addition, the destruction of habitat caused by the extraction of sand for construction, circulation of vehicles along the beaches, and an ever-expanding urban development has compounded the pressure on this species. After a mass mortality event decimated most populations in 1995, a complete closure was put in place in 1996, including the bag limit for personal consumption. Although illegal, harvesting continues to be a common activity during the summers and the mass mortality did not affect stocks of *berberecho* (Dadón, 1999), whose size even increased after 1998. As a result, it has been increasingly targeted recreationally but also commercially. This fishery is not regulated and catch is not monitored. Although not illegal, most of the catch is marketed through informal conduits. The daily catch is frozen and sold in bulk.

In Chubut Province, many families of coastal gatherers harvest molluscs in the intertidal zone (Figure 2), mostly in San José Gulf. They target blue mussels (*mejillón*), etched clams (*almeja rayada*), ribbed mussels (*cholga*), volute (*caracol*), and beach and hot snails (*caracoles*). In the case of clams, harvesters can recognize the holes left by the siphons at the surface, and use 2- or 3-prong forks; small snails are concentrated using bait. The shellfish catch is collected in handheld mesh bags (*chinguillos*) with an approximate capacity of 40 kg. Once a team has filled 10 to 20 *chinguillos*, these are transported ashore, 1 to 3 km across tidelands. The catch is transported by truck to processing plants, fish shops or restaurants in Puerto Madryn and Trelew. The activity is seasonal (autumn and winter), generally constrained by the onset of the red tide season (Santa Ana, 2004).

Gastropods and bivalves are also gathered in scattered locations of Santa Cruz and Tierra del Fuego Provinces. In the latter there is a small catch of blue mussels, etched clams, white clams, brown clams, limpets (*lapas*) and voluta snails. The activity is seasonally constrained by the development of red tides, usually during the summer. The product is marketed locally, fresh and unprocessed.

* Correspondence between scientific names and common Spanish and English names are summarized in Table 3. English names are used throughout text; the first time that the name is used, the Spanish name is quoted in parentheses. Fish common names follow Cousseau and Perrotta (2000) in most instances.

FIGURE 2
**Artisanal gathering of intertidal mussels (*Mytilus edulis platensis*) in El Riacho,
 San José Gulf, Chubut Province**



(Photo by Javier Rodriguez)

Small octopus: In Chubut and Río Negro Provinces, the intertidal gathering of a small-sized octopus species (Tehuelche octopus or *pulpito*) is a popular recreational activity. Octopus is also harvested commercially (*pulpeo*), being a complement to gathering of bivalves and gastropods. In San Matías Gulf, *pulpeo* has been a traditional seasonal occupation for low-income labourers who establish camps along the seashore during the summers. *Pulperos* (octopus harvesters) use a gaff built of a 6 mm iron rod, 30 to 40 cm long. The tip is sharpened and curved with a precise angle. Octopus is removed from crevices and holes and the success of the *pulperos* is strongly determined by experience. Traditional gatherers are very careful not to damage the substrate when extracting octopus, because newcomers will not establish themselves in damaged refuges. Commercial harvest is seasonal, extending from late spring (November–December) to early autumn (March–April), peaking by mid to late summer. In Río Negro Province, catch records go back to 1953 (Iribarne, 1990, 1991); the maximum recorded catch was 307 tonnes in 1967. The annual catch has been 20 to 40 tonnes in recent years. The fishery is not regulated or monitored in Chubut Province. One fisher (Cándida Vargas*, personal communication) reported that she and her family collect up to 15 tonnes in San José Gulf during a single season. Intermediaries (*acopiadores* or *acarreadores*) have played a significant role in this fishery and processing plants also buy octopus occasionally. Ré (1998a, 1998b) observed that fishing pressure goes down when *pulpeo* ceases to be lucrative. When this occurs, immigration from the subtidal zone appears to replenish the intertidal segment of the population.

* Mrs Cándida Vargas is the daughter of *pulperos* and a *pulpera* herself. She lives with her extended family (husband, 10 children, and grandchildren) in Playa Larralde, San José Gulf.

Red octopus (dormilón): Red octopus is caught in San José Gulf, the Camarones area, Comodoro Rivadavia (all in Chubut Province), Caleta Olivia (Santa Cruz Province), and other scattered locations. As in the small octopus fishery, fishers (all male) use a gaff; however, this gaff is stronger (8 mm iron rod) and longer (1–1.2 m) (Ré, 1998b). In the Camarones area (the main producing zone), fishing takes place during winter and spring tides. Landings from this area started to be commercialized in 1995–1997 due to the abundance and increased demand of octopus (Cinti and Soria, 2003). This is the most significant artisanal fishery in the Camarones area in terms of people involved and catch landed. Although it appears to have great potential, the present catch is relatively small due to poor accessibility. Cinti and Soria (2003) estimated a total catch of 9 tonnes for the 2002 season; there are no official records and the fishery is unregulated. Red octopus is sold gutted (fresh or frozen) in fish stores of provincial coastal cities.

2.2 Beach seining

Beach seining is practiced in San Matías Gulf (Río Negro Province), along the coasts of Chubut Province, and on the Atlantic coast of Tierra del Fuego, always in a very narrow (30–50 m from the water edge) and shallow (up to 4–10 m depth) area (Figure 3). Teams are formed by two to four fishers that generally use a row boat and a 70 to 100 m long net that is folded on the stern and deployed forming a semi-circle, one end tied to land with a piece of rope. Seines are occasionally operated without the help of a boat, in which case the net is deployed perpendicular to the shoreline. Two fishers pull the net in parallel, one walking into the water and the other ashore. Fishing takes place all year long, although operations are constrained by meteorological conditions. Resources targeted are markedly seasonal, particularly silversides (*pejerreyes*), which are migratory. Adults are caught mostly during the autumn and spring, when they form reproductive aggregations and juveniles during spring and summer (Elías *et al.*, 1991; Ré and Berón, 1999). This is mostly a small-scale, artisanal commercial fishery, but there is also a small recreational component. Only four or five families are presently active in this traditional fishery in San Matías Gulf, where it peaked during the 1950s. Maximum recorded catch of silversides was 376 tonnes in 1956 (Perier, 1994). The catch is sold fresh in San Antonio Oeste, door-to-door or to restaurants, as is also the case in Tierra del Fuego. Fishers from Chubut Province also sell to plants that process silversides and Patagonian blennies (*róbalos*) in a variety of forms (fresh, frozen, smoked and canned). Catch records are fragmented and the fishery is not regulated.

2.3 Gill and tangle nets deployed in the intertidal zone

This fishery operates inside estuaries and bays of Santa Cruz Province and the Atlantic coast of Tierra del Fuego. Most fishers operate directly from the beach, tracking the tides: the net is deployed during a low tide and the catch is retrieved during the next low tide. The mesh used in Tierra del Fuego for large species is 100 to 120 mm (stretched) (Isla, 2001). This activity is generally seasonal,

taking place between October and April. It can be categorized as a small-scale, artisanal, opportunistic, multispecies fishery. Species targeted include silversides, Patagonian blenny, parona leatherjack (*palometa*), southern hake (*merluza austral*) and Patagonian cod (*bacalao criollo*). Fish is generally sold fresh. Silversides are filleted, and large Patagonian blennies are sold whole or gutted. In Santa Cruz there are *in situ* inspections to control the gear utilized, and quality controls of processing and marketing (Pereiro, 2001). Although there are no official records, landings and the length of the fishing season have declined in Tierra del Fuego over recent years.



2.4 Bottom tangle nets and tide-intersecting nets deployed from boats

A fishery operating along the northern maritime coast of Buenos Aires Province (Partido de la Costa) employs inflatable or semi-rigid boats with outboard motors (Figure 4). The gear consists of tangle nets deployed up to 1 to 2 miles (1.6–3.2 km) offshore. Species caught include white croaker (*corvina*), leatherjack and, to a lesser extent, striped weakfish (*pescadilla de red*), Brazilian codling (*brótola*) and Patagonian smoothhound shark (*gatuzo*) (Lasta *et al.*, 2001; Lagos, 2001). This fishery grew rapidly towards the end of the 1990s, providing significant labour opportunities in the region. Marketing takes place mostly during the summer, coincidentally, with the peak of tourism (Lagos, 2001). There are no official catch records. Regulations include the use of two pieces of net, 50 m long each, 28 to 30 cm mesh size (stretched), and legal size limits for most species.

FIGURE 4
Boats and trailers (*catres*) in San Bernardo Beach, illustrative of the artisanal fleet from Partido de La Costa, Buenos Aires Province



(Photo from Lagos, 2001)

In the region of Bahía Blanca (Buenos Aires Province) operates a fishery with a relatively long tradition, going back to the 1940s. The main gear consists of stationary nets that intercept tidal flows. The fleet is based in Ing. White, Puerto Rosales and Monte Hermoso, all close to the city of Bahía Blanca. Hulls are made of wood, plastic or fibreglass and are up to 16 m long. Approximately 40% have inner engines; the rest are split between boats with outboard motors (up to 7.7 m long) and rowboats (up to 6 m). Fishing trips do not last longer than 3 to 12 hours. The catch includes stiletto shrimp (*camarón*), Argentine shrimp (*langostino*), flounders (*lenguados*), Patagonian smoothhound, and Brazilian flathead (*pez palo*). In addition, tope shark (*cazón*) is caught with tangle nets, and white croaker and stripped weakfish with handlines (Izzo *et al.*, 1999). Annual landings are below 300 tonnes. Starting in 1999, fishers have been required to report catches through a catch slip programme.

In the Beagle Channel (Tierra del Fuego), small boats (10 m; Figure 5) are used to catch hoki (*merluza de cola*) with stationary tide-intersecting nets. This fishery is not regulated. Iron-made traps are used to catch small amounts of kinclip (*abadejo*), Patagonian cod, sharks and rays.

2.5 Beam trawling

Initially, only one boat operated beam-trawled for stiletto shrimp in Rawson Harbor, Chubut Province. However, at the beginning of the twenty-first century, more than 25 artisanal boats (less than 10 m long as defined in provincial legislation) have requested fishing permits (Soutric and Caille, 2005). Beam trawls with a 4 m long beam (locally known as *raño*) were traditionally used in Mar del Plata, where they have been virtually abandoned (beam trawlers were 9–18 m long) (Lasta *et al.*, 2001). The main targets of the beam trawl fishery are stiletto and Argentine shrimp.



2.6 Commercial diving

Commercial diving takes place in the San Matías and San José Gulfs and in the Beagle Channel (Tierra del Fuego). A typical commercial diving team operates a boat approximately 7 m long with an outboard motor (40 to 120 hp), equipped with an air compressor and hookahs (Figure 6). Teams are composed of two or three divers, a deckhand and a skipper. Divers search the sea bed for shellfish, usually bivalves, which are placed in handheld mesh bags known as *salabardos*. The catch is stockpiled on the deck in bags with a capacity of 40 kg or more (Ciocco, 1995).



San Matías and San José Gulfs: The activity is sporadic in San Matías Gulf (Río Negro Province), depending on prices and availability of resources within the range of operation of the divers (down to 30 m). Target species are blue mussels, scallops (*vieiras*), ribbed mussels, voluta snails, purple clams and geoducks (*almeja panopea*). In the adjacent San José Gulf (Chubut Province), the main targets are scallops; mussels, clams and snails are of lesser significance. These are selective fisheries, with virtually no bycatch. A total of 1 241 tonnes were recorded in San Matías Gulf in 2001 and 600 tonnes of scallop in San José Gulf in 2003. Bivalve meats are processed in plants located in San Antonio Oeste, Puerto Madryn and Trelew. In the case of scallops, only the adductor muscles are packed for export.

Beagle Channel: In the Beagle Channel small volumes of sea urchin (*erizo*) and ascidians (*piure*) are harvested in addition to blue and ribbed mussels. The annual sea urchin catch used to be less than 1 tonne, but in 1996 rose to 85.4 tonnes due to participation of Chilean divers. The shellfish catch is processed in plants certified by SENASA or sold fresh, locally. The fishery is regularly monitored for red tide toxins, and closed by the provincial health authority when a safety threshold is surpassed. In 1990, there were 36 active fishers (annual catch was 31 tonnes), which dropped to 32 in 1992 (annual catch 1.7 tonnes) (Isla, 2001).

2.7 Bottom longlining

During the period 1994–1998 a team from CENPAT conducted a research and development project to explore the prospects of bottom longlining in Chubut Province as an alternative to commercial diving for bivalves during the seasonal closures of that fishery. Artisanal fishers contributed boats and crews. In 2000, some of the latter requested experimental permits to longline for tope shark.

Nuevo Gulf tope shark fishery: This experimental fishery was monitored by CENPAT, operating only in Nuevo Gulf. Boats deployed approximately 2 000 hooks baited with anchovy at depths ranging from 40 to 120 m, and had an action radius of 24 km. A total of 34 tonnes (80% elasmobranchs) were caught during the 2000–2001 and 2001–2002 seasons, with no bycatch discarded. Since then, this fishery has been very irregular (Elías, 2002).

San Matías Gulf hake fishery: In 1996 a longline fishery targeting hake boomed in San Matías Gulf (Río Negro Province), triggered by demand in the Spanish market. In its initial phase the fleet was artisanal, composed of boats less than 10 m long powered by an outboard motor, with a 15 nautical mile radius of operation. Anchovy (*anchoita*) was used as bait. The size of boats increased in 1997 (12–25 m), using 6 000 to 10 000 hooks and there were two even larger boats (25 m), operating 10 000 to 15 000 hooks. The size of the fleet peaked in 1998, when it reached 66 boats and the maximum annual catch was approximately 3 900 tonnes. The fishery collapsed in 2001 due to a drop in price. Some boats were converted for shell fishing. The fishery started to gradually recover in 2002, and in 2003 landings reached 1 032 tonnes. During the heyday of the fishery the catch was exported by plane to Spain, fresh and gutted.

Besides tope shark and hake, species caught in the two regions include seven-gilled shark (*gatopardo*), dogfish, rays (*rayas*), stingrays (*chuchos*), cockfish (gallo), rockfish (*mero*), sandperch (*salmón de mar*), kinclip and flounders.

2.8 The 'lampara' (hand-thrown seine) fishery

This net is used to fish for anchovy (September to November) and mackerel (*caballa*, October to January) in the Mar del Plata area, within the 50 m isobath. The net is thrown from the bow and maneuvered on the weather side. In the case of mackerel, the lampara is thrown on a site that is baited with anchovy heads and other fish discards (Izzo and Boccanfuso, 1993). In 2003, anchovy and mackerel landings were, respectively, 900 tonnes and 100 tonnes. Anchovy is canned or salted; mackerel is sold fresh, frozen or canned.

2.9 Trap fisheries

Rocky-reef finfish trap fishery: In the Mar del Plata area, traps (*nasas*) are used to capture finfish species from rocky reefs, like red porgy (*besugo*), sandperch, rockfish and wreckfish (*chernia*).

King crab fishery of Tierra del Fuego: A locally significant and traditional trap fishery targets southern king crab (*centolla*) in the Beagle Channel (Tierra del Fuego). Traps of conical design are deployed in lines of 10 units, using meat discards as bait. Traps are soaked for at least two to three days, then tended and deployed again (Boschi *et al.*, 1984). Another lithodid crab, the false king crab (*centollón*) is also caught, but its quality is comparatively lower. In spite of this, it has become a significant alternative, considering the sharp decline of king crab stocks and subsequent restrictive regulations. Catches of false king crab have increased in recent years, reaching a historical maximum of 362 tonnes in 1996. Octopus (occasionally sold) is caught as bycatch.

The fishery is seasonal, operating between January and October. Artisanal fishers and their families process and sell the catch fresh in Ushuaia or Rio Grande, and eventually to processing plants. Presently, the plants also export king crab and false king crab. They own a fleet of larger and better equipped vessels, manned by crews of two or three people that are employees of the plant. This 'industrial' fleet soaks 800 traps, while the artisanal fleet soaks only 100 to 150 (Lovrich, 1997).

Resources are shared with Chile, but no data are available for the Chilean sector of the channel since 1983. There is no formal collaboration or exchange of information between agencies from the two countries.

3. FISHERS AND SOCIO-ECONOMIC ASPECTS

3.1 Description of fishers

Coastal gatherers and beach seiners: In Río Negro Province gatherers are mostly *pulperos* that move to the coast during the summer months. Once the harvest (*zafra*) is over, most of them return to San Antonio where they work temporary jobs (*changas*). In the past they used to build huts made out of brush branches, cardboard and other scrap materials (*enramadas*) in their temporary summer

campes. *Enramadas*, used both for habitation and to hold the octopus catch, are now being replaced by small cinder block houses. Intermediaries (*acarreadores* or *acopiadores*) concentrate and market the catch in most cases, often paying the fishers in kind. As a result, *pulperos* survive the summer but end up penniless. *Pulperos* that live in urban areas (San Antonio Oeste, Puerto Madryn) sell the catch directly to consumers and fish shops, fresh or pickled (*escabeche*). In Chubut Province most families of gatherers live in El Riacho and Larralde, small rural fishing villages where wood stoves are used for cooking and heating. Water is in short supply everywhere along the coast.

In Tierra del Fuego there are only a few coastal gatherers. They depend on welfare or temporary jobs during the red tide season (Pascual *et al.*, 2002). In 1994, Ré and Berón (1999) counted 69 beach seiners in Chubut Province; 61 of them were owners of their fishing gear. Considering that teams are generally composed of two persons, the number of people involved directly in this fishery was at least 120. Of these 54% were exclusively artisanal fishers and 8% alternated between beach seining and jobs as deckhands in the industrial fleet.

Gatherers and beach seiners constitute the lowest income group of fishers, often living in precarious conditions. The illiteracy rate is highest in Río Negro Province. Flamanc (1999) pointed out that in Puerto Madryn there are two subgroups: older fishers, which are more sedentary and often live near the coast, and younger, more mobile fishers that alternate with low paying jobs. There are no official figures of the number of fishers in this group, but it is estimated to be approximately 440 in the whole country (100 in Río Negro, 200 in Chubut, 100 in Santa Cruz and 40 in Tierra del Fuego).

Fishers that work from small (strictly artisanal) boats: This group is very heterogeneous. In general, their income is higher than that of workers with their qualifications in other sectors of the economy. Included here are fishers that operate in the north of Buenos Aires Province (Partido de la Costa) using inflatable or semi-rigid boats, commercial divers from San Matías and San José Gulfs, and some of the boats that operate from Rawson (Chubut Province) or in the Beagle Channel (Tierra del Fuego Province).

Fishers from Partido de la Costa are relatively young (36 years old on average) and not very experienced: only 25% come from fishing families. In general, they alternate between fishing and other jobs.

Flamanc (1999) found that in Puerto Madryn (Chubut Province) younger fishers (28 years on average) are commercial divers. This is a mostly urban group of fishers that go to the coast to fish but reside in the city (not all are homeowners), have a perception very different from that of coastal gatherers, and show concern for the sustainability of the resources that they depend on. Santa Ana (2001) conducted an interview survey in the region of Puerto Madryn, identifying 98 active fishers. This was a very dynamic group, with members alternating often between different occupations. A later interview of team leaders showed that 75% heads of household have an average time of 14 years in the fishery; fishing is the sole source of income for 63% and the main source for the remainder. Among

boats in the fleet 68% showed signs of decay and 13% were definitely precarious (Elías *et al.*, 2001). A few boat owners do not participate physically in the fishing operations, which is inconsistent with recent provincial legislation (Law 4725 of 2001), and are not considered here as artisanal fishers. Artisanal fishers from Puerto Madryn do not have access to welfare or retirement programmes. Most fishers have only an elementary school education level. The number of fishers in this group is around 660 for the entire country (300 in Buenos Aires Province, 200 in Río Negro, 130 in Chubut and 30 in Tierra del Fuego).

Fishers that work in the rada/ría fleet: This group has the highest income level, although it is presently affected by a generalized crisis related to the decline or collapse of many resources of the Argentine shelf. Fishers in this group can be generally defined as middle class. Children have access to all educational levels. Hierarchies in the working place are minimal (Errazti and Bertolotti, 1998). In most cases, the skipper works side by side with the deckhands. Education level is generally at the elementary level for deckhands and tertiary for skippers and engineers. There are approximately 166 registered boats in this sector, with an average crew of 4, making the total number of active fishers between 600 and 700.

3.2 Social and economical aspects

Access to credit

In contrast with the industrial sector, which has been heavily subsidized, the artisanal sector has very limited access to credit and subsidies (Godelman *et al.*, 1999). The situation is better in Río Negro and Tierra del Fuego Provinces, where provincial states have granted subsidies for the construction of municipal processing plants and the purchase of boats. This assistance, however, has not been accompanied by orientation or strengthening of fishers' organizations, and so was not successful in reverting the vulnerability of this sector. It must be emphasized that artisanal fishing is not a subsistence activity in Argentina, where even the poorest fishers are commercially-oriented. However, society perceives artisanal fishery as an activity with a low status.

Women participating in artisanal fisheries

Women's presence is generally related to processing and marketing. Female participation in fishing activities is limited, being most significant among the coastal gatherers of San Matías and San José Gulfs, where only a few have worked as deckhands. In the case of the inshore fleet, virtually no women go to sea. A few women participate actively in the fishers' association of Puerto Madryn. Marta Piñeiro, wife of an artisanal fisher (personal communication), noted that women are marginalized twice: once for being women and again because of the occupation of their husbands.

Pascual *et al.* (2002) conducted a socio-economic diagnostic survey of women's participation in fisheries of the Patagonian provinces. They interviewed 251 women belonging to six groups: workers from processing plants (59%); fishers (5%, including aquaculturists); *pulperas* (8%); processers of artisanal

products (preserves and souvenirs, 12%), professionals (plant managers, health-related controllers, administrators, engineers, scientists, 12%); and merchants (owners of fish stores or thematic restaurants, 4%). The average age of the women interviewed was 36 years old; age was highest among *pulperas* (47 years old) and plant workers (44 years old). Gatherers and *pulperas* stop working at age 60, because “at an advanced age it is difficult to walk over the rocky intertidal”. Professionals are mostly young, as management agencies and research centres from Patagonia are generally of recent creation, at least as compared to Buenos Aires Province. The average age of recruitment for *pulperas* is 23, but some are recruited as early as 5 years old. About 68% work full-time in fisheries-related jobs, 21% are temporary, 8% seasonal and 3% occasional. With regards to education, 3% are illiterate, 21% did not complete elementary education, 12% completed high school, and 13% went through tertiary or college education. *Pulperas* are the most vulnerable sector: 20% have no education and 20% are illiterate. The survey concluded that the female segment of the fishing-related population is eager to receive some form of education or training.

Fisheries origins and traditions

Fishing peoples using canoes inhabited the Magellanic region, including Beagle Channel. As indicated earlier, the fishing traditions of prehispanic peoples were lost during the colonial period. Archaeological research conducted around Valdés Peninsula (Chubut Province) shows that 3 200 years ago hunters-gatherers already roamed the coast, occasionally moving inland in search for freshwater (Gómez-Otero, 1996). Shellfish gathering was likely conducted during the low tides, or following storm-induced strandings of subtidal bivalves. The finding of a wooden fishing hook suggests that there was some finfishing in deep tidal pools (Gómez-Otero, 1996).

Octopus gathering (*pulpeo*) had its origins on the west coast of San Matías Gulf (Río Negro Province) during the 1940s. Since then, knowledge has been transferred from parents to children. The community of El Riacho (Chubut Province) was started during the 1960s by *pulperos* from San Matías Gulf (Santa Ana, 2004), and later joined during the 1990s by some families without previous experience.

Fishing traditions were brought to the country by European immigrants around the turn of the nineteenth to the twentieth century. Many of them settled in El Tigre and La Boca, on the shores of La Plata River near Buenos Aires. Mar del Plata gained gradually in relative importance with the advent of railroads (1886), largely as it became a major destination of tourists and vacationers during the summer season. The inshore fishery developed to supply fresh fish (silversides, white croaker, flounders) to this population. A similar pattern followed later in Necochea, San Antonio Oeste and Puerto Madryn.

As late as the 1940s, fishing boats operated only within sight of the coast, never venturing beyond. The catch was sufficient to satisfy the local demand. Starting in 1943, longlining for tope shark rapidly developed in the area of Mar del Plata,

paving the way for a transformation of the fishing fleet, which started targeting anchovy and mackerel. When the tope shark fishery declined in Mar de Plata, the fleet gradually moved to other ports: Monte Hermoso, Puerto Madryn, Rawson, and Comodoro Rivadavia (Mateo Oviedo, 2003). Small groups of fishers settled in these communities, but many moved to other activities after the decline of the tope shark fishery.

Commercial diving for shellfish originated in San José Gulf during the early 1970s (Ciocco, 1995). A scallop dredge fishery had boomed and collapsed in the adjacent San Matías Gulf between 1968 and 1972, and there was concern about the same happening here. Commercial diving was then envisioned as an environment-friendly alternative to dredging, and developed by a team of divers with experience in diving for mussels in Uruguay (Santiago Picallo, personal communication). Commercial diving has operated continuously ever since, incorporating new divers from other parts of the country and from Chile. Artisanal fishing was started in Tierra del Fuego by immigrant skippers, many of Chilean origin.

4. COMMUNITY ORGANIZATION AND INTERACTIONS WITH OTHER SECTORS

4.1 Community organization

The level of organization of the fishers increases with their socio-economic status. There were attempts to create cooperatives for low-income fishers in Buenos Aires, Santa Cruz and Tierra del Fuego Provinces, but these were short lived. In San Antonio Oeste there is an association (APASAO) that groups commercial divers and longliners. Artisanal fishers are best organized in the area of Puerto Madryn (Chubut Province), where the local association (APAPM) integrates fishers from all sectors. Marta Piñeiro, an active member of this organization, believes that the scarcity of organizations like APAPM makes it difficult for fishers along the extensive Argentine coastline to unite to improve their living conditions. Increasingly, pressure from the markets fosters competition, giving significance to fishers' qualifications in catching, processing and marketing.

The first Gathering of Artisanal Fishers of Chubut took place in Puerto Madryn in 1999, bringing together 35 fishers (coastal gatherers, beach seiners and commercial divers). This was the first formal event involving fishers and scientists (Elías and Pereiro, 1999). From these beginnings there have been consistent efforts from different sectors (municipal government, scientists, universities and non-governmental organizations [NGOs]) to accompany the organization of fishers as a requisite for the sustainability of local artisanal fisheries. Interinstitutional interactions proved positive, bringing some successes. A facility close to the beach of Puerto Madryn served both as a restaurant that sold products prepared by fishers' wives and to educate the general public. The association put together its own web page (www.apamadryn.com) and an informative bulletin is published and distributed.

Organizations from Buenos Aires Province include the Chamber of Artisanal Fishers of Monte Hermoso and Pehuencó, and the Chamber of Fishers from Partido de La Costa. *Rada/ria* fishers are organized at the level of different

harbours, like the Society of Skippers of Mar del Plata, the Chamber of Fishers of Bahía Blanca, and the Chamber of Fishers of the Inshore Fleet of Rawson.

The First National Gathering on Policies for Coastal Fisheries (artisanal and small scale) was held in Mar del Plata in 2000, and the second in Puerto Madryn in 2001. Both were attended by fishers from all over the country, as well as members of the coast guard, business owners and scientists. This was a forum for the discussion of many important subjects: management, conservation of coastal environments, and socio-economic aspects of fisheries development. The National Federation of Artisanal Fishers was founded during the first gathering, with a commitment to gain areas of exclusive access for artisanal fishers and small-scale fleets, consolidate the social and juridical organization in every harbour, promote the creation of cooperatives, work towards the solution of well-being and educational problems, and lobby for controls on the large industrial fleets responsible for the collapse of most major resources (Perrotta *et al.*, 2000). The Federation was ratified during the second gathering, but never gained real momentum. Both gatherings made it evident that there were significant differences in the goals and priorities of artisanal and semi-industrial fishers, which made it difficult to consolidate the organization.

Participation of fishers' organizations in monitoring and management are at best incipient in most fisheries, with the artisanal fishery of Puerto Madryn (Chubut Province) leading the way. Several NGOs in the country are involved with marine conservation (e.g. Fundación Vida Silvestre, Fundación Patagonia Natural, Fauna Silvestre, etc.), but only one is exclusively related to fisheries: the Center for the Development of National Fisheries (CeDePesca). Many of these NGOs have helped with the organization of workshops and other events to discuss problems related to artisanal fisheries, but have not been involved in the discussion of management.

4.2 Interactions between fishers and other sectors

Most of the Argentina coast is sparsely populated. The long coastal zone of Patagonia (15° latitude) has only 21 human settlements and a total population of 790 000; the number of artisanal or small-scale fishers is comparatively modest. Perhaps for this reason conflicts with other uses of the coastal zone, while existent, are not generally significant.

Conflicts between industrial and small-scale fisheries: During recurrent crises in the hake fishery, the industrial fleet based in Mar del Plata has redirected effort to pelagic and demersal resources from the coastal zone, which has been a source of conflict with small-scale fleets (Lasta *et al.*, 2000; Garcarena *et al.*, 2002).

Conflicts between recreational and artisanal fishers: In the *rías* of Santa Cruz Province artisanal fishers occasionally compete with sport fishers targeting brown trout (*Salmo trutta*) and steelhead (*Oncorhynchus mykiss*). Conflict between artisanal and recreational gatherers of shellfish (mostly mussels) was frequent in the zone of El Riacho. Artisanal fishers pay for a permit and are regulated, while recreational fishers are not. Artisanal fishers also complain because recreational

fishers use destructive practices (shovels, unselective mussel gathering, overturning of rocks, etc.). This situation led to an experiment with territorial use communal rights (Santa Ana, 2004). In the Beagle Channel (Tierra del Fuego), recreational boats occasionally accidentally cut off the buoys that mark trap lines.

Conflicts with landowners: A common conflict along the coasts of Patagonia is created by landowners cutting the access to the seashore to artisanal fisheries that pull their boats over land. The reason is recurrent complaints by landowners about fishers killing sheep for consumption.

4.3 Integrated management of the coastal zone and marine conservation

Only recently has there been a concern about integrated coastal management, mostly through Global Environment Facility (GEF) projects funded by the World Bank through the United Nations Development Programme (UNDP) (e.g. Integrated Management Plan for the Patagonian Coastal Zone, and Environmental Protection of the La Plata River and its Maritime Front). The National Under-Secretary of Natural Resources and Sustainable Development is elaborating a National Strategy for Biodiversity, according to the United Nations Convention on Biodiversity (UNCED). To date, the protection of coastal habitats has relied mostly on a number of protected areas that represent only 0.59% of the coastal zone. In most cases there is some level of economic activity, those related to tourism/recreation being the most frequent. In many cases (San Antonio Bay, Valdés Peninsula, Tierra del Fuego) those coexist with other activities. Artisanal fishers operate within the boundaries of the following protected areas.

Buenos Aires Province: Natural Integrated Reserves (RNIs; Samborombón Bay, Mar Chiquita Lagoon) are established to protect nature as a whole, allowing only scientific exploration in restricted sectors. Natural Reserves with a Specific Objective (RNODs) are conceived to protect the soil, biota and natural features; human activity is allowed but regulated. Natural Multiple Use Reserves (NMUR; Bahía Blanca, Bahía Verde, Bahía Falsa) are oriented towards research and to experiments on the rational and sustainable use of natural resources. Focus is on the ecosystem rather than on individual species.

Río Negro Province: The Natural Protected Area of San Antonio Bay includes the open coastal zone adjacent to (and under the influence of) the bay. This area has ecological, fishing, tourism and historical significance. To date there is no management plan in place. Fishing and tourism, and to a lesser extent a deep water harbour, are activities compatible with each other, sustaining the local economy. A plan for the production of sodium carbonate (Solvay method), soon to start operating, brings into question the future sustainability of this ecosystem.

Chubut Province: The Natural Protected Area of Valdés Peninsula was created with the objective of promoting sustainable activities compatible with conservation, like tourism, commercial diving, artisanal aquaculture and husbandry. Access to the area is restricted and management plans are under development for several activities.

Santa Cruz Province: The Bahía Laura Natural Reserve is a nominally intangible reserve created to protect marine birds and mammals and subtidal kelp forests. There is, however, no control. Some beach seining for silversides takes place within its boundaries. The National Park Monte León* and the Area for Scientific Use of Deseada Island are under special protection because of large bird breeding colonies. Some beach seiners and mussel gatherers operate within their boundaries.

Tierra del Fuego Province: The Reserve of the Atlantic Coast of Tierra del Fuego is part of a hemispheric network for the protection of coastal birds. It harbours many colonies of marine birds and mammals, as well as populations of introduced beavers. Economic activities within its boundaries include sheep ranching, oil/gas exploitation and sand/gravel mining. Artisanal fishers catch silversides and Patagonian blenny using beach seine. There are plans to extend the boundaries of the reserve to incorporate the adjacent sea. The National Park of Tierra del Fuego includes kelp forests and colonies of birds and mammals. Economic activities include tourism and the king crab fishery. The National Park Administration is considering the extension of the park to incorporate the adjacent sea. There are projects for other protected areas that include the adjacent sea, including the Provincial Reserve of Isla de los Estados and a protected sector in the southeast of the Isla Grande de Tierra del Fuego (Península Mitre).

5. ASSESSMENT OF FISHERIES

Quantitative assessments have been conducted only for a handful of resources:

Coastal demersal fishes, Buenos Aires Province: Biologically Acceptable Catches (BAC) of white croaker and striped weakfish were determined by INIDEP using a Schaefer's dynamic biomass model (Ruarte and Aubone, 2003; Carozza *et al.*, 2004). Reference points considered for the management of this fishery include: maximum sustainable yield (MSY), optimum biomass (B_{opt}) and replacement catch (C_R). An indicator of the state of the resource and the fishery is the proportion of the current biomass relative to carrying capacity (K) and to B_{opt} . A risk analysis (Monte Carlo simulation) was conducted in the case of white croaker, considering the probability that next year biomass is above current biomass for different levels of catch. For other species (flathead, flounders, rockfish, red porgy, sharks and rays), the analysis suggested precautionary harvest levels are based on the average catch over the preceding decade and/or direct biomass estimates (survey data), because there is not enough biological data to be used in assessment models.

Pelagic fishes: Biomass of anchovy and mackerel has been assessed with hydro-acoustic surveys conducted by INIDEP, and BACs have been determined with production models (Perrotta *et al.*, 2003; Hansen and Garciarena, 2004a, 2004b).

Hake, San Matías Gulf: Occasional snapshot assessments have been based on survey data (area swept). Thompson-Bell's yield-per-recruit analysis was applied using bio-economic data (González and Morsán, 1998, 1999). Assessments are conducted by the provincial institute.

* Created by National Law number 25.945 in 2004.

Yellow clam, Buenos Aires Province: Stocks of yellow clam from exposed sandy beaches of Buenos Aires Province were assessed during the 1960s through extensive snapshot surveys and monthly sampling of a fix station (Olivier and Penchaszadeh, 1968a, 1968b). As described earlier, stocks are now collapsed.

Purple clam, San Matías Gulf: The purple clam stock of San Matías Gulf, which is found only in a 21-km² stretch of subtidal sandy bottom, has been composed almost exclusively by 2-year classes (1979–1980) over the last 25 years. Abundance was assessed for the first time in 1994 by means of a diving survey, following a systematic sampling design (quadrants dug on a fix grid), and using geo-statistical methods (Morsán, 2003); estimated biomass was around 53 000 tonnes. A recent survey showed no significant change, perhaps reflecting compensation between growth rate and mortality (Morsán, personal communication).

Scallops, San José Gulf: Tehuelche scallop stocks of San José Gulf were assessed in 1995–1996 and 2001–2005 by means of diving surveys (Ciocco *et al.*, 1996, 2001a, 2001b, 2002, 2003), conducted by scientists from CENPAT, with participation of commercial divers through the local association of artisanal fishers (APAPM). Scallops were counted by trained divers along transects perpendicular to the shore. The basic survey design was systematic and incorporated an adaptive component. The earlier surveys provided the evidence that substantiate claims of overfishing and a 3-year closure (Ciocco and Orensanz, 1997). Since 2000, sampling surveys have provided the rationale for setting annual total allowable catches (TACs) by the provincial fisheries agency (Cinti *et al.*, 2003; Orensanz *et al.*, 2006).

Mussels, San José Gulf: Between 2001 and 2004, mussel beds of El Riacho were assessed twice a year (before and after the harvest season) with scientific supervision from CENPAT (Santa Ana, 2004; Santa Ana *et al.*, 2003a, 2003b). The field protocol was designed to be simple, so that it can be conducted with the assistance of coastal gatherers. The design consists of a regular grid, combining quadrants and a photo survey. Results were used in a participatory context to propose management regulations.

6. FISHERY MANAGEMENT AND PLANNING

Buenos Aires Province: Fisheries are open access, and in many cases there is not even a fishing slip programme for monitoring. There is a nominal regulatory framework (e.g. restrictions on effort, gear regulations, size limits).

Río Negro Province: Fisheries are managed by the provincial fisheries agency with technical support from the Institute of Marine Biology and Fisheries ‘Almirante Storni’, located in San Antonio Oeste. Official catch statistics have been recorded since the 1960s, and were refined in 1979, when a fishing slip programme (filled by the skippers) was implemented. During the mid-1990s, when longlining was introduced, the provincial fishing authority designed a programme for reconverting trawlers to longliners. Although the initiative was partially accepted by some companies, trawling is still prevalent nowadays. Currently only the hake fishery is regulated and catch appears to be at a sustainable level. Other fisheries

are not managed. However, a new provincial fishing act is being considered, which would introduce an individual transferable quota (ITQ) system.

Chubut Province: The provincial fisheries authority is based in Rawson, with delegations in Puerto Madryn and Comodoro Rivadavia. The regulatory framework is prolific, but limited in the specifics by frequent changes in political direction (Santa Ana, 2004). There are three types of individual permits: (i) coastal shellfish gathering and beach seining; (ii) motorized boats operating beam trawls and longlines; and (iii) motorized boats authorized also for commercial diving.

In 2001, a provincial artisanal fisheries act (No. 4725) defined four fishing zones: (i) Puerto Madryn, from 42° south latitude, northern provincial boundary, to Punta Ninfas (43° south latitude); (ii) Rawson, from Punta Ninfas to Punta Atlas (44° 08' south latitude); (iii) Camarones, from Punta Atlas to Punta Esquerra (45° 04' south latitude); and (iv) Comodoro Rivadavia (from Punta Esquerra to 46° south latitude, the southern provincial boundary). The law, which has not been fully implemented, also introduced a provincial registry of artisanal fishers. The provincial fisheries agency has the authority to establish temporal and spatial closures, quotas, size limits, etc. It is also in charge of enforcement. Fisheries are monitored through 'transit slips', which permit-holders must fill to report catch by species, fishing area and destination of the product. Monitoring and enforcement, however, have been and continue to be inefficient. The only artisanal fishery in the province that is regulated with a TAC is the scallop fishery of San José Gulf, for which there is a long history of research and management (Ciocco, 1995). Scientific support for management has been provided over the years by CENPAT. The provincial Ministry of Health monitors red tides produced by seasonal blooms of *Alexandrium tamarense* (Gayoso, 2001); mollusc fisheries are closed (usually during the spring) when allowable thresholds are surpassed.

Under open access the commercial diving fishery of San José Gulf grew to more than 30 teams during the early 1990s (Parma *et al.*, 2001). The scallop stock collapsed and the fishery was closed for three years (1996–1998) (Ciocco and Orensanz, 1997; Ciocco *et al.*, 2005). In 2000, the industrial hake fishery (backbone of the Argentine industrial fishery) experienced a severe crisis. Requests of artisanal fishing permits by displaced fishers increased. Faced with a complex situation, the provincial fisheries agency formed a technical committee as an ambit to discuss the management of commercial diving, and eventually of other fisheries. Parties included technical staff from the agency, scientists from CENPAT, and leaders of organized artisanal fishers. In 2004, the committee incorporated representatives of the provincial tourism agency and the autonomous regulatory board of Valdés Peninsula, which has been designated as part of Humanity's Natural Heritage by the United Nations Educational, Scientific and Cultural Organization (UNESCO). The technical committee's mission is to elaborate management plans for the artisanal fisheries of the Puerto Madryn region. This is, effectively, the first effective co-management experiment in the context of Argentine artisanal fisheries. So far, the committee has been instrumental in implementing a limited entry programme for commercial diving and territorial

use rights for the community of gatherers of El Riacho (Santa Ana, 2004). The latter became dysfunctional in 2005. The main reason is that the provincial administration cannot legally delegate management authority, as required by the effective implementation of a Territorial User Rights Fishery (TURF) system. At the same time, however, it has been incapable to exercise the authority retained because of the weakness in its enforcement capability.

Santa Cruz Province: Fisheries are regulated by a provincial agency with headquarters in Río Gallegos and delegations in coastal towns. The legal framework for management is provided by a provincial act (No. 1464 of 1982). Artisanal fisheries are open access; fishers need only to register with the provincial administration to get a permit. Regulations aim at a balance between artisanal (commercial) and incipient recreational fisheries, which are considered strategic for the development of tourism and conservation. Artisanal fisheries may pose some risks for marine wildlife, including the Magellan penguin (*Spheniscus magellanicus*) and Commerson's dolphins (*Cephalorhynchus comersoni*). Controls consist of *in situ* enforcement of fishing gear and quality controls over processing and marketing. Scientific/technical support is provided by an institute based in Río Gallegos. Stocks are not assessed. Pereiro (2001) made recommendations towards a strategic management plan, including elementary assessments and enforcement.

Tierra del Fuego Province: Artisanal fisheries are managed by a provincial agency, which grants fishing permits, under a legal framework that includes several provincial laws and written regulations. Fisheries are open access. In the case of the lithodid crab fishery, there used to be an effort quota of 1 000 traps for Beagle Channel. This regulation needs to be reconsidered. There are no forms of traditional management, nor is there a strategic plan for development. Enforcement is conducted by inspectors of the provincial agency, eventually with the collaboration of the coast guard (Prefectura Marítima) or the navy. Only lithodid crab stocks are monitored by means of periodical surveys (conducted jointly with INIDEP), which provide the scientific support for regulations. As an example, a TAC of 200 tonnes was introduced in 1999 (renewed in 2000) for false king crab in the most heavily fished sector of Beagle Channel. There is a monitoring programme for red tides, and mollusc fisheries are closed seasonally when safety threshold are surpassed.

7. RESEARCH AND EDUCATION

Most artisanal fisheries are not monitored. Catch and effort are recorded in a few cases, based on fishing slips. There are no observer programmes implemented for artisanal or small-scale fisheries of the Patagonian provinces and there are no specific training programmes oriented to small-scale or artisanal fishers.

Buenos Aires Province: INIDEP uses three sources of data: (i) fishing slips for catch and effort data; (ii) biological port sampling of most important species landed in Mar del Plata; and (iii) surveys directed to the assessment of coastal resources (demersal and pelagic) and their environment. The observer programme is limited to the industrial fleets, with the exception of anchovy and mackerel.

Specific studies have been conducted on the latter with participation of the *rada/ría* fleet since 1983. Both in INIDEP and the National University of Mar del Plata there are research teams studying a number of subjects pertaining to artisanal or coastal fisheries (see list of references). CeDePesca has organized courses oriented to fishers with the collaboration of scientists and several institutions. Subjects included biological sampling for recreational fishers, fish handling on board, and fisheries control and monitoring.

Río Negro Province: Most of the scientific and technical support is provided by the Institute of Marine Biology and Fisheries ‘Almirante Storni’ (San Antonio Oeste), which depends jointly from the provincial government and the National University of the Comahue. The institute offers a three-year tertiary degree programme for fishery technicians.

Chubut Province: The commercial diving fishery of San José Gulf has a long tradition of associated research. In Chubut, there is also significant documentation of coastal gathering, beach seining and longlining (see references). Most of the scientific/technical support for management has been provided by CENPAT. Since 2000, management-oriented research and training (fishers, undergraduate and graduate students, enforcement personnel of the provincial agency) have been substantially supported by the Pew Fellows in Marine Conservation Programme. The AVINA Foundation (non-profit organization focused on sustainable development in Latin America) and a GEF project play a significant role in providing support to an incipient co-management system. Many students from the National University of Patagonia (with branches in Comodoro Rivadavia, Trelew and Puerto Madryn) do internships or complete their theses on subjects related to artisanal fisheries or aquaculture. In Puerto Madryn there are two fisheries-related training programmes, one at the high school (Municipal School of Fisheries), and the other at the tertiary level (Fisheries Engineering, National Technological University). A three-month participatory training project for fishers and members of their families was conducted in Puerto Madryn in 2000. The subjects had been requested by fishers themselves during the first national gathering: biology of fishery resources, and handling of fishery products on-board.

Santa Cruz Province: The provincial fisheries agency monitors gear used by artisanal and recreational fishers. Some studies have been conducted on the biology of the most significant species, as well as cost-benefit analysis for present and projected fisheries.

Tierra del Fuego Province: CADIC has contributed significant scientific support for management, primarily in the case of lithodid crabs.

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Editors' profile

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From left to right: Anthony Charles, Silvia Salas, Ratana Chuenpagdee, Juan Carlos Seiyo.

This state-of-the-knowledge document examines the assessment and management of coastal small-scale fisheries in Latin America and the Caribbean (which are inherently interdisciplinary and integrated in approach), covering biological, socio-economic and policy aspects. It includes an introductory overview chapter, a set of 12 chapters each examining fisheries of a particular country, and two major conceptual and analytical synthesis chapters. The country chapters cover the main subregions of Latin America and the Caribbean: the Caribbean Islands (specifically Barbados, Cuba, Dominican Republic, Grenada, Puerto Rico, Trinidad and Tobago), Central America (Costa Rica, Mexico) and South America (Argentina, Brazil, Colombia, Uruguay). The analysis in the document contributes to a better understanding of these coastal fisheries, of the information available on them, of the gaps that exist in fisheries assessment and of trends in fisheries management. Through its knowledge sharing, the document will lead to more effective approaches to managing coastal fisheries in the region, as well as identification of priorities for information collection and research – thus leading to more sustainable fisheries across Latin America and the Caribbean.

