



Authors:

R.P. Pottinger, J. Curelovich
(OIA)

E. Morsan, H.J. Cranfield, J. Mendo
(Invited Assessment Team Experts)

**MSC ASSESSMENT REPORT
PATAGONIAN SCALLOP FISHERY
Assessed against the Principles and Criteria of the MSC**

FINAL REPORT

Certification Body:

Organización Internacional Agropecuaria (OIA)
Av. Santa Fe 830 – Acassuso - (B1641ABN)
Buenos Aires – Argentina
Tel./Fax: (54-11) 4798-9084 / 4793-4340
<http://www.oia.com.ar>

Client contact:

CPN Eduardo González Lemmi
Glaciar Pesquera S.A.
Santiago del Estero 1718 – 1° Piso Of. 7
7600 Mar del Plata - Argentina
Tel.: (54-223) 495-4789
Fax: (54-223) 492-0450

INDEX

LIST OF ABBREVIATIONS.....	4
SUMMARY.....	5
1 INTRODUCTION	7
1.1 THE FISHERY PROPOSED FOR ASSESSMENT	7
1.2 THE ASSESSMENT PROCESS	7
1.3 MAIN ORGANIZATIONS/PEOPLE INTERVIEWED.....	9
1.4 OTHER ACTIVITIES	11
1.5 OTHER INFORMATION SOURCES	13
<i>BIBLIOGRAPHY</i>	<i>13</i>
1.5.1 <i>Scientific Publications and Technical Reports Consulted.....</i>	<i>13</i>
1.5.2 <i>Operational Manuals.....</i>	<i>30</i>
1.5.3 <i>On Board Observers Programme – Final Trip Reports.....</i>	<i>30</i>
1.5.4 <i>REDES National Fishing Industry Magazine.....</i>	<i>32</i>
1.5.5 <i>Laws, Resolutions and other Official Government Requirements (examples only).....</i>	<i>32</i>
<i>WEB SITES.....</i>	<i>33</i>
1.6 PREVIOUS ASSESSMENTS	33
1.7 KEY ISSUES FOR THE ASSESSMENT	33
2 THE PATAGONIAN SCALLOP FISHERY.....	34
2.1 BIOLOGICAL AND ECOLOGICAL ASPECTS OF PATAGONIAN SCALLOP.....	36
2.2 HISTORICAL.....	37
2.3 CURRENT OPERATION	38
2.4 MANAGEMENT SYSTEM.....	44
2.5 INSTITUTIONAL AND LEGAL FRAMEWORK.....	50
2.5.1 <i>Federal Fishery Council.....</i>	<i>50</i>
2.5.2 <i>SAGPyA</i>	<i>51</i>
2.5.3 <i>INIDEP</i>	<i>52</i>
2.6 POLITICAL STABILITY OF THE GOVERNMENT	54
2.7 DOMESTIC CONSUMPTION AND EXPORTATION	54
2.8 NEIGHBORING AND ASSOCIATED FISHERIES	54
2.9 ENVIRONMENTAL FEATURES	55
3 THE ASSESSMENT PROCESS.....	60
3.1 GENERAL STEPS FOLLOWED.....	60
3.2 STANDARD USED FOR THE ASSESSMENT	63
3.3 ASSESSMENT TEAM	66
4 CONSULTATION PROCESS	68
5 STAKEHOLDER CONCERNS.....	72
CAIPA’S COMPLAINT	73
6 ASSESSMENT TEAM PERFORMANCE EVALUATIONS.....	73
6.1 ASSESSMENT RESULTS	74
6.2 ASSIGNED SCORES AND COMMENTS.....	74
<i>PRINCIPLE 1</i>	<i>75</i>
<i>PRINCIPLE 2.....</i>	<i>117</i>

<i>PRINCIPLE 3</i>	141
6.3 TRACKING AND TRACING OF THE PATAGONIAN SCALLOP PRODUCT.....	198
7 CONDITIONS AND RECOMMENDATIONS.....	198
7.1 CONDITIONS	198
7.2 RECOMMENDATIONS	201
8 PERSONAL COMMUNICATIONS	207
9 STATEMENT FROM THE OIA CERTIFICATION COMMITTEE	208
ACTION PLAN PRESENTED	210
APPENDIX I.....	212
<i>A. The Marine Stewardship Council (MSC)</i>	212
<i>B. Organización Internacional Agropecuaria (OIA)</i>	212
APPENDIX II.....	214
<i>Resolutions 4 and 5/2005 - Federal Fishery Council</i>	214
APPENDIX III.....	220
<i>Federal Fishing Law N° 24.922 and its Complementary Decree</i>	220
APPENDIX IV	247
<i>CAIPA – Resumen Ejecutivo (Executive Summary)</i>	247
APPENDIX V	261
<i>Peer Reviewers Comments on Patagonian Scallop Fishery</i>	261
<i>Assessment Team rationale for points raised by the Peer Reviewers</i>	272

TABLES

Table 1. Average towing time per year for the fleet.....	39
Table 2. Landings of Patagonian scallop (<i>Zygochlamys patagonica</i>) in the Republic of Argentina.....	42
Table 3. Estimates of biomass of total scallops for the management units and commercial captures for the two management units and overall the platform.....	43
Table 4. Total Allowable Catch established in tonnes of entire scallop.....	45
Table 5. The location of the beds associated with the North and South Patagonian scallop management units and the polygon called OSMU.....	48
Table 6. List of taxa collected in the <i>Zygochlamys patagonica</i> beds during 1995 in the Argentine Sea.	59
Table 7. List of industry and management personnel, conservation organizations and other non-industry stakeholders interviewed for the project.....	69

FIGURES

Figure 1. Patagonian scallop (<i>Zygochlamys patagonica</i> , King and Broderip, 1832).....	34
Figure 2 A, B. The vessel “Atlantic Surf III”, Glaciar Pesquera S.A.....	35
Figure 3 A, B. On board catch.....	36
Figure 4. Drum for separating commercial size scallops from catch.....	39
Figure 5. Steaming machinery.....	40

Figure 6. Unpeeled scallops after steaming process.....	40
Figure 7. Peeling machinery.....	40
Figure 8. Muscles graded to size for packing.....	41
Figure 9. Annual landings of Patagonian scallop (callus) throughout the history of the fishery.....	42
Figure 10. Estimated total biomass and total catch per year.....	44
Figure 11. Map of the Argentine Sea, indicating the location of the North and South Management Units for Patagonian scallop.....	46
Figure 12. Schematic representation of main Patagonian scallop's beds.....	47
Figure 13. Southwestern Atlantic schematic ocean circulation: Malvinas (MC), Antarctic Circumpolar (ACC) and Brazil Currents (BC), Confluence Zone (CZ)..	56

LIST OF ABBREVIATIONS

AEEZ	Argentine Economic Exclusive Zone
CAIPA	Fishing Industry Chamber
CAPECA	Fishers and Ship-owners Chamber
CEDEPESCA	Center for Defense of Fishing
CENPAT	National Patagonian Research Institute
CITEP	Fishery Technology Research Center
CONICET	Advisory Centre of Scientific and Technological Research
CONVEMAR	Convención sobre el Derecho del Mar (Agreement on Sea Rights)
CPUE	Catch Per Unit Effort
ENSO	El Niño – Southern Oscillation
FCEyN	Faculty of Natural and Hard Sciences
FFC	Federal Fishery Council
FO.NA.PE	National Fishing Fund
FVSA	Argentina Wildlife Foundation
IBMPAS	Institute of Fisheries and Marine Biology “Almirante Storni”
INIDEP	National Institute of Fisheries Research and Development
JICA	Japan International Cooperation Agency
MSC	Marine Stewardship Council
NGO	Non Governmental Organization
OIA	Organización Internacional Agropecuaria
PNA	Argentine Prefecture
SAGPyA	Secretariat of Agriculture, Livestock, Fisheries and Food
Se.Na.SA	National Service of Health and Agroalimentary Quality
SSPyA	Sub-Secretariat of Fisheries and Aquaculture
TAC	Total Allowable Catch
TRPFM	Treatment of La Plata River and its associated Maritime Front
UNALM	National University of La Molina
UNMdP	National University of Mar del Plata
ZCPAU	Argentine-Uruguayan Common Fishing Zone

SUMMARY

1. This assessment for certification of the Patagonian scallop (*Zygochlamys patagonica*) fishery, within the Economic Exclusive Zone of Argentina, has been prepared for Glaciar Pesquera S.A., one of two companies, each operating two factory vessels, fishing the resource.
2. The benefits arising from this assessment, if successful, can only be used by the client Glaciar Pesquera S.A. to claim this as a well managed and sustainable fishery.
3. This assessment does not include consideration for MSC Chain of Custody.
4. This assessment follows a pre-evaluation of the fishery which identified it as a strong candidate for consideration as an MSC sustainable fishery.
5. The Assessment Process in which this report is based, followed the Guidelines for Fisheries Certification established by the MSC.
6. Management of the fishery is the responsibility of the Federal Fishery Council (FFC), a Council of Federal and Provincial government nominees, chaired by the Secretary of Agriculture, Livestock, Fisheries and Food or his nominee acting as President.
7. The overall fishery management involves the FFC, SSPyA (Sub-Secretariat of Fisheries and Aquaculture), SAGPyA (Secretariat of Agriculture, Livestock, Fisheries and Food) and its research institute, INIDEP (National Institute of Fisheries Research and Development), the fishing companies and various Federal Government Agencies including, the Coastguard. Non Governmental Organizations can make submissions, but are not recognized as an obligatory part of the management structure.
8. A legal framework for appeals exists.
9. The Assessment Team selected, developed the subcriteria, indicators for them, and the scoring guidelines on which the fishery has been scored, revising them in light of comments made by the client, the MSC and stakeholders. Stakeholders were contacted personally and/or through the electronic media, and were given the opportunity to make written and oral submissions.
10. The Assessment Team of OIA have recommended that the fishery be certified, but with conditions. Such conditions and total process must be approved by the OIA Certification Committee. The Team awarded a pass mark for each of the 3 Principles. Namely:

Principle 1	82.7
Principle 2	91.6
Principle 3	92.4

The minimal pass mark is 80 in each. The fishery achieved at least a minimum pass mark of 60 in all performance indicators, but in line with MSC requirements when the score awarded for each indicator did not reach 80 conditions have been applied, which

require achievement within specified time periods. As well the Assessment Team have recommended that the client consider several areas which achieved a score of 80, but justify improvement.

English and Spanish versions of this report have been prepared.
The English version is the official document accepted by the MSC.

1 INTRODUCTION

This report provides the results of the assessment of the Patagonian scallop (*Zygochlamys patagonica*) fishery considered for certification against the Marine Stewardship Council (MSC) Principles and Criteria for Sustainable Fisheries.

1.1 THE FISHERY PROPOSED FOR ASSESSMENT

The MSC Guidelines to Certifiers specify that the unit for certification is “The fishery or fish stock (=biologically distinct unit) combined with the fishing method/gear and practice (=vessel(s) pursuing the fish of that stock) and management framework.”

The fishery considered for certification is therefore defined as:

Species:	Patagonian scallop or <i>Vieira patagónica</i> (<i>Zygochlamys patagonica</i> , King and Broderip, 1832).
Geographic Area:	The fishery considered for certification is solely within the Argentine Continental Shelf, between the latitudes 36° 45' to 48° SL and the longitudes 54° 20' to 65° 20' WL, in waters approximately 60-120 meters deep, between the northern boundary with Uruguay and a line drawn between the Malvinas Islands and Tierra del Fuego in the south. The fishery is wholly within the Argentine Economic Exclusive Zone.
Stock:	The Patagonian scallop extends from 42°S in the Pacific Ocean to 35°S in the Atlantic. It is not known whether distinctive stocks exist, but logic and geographic isolation suggest separate stocks, at least between both oceans.
Fishing Method:	Benthic Otter Trawl Net.
Fishery Management:	Secretary of Agriculture, Livestock, Fisheries and Food (SAGPyA), Sub-secretary of Fisheries and Aquaculture (SSPyA), Federal Fishery Council (FFC).
The Client:	Glaciar Pesquera S.A., one of two companies, each operating two ocean-going factory vessels over the fishery.

1.2 THE ASSESSMENT PROCESS

The aim of this assessment is to determine the degree of compliance of the fishery with the MSC Principles and Criteria for Sustainable Fisheries. The process used has followed MSC Fisheries Certification Methodology, with attention to

- Compliance of the fishery with regulations for Federally managed fisheries in Argentina.
- Management of the fishery.
- The adequacy of the research programme and application of its outputs within the fishery.
- Control of fishing pressure and actions to maintain the sustainability of the resource.
- The impact of the fishery on the benthic ecosystem, and “at risk” and endangered species.

- f. The level of understanding of the species biology, population dynamics, specific mortalities, their role in regulation of populations and the processes associated with recruitment into both the motile and sedentary stages of the stock.

This assessment is concerned only with the fishery defined above.

The report presents:

- The background of the fishery proposed for assessment.
- Lists of the literature and information sources considered by the team.
- Key aspects considered in the full assessment.
- The standard (MSC Principles and Criteria) used to evaluate the fishery against.
- The qualifications and experience of the team undertaking the assessment (Curriculum vitae were obtained from scientists with experience in scallop fisheries and/or fisheries management for evaluation and consideration).
- The consultative process carried out with stakeholders, including all those parties with an interest in the management of the fishery, including fishers, management authorities, scientists and Non-governmental Organizations (NGOs). To ensure fairness and transparency OIA has provided opportunity for inputs into all stages of the assessment process, whether or not required by MSC procedures.
- Stakeholder concerns.
- The methodology used to assess or score the fishery against the MSC standard. The scoring indicators used by the assessment team and the scoring guidelines developed by them as aids in allocation of scores to the fishery. These are described in the text, and indicated under each sub-criterion.

Section 6 of the report sets out the Assessment Team's decisions for the scoring of the Performance Indicators.

The intention of the earlier sections of the report is to provide the reader with background information to interpret the scoring commentary in context. Publications and sources of information pertinent to the Team's decisions are referenced in the scoring for each indicator. These also include the weighting given to each criterion, sub-criterion and performance indicator considered. A full list of resource material is presented in Section 1.5.

Finally, the Certification Recommendation of the Assessment Team, together with conditions and recommendations attached to the certification, are presented in Section 7. These conditions and recommendations result from consideration of technical reports, scientific publications, relevant laws, submissions and oral evidence from stakeholders and quantitative analysis of the scores assigned.

The certification process started in November 2003 when the contract for the Pre-assessment between Glaciar Pesquera S.A. and OIA was signed. In January 2004 the OIA Team, with Dr. Peter Pottinger as its leader, started with the activities, which included the presentation of a Technical Report with all the relevant information compiled by the Client in April 2004; stakeholders consultation, field visits and a workshop on the sustainability of the fishery. The Pre-assessment report was delivered to the Client for comment on August 2004. The Client decided to proceed with the Full Assessment and the process was initiated in January 2005. The Assessment Team was assembled in February 2005 and they met in Argentina for the first time between 7th and 11th March 2005 to start preparing the draft "Assessment Tree", which includes a set of sub-criteria, performance indicators and scoring guideposts specific to the fishery being

evaluated. The Assessment Tree was submitted to the client and stakeholders (almost 50 organizations in Argentina and more than 200 international NGOs) for comment between 22nd August and 26th September 2005.

The Client provided an update to the Technical Report in July 2005.

The evaluations conducted for this fishery occurred primarily between September and November 2005. The stakeholder's consultation and the assessment and scoring of the fishery were carried out between 31st October and 14th November 2005.

The Preliminary Draft Report was prepared between 15th November and 30th December 2005 and was submitted for peer review during 11st - 25th April 2006.

The period for public comments on the Draft Report lasted 30 days from 14th July 2006 until 14th August 2006.

Short summaries describing the MSC and OIA are presented in Appendix I.

1.3 MAIN ORGANIZATIONS/PEOPLE INTERVIEWED

The assessment team identified a number of organizations and or people to contact and meet in order to properly evaluate the research and management activities associated with the Patagonian Scallop Fishery. They included:

- **Glaciar Pesquera S.A.** – Fishing Company
Contact: Mr. Eduardo González Lemmi – President and the Argentine shareholder of Glaciar Pesquera S.A.
- **Wanchese Argentina S.A.** – Fishing Company
Contact: Mr. Pedro Böhnsdalen – Director
- **SSPyA (Sub-Secretariat of Fishing and Aquaculture) – SAGPyA** (See 2.5.2)
Contact: Mr. Gerardo Nieto
 - Mar del Plata Fishing District – Control Inspectors
Contact: Mr. Alejandro Moscato
- **FFC (Federal Fishery Council)** (See 2.5.1)
Contact: Eng. Marcelo Santos
- **PNA (Argentine Prefecture)**: Responsible for control of fishing vessels to prevent fishing within prohibited areas.
Contact: PM Luis Alberto Berta
- **INIDEP (National Institute of Fisheries Research and Development)** (See 2.5.3)
Contact: Lic. Mario Lasta
- **CENPAT (Centro Nacional Patagónico)** – Research Institute
Contact: Lic. Eugenia Bogazzi
- **UNMDP (National University of Mar del Plata)**
Contact: Dr. Oscar Iribarne
- **FVSA (Fundación Vida Silvestre Argentina)**

The Fundación Vida Silvestre Argentina (FVSA) is a private organization (non-governmental), created in 1977. Its mission is to encourage the conservation of biodiversity and Argentine natural resources, to alter the patterns of these resources consumption and support sustainable development. The FVSA is directed by a Stewardship Council composed by businessmen, lawyers, naturalists, economists and other professionals committed to its mission. A Scientific Advisory Committee composed of leading Argentine experts on environmental issues gives support.

Since 1998, the FVSA has been associated with and represents the Organization for the World Wide Fund for Nature (WWF) within Argentina, the largest environmental organization in the world.

Contact: Lic. Guillermo Cañete

- **CEDEPESCA (Centro en Defensa de la Pesca)**

It is a non-governmental organization based in Mar del Plata (the main Argentine fishing port) whose mission is to work towards achievement socially, economically and ecologically sustainable fishing activity.

It is composed of people from the fishing sector and professionals such as biologists, teachers, economists, engineers and lawyers, etc., concerned with the investigation and dissemination of management systems to ensure the sustainable use of marine resources. CEDEPESCA is working to create a legal and economic frame-work that permits the participation of the community in the management and protection of Argentina's fishing grounds.

CEDEPESCA works very much in favour of small fisheries. The President, Eng. Ernesto Godelman is an active member of the fishery community who is permanently studying and writing about different fisheries. He held a position at Government level during 2001, as an adviser of SAGPyA, prior to assuming his association with CEDEPESCA.

Contact: Eng. Ernesto Godelman

- **CAIPA (Cámara de la Industria Pesquera Argentina)**

Contact: CPN Mariano Pérez

- **Custom's Agent - "Shepherd y Asociados"**

Contact: CPN Jorge Shepherd

Since the beginning of the evaluation process several notifications were made publicly available to all interested parties:

Date	Purpose	Media
15 March 2005	Notification of confirmation of assessment	Direct E-mail Notification on MSC website Advertisement in national and provincial newspapers
7 June 2005	First notification on assessment visit and call for meeting requests	Direct E-mail Notification on MSC website
19 August 2005	Confirmation of Assessment Team	Notification on MSC website

22 August 2005	Consultation on draft Performance Indicators and Guideposts	Direct E-mail Notification on MSC website
3 October 2005	Second notification on assessment visit and call for meeting requests	Direct E-mail Notification on MSC website
3 October 2005	Notification of proposed Peer Reviewers	Direct E-mail Notification on MSC website
12 October 2005	Notification on modification of one Assessment Team member	Direct E-mail Notification on MSC website
31 October – 10 November 2005	Assessment visit	Meetings

1.4 OTHER ACTIVITIES

During the Pre- and Full Assessments several attempts to get information were made. These included contacts by phone, e-mail and interviews with managers, researchers, fishing chambers, NGOs, control agents and fishers. Other activities included the following:

March, 2004

Dr. Peter Pottinger travelled to USA and Canada to interview experts in molluscan fisheries in both countries and obtain background information, visiting both Clearwater Seafood Inc. - Nova Scotia (main shareholder of Glaciar Pesquera S.A.) and Wanchese Fish Company Inc. – Virginia (100% owner of Wanchese Argentina S.A.).

April, 2004

To ensure a thorough and robust assessment process in which all interested stakeholders could participate OIA conducted an MSC awareness workshop called: *“The Patagonian scallop fishery in National jurisdiction: an interesting case of research, development and responsible management”*.

Participants:

- Eng. Pedro Landa (OIA)
- Dr. Peter Pottinger (OIA)
- Lic. Jessica Curelovich (OIA)
- Dr. Ignacio Isla (Dean FCEyN, National University of Mar del Plata)
- Dr. Oscar Iribarne (FCEyN, National University of Mar del Plata)
- Lic. Mario Lasta (INIDEP)
- Lic. María Eugenia Bogazzi (CENPAT)
- Eng. Ernesto Godelman (CEDEPESCA)
- Lic. Guillermo Cañete (FVSA)
- Mr. Enrique Díaz (CAPECA)
- Mr. Luis Albero Heiler (Coastguard)
- Mr. Jorge Dondero (Coastguard – Mar del Plata)

The participants discussed the sustainability of the fishery, biological and ecological knowledge of the resource and the certification process.

In addition, OIA conducted a series of seminars in Buenos Aires and Mar del Plata, prior to and during the Pre-assessment visits, respectively.

May, 2004

Stakeholder consultation during the Pre-assessment process to obtain additional information on the fishery.

Stakeholders interviewed:

- Wanchese Argentina S.A. (Fishing company, Mar del Plata)
Mr. Pedro Böhnsdalen

- INIDEP
Lic. Mario Lasta
Dr. Claudia Bremec
Dr. María Inés Trucco

- On Board Observers
Lic. Gabriel Blanco

- National University of Mar del Plata and CONICET
Dr. Oscar Iribarne

- CEDEPESCA (NGO), Mar del Plata
Eng. Ernesto Godelman
Lic. Fabián González

- Fundación Vida Silvestre Argentina (NGO), Buenos Aires and Mar del Plata
Lic. Javier Corcuera
Dr. Sarah Jones
Lic. Guillermo Cañete

- Federal Fishery Council
Eng. Marcelo Santos, President

May, 2004

Field visit to the scalloper “Mr. Big” owned by the fishing company Wanchese Argentina S.A. in order to observe on board processing facilities, fishing systems, equipment for detection of the beds, fishing data registers, quality controls and preparation of the product.

October, 2005

Field visit to the scalloper “Atlantic Surf I” owned by the fishing company Glaciar Pesquera S.A. in order to observe on board processing facilities, fishing systems, equipment for detection of the beds, fishing data registers, quality controls and preparation of the product.

February, 2006

Meeting between some members of the Assessment Team and the Client in order to discuss and review the Glaciar Pesquera S.A.’s comments on the Preliminary Draft Report.

1.5 OTHER INFORMATION SOURCES

BIBLIOGRAPHY

1.5.1 Scientific Publications and Technical Reports Consulted

ANDRADE, B.S.; BONICOLI, D.; VALLADARES, M.C.; SCABINI, V.; CORMACK, A.; PARADA, G.; MUTSUMOTO, H.; PERES, S.; PINTO, M.; TECAY, V. (1991). Estudios sobre repoblamiento del ostión del sur, XII Región de Magallanes, Chile. Inf. Fac. Cs. N° 2/91. Universidad de Magallanes, Punta Arenas, Chile. pp 184.

ARROYO, A.; URIARTE, I.; FARIAS, A. (2002). Estudio comparativo de acondicionamiento de reproductores de *Argopecten purpuratus* vs *Zygochlamys patagonica*. XXII Congreso de Ciencias del Mar, 28-30 May 2002, Valdivia, Chile. pp: 89-90. (Summary)

BAKER, P. (2003). Two species of oyster larvae show different depth distributions in a shallow, well-mixed estuary. *Journal of Shellfish Research*, Vol. 22, N° 3: 733-736.

BALDONI, A.; GUERRERO, R. (2000). Seasonal Pattern of temperature over the outer shelf of the Argentinean Basin. IV Jornadas Nacionales de Ciencias del Mar, 11-15 September 2000, Puerto Madryn, Argentina. (Summary)

BIGATTI, G.; BONARD, A. (2000). Diferenciación sexual en *Zygochlamys patagonica* (King & Broderip, 1832) (Mollusca, Bivalvia, Pectinidae) en el Banco "Reclutas" del Mar Argentino. Seminario. Curso de Oceanografía Biológica, FCEyN, UBA. INIDEP, Mar del Plata. pp 18.

BOGAZZI, E. (2005) Using individual vessel tracks for mapping spatial fishing opportunities in a benthic fishery. In: Glaciar Pesquera S.A. Technical Report to OIA, Chapter 2.5. pp 5.

BOGAZZI, E.; BALDONI, A.; RIVAS, A.; MARTOS, P.; RETA, R.; ORENSANZ, J.M.; LASTA, M.; DELL'ARCIPRETE, P.; WERNER, F. (2005). Spatial correspondence between areas of concentration of Patagonian scallop (*Zygochlamys patagonica*) and frontal systems in the Southwestern Atlantic. *Fisheries Oceanography*, 14(5): 359-376.

BOGAZZI, E.; LASTA, M. (2000). Capacidad bisógena y natatoria de la vieira patagónica *Zygochlamys patagonica*. IV Jornadas Nacionales de Ciencias del Mar, 11-15 September 2000, Puerto Madryn, Argentina. (Summary)

BOGAZZI, E.; WERNER, F.; ORENSANZ, J.M. (2003). Relation of large-scale distribution patterns of Patagonian scallop (*Zygochlamys patagonica*) to frontal systems in the Southwestern Atlantic. POGO-IOC-SCOR Fellowship Programme Report, pp 62.

BOHNSACK, J.A.; AULT, J.S.; CAUSEY, B. (2004). Why have no-take marine protected areas? *American Fisheries Society Symposium*, 42: 185-193.

BRANCH, T.A.; HILBORN, R.; BOGAZZI, E. (2005). Escaping the tyranny of the grid: a more realistic way of defining fishing opportunities. *Canadian Journal of Fisheries and Aquatic Sciences*, 62: 631-642.

BRAND, A.R.; PAUL, J.D.; HOOGESTEGER, J.N. (1980). Spat settlement of the scallops *Chlamys opercularis* (L.) and *Pecten maximus* (L.) on artificial collectors. *Journal of the Marine Biological Association United Kingdom*, 60: 379-390.

BREEN, P.A.; KENDRICK, T.H. (1997). A model to evaluate fishing strategies for the Challenger scallop fishery. NIWA Client Report WLG97/36. pp 43 (Held in Library, NIWA, Greta Point, Wellington, New Zealand).

BREMEC, C. (2002). Informe Proyecto Vieira Patagónica (*Zygochlamys patagonica*). Informe Técnico Interno INIDEP N° 17, 20 de marzo de 2002.

BREMEC, C.; BREY, T.; LASTA, M.L.; VALERO, J.; LUCIFORA, L. (2000). *Zygochlamys patagonica* beds on the Argentinian shelf. Part I: Energy flow through the scallop bed community. *Archives of Fisheries Marine Research*, 48: 295-303.

BREMEC, C.; ECHEVERRIA, A. (2005). *Zygochlamys patagonica* fishery in the Argentine Sea. Invertebrates by-catch: a preliminary review on lifespans of taxa. In: Glaciar Pesquera S.A. Technical Report to OIA, Chapter 2.7. pp 23.

BREMEC, C.; LASTA, M. (1997). Macrobenthic bycatch associated with the scallop (*Zygochlamys patagonica* King & Broderip, 1832) assemblage in the argentine continental shelf: a baseline study. 11th International Pectinid Workshop, 10-15 April 1997, La Paz, México: 138-139.

BREMEC, C.; LASTA, M. (1998). Experimental study on macrobenthic community structure of Patagonian scallops (*Zygochlamys patagonica* King & Broderip, 1832) beds affected by fishing disturbances. ICES Symposium on Marine Benthic Dynamics: Environmental and Fisheries Impacts. 5-7 October 1998, Creta, Greece: 42-43.

BREMEC, C.; LASTA, M. (1999). Effects of fishing on faunistic composition of scallop beds in the Argentine Sea. 12th International Pectinid Workshop, 5-11 May 1999, Bergen, Norway: 152-153.

BREMEC, C.; LASTA, M. (2000). Informe Proyecto Vieira Patagónica (*Zygochlamys patagonica*). Informe Técnico Interno INIDEP N° 114, 29 de diciembre de 2000.

BREMEC, C.; LASTA, M. (2001). Community structure of scallop beds subjected to fishing disturbance in the Argentine Sea. XIII International Pectinid Workshop, 18-24 April 2001, Coquimbo, Chile.

BREMEC, C.; LASTA, M. (2002). Epibenthic assemblage associated with scallop (*Zygochlamys patagonica*) beds in Argentina. *Bulletin of Marine Sciences*, 70: 89-106.

BREMEC, C.S.; LASTA, M.L.; HERNÁNDEZ, D. (2004). Survival of patagonic scallop (*Zygochlamys patagonica* King and Broderip, 1832) after size selection process onboard. *Fisheries Research*, 66: 49-52.

BREMEC, C.; LASTA, M.; LUCIFORA, L.; VALERO, J. (1998). Análisis de la captura incidental asociada a la pesquería de vieira patagónica (*Zygochlamys patagonica* King & Broderip, 1832). Informe Técnico INIDEP N° 22, 18 pp.

BREMEC, C.; MARECOS, A.; SCHEJTER, L.; LASTA, M. (2003). Guía técnica para la identificación de invertebrados epibentónicos asociados a bancos de vieira patagónica (*Zygochlamys patagonica*) en el Mar Argentino. Publicaciones Especiales INIDEP, Mar del Plata. pp 28.

BREMEC, C.; SCHEJTER, L.; GIBERTO, D. (2001). Vieira Patagónica. Unidad Norte de Manejo - CTMFM. Evaluación de biomasa fauna acompañante año 2001. Informe Técnico Interno INIDEP N° 14, 17 de abril de 2001.

BREMEC, C.; SCHEJTER, L.; MARECOS, A. (2002). Vieira Patagónica. Unidades de Manejo Sur y Norte. Evaluación de biomasa fauna acompañante año 2002. Informe Técnico Interno INIDEP N° 002-03, 9 de diciembre de 2002.

BRUNETTI, N.; IVANOVIC, M.; AUBONE, A.; ROSSI, G. (2000) Calamar. In: Bezzi, S., Akselman, R. and Boschi, E. (eds.). Síntesis del estado de las pesquerías marítimas argentinas y de la Cuenca del Plata. Años 1997-1998, con una actualización de 1999. INIDEP, Mar del Plata, Argentina. pp: 104-116.

CALVO, J.; MORRICONI, E.; ORLER, P. (1998). Estrategias reproductivas de moluscos bivalvos y equinoideos. In: Boschi, E. (ed.). El Mar Argentino y sus Recursos Pesqueros, volumen 2: 195-231. INIDEP, Mar del Plata, Argentina.

CAMPODÓNICO, S. (2004a). Informe de Campaña OB-03-04. Vieira Patagónica: Prospección en aguas nacionales en zona lindante al Golfo San Jorge. INIDEP, Mar del Plata, Argentina.

CAMPODÓNICO, S. (2004b). Informe de Campaña CC-11-2004. Vieira Patagónica: Unidad Sur de Manejo. Bancos San Blas, SWSAO, Valdés, Tango B y SW Tango B. INIDEP, Mar del Plata, Argentina.

CAMPODÓNICO, S.; LASTA, M. (2002). Informe de campaña CC-05-2002. Evaluación de biomasa de vieira Patagónica. Unidad Sur de Manejo: bancos San Blas, SWSAO, Valdés, Tango B, SW-Tango B y Fuera Unidad Sur de Manejo. Complementariamente: Estación Fija Banco Reclutas. Informe Técnico Interno INIDEP N° 20, 17 de abril de 2002.

CAMPODÓNICO, S.; LASTA, M. (2004). Informes de Campañas CC-13-2004 y CC-15-2004. Evaluación de Biomasa de Vieira Patagónica. Unidad Norte de Manejo: Bancos Reclutas, MDQ y Área "a". INIDEP, Mar del Plata, Argentina.

CAMPODÓNICO, S.; MACCHI, G.; LASTA, M. (2001a). Ciclo reproductivo de la vieira patagónica *Zygochlamys patagonica* (King & Broderip, 1832) en el Banco

Reclutas, Argentina. 2001. Informe Técnico Interno INIDEP N° 80, 5 de octubre de 2001.

CAMPODÓNICO, S.; MACCHI, G.; LASTA, M. (2001b). Reproductive cycle of the patagonic scallop *Zygochlamys patagonica* (King & Broderip, 1832) in Reclutas Bed, Argentina. XIII International Pectinid Workshop, 18-24 April 2001, Coquimbo, Chile.

CAMPODÓNICO, S.; MACCHI, G.; LASTA, M. (2002). Hermafroditismo en la vieira patagónica *Zygochlamys patagonica* (King & Broderip, 1832) en el Banco Reclutas, Argentina. Informe Técnico Interno INIDEP N° 5, 1 de febrero de 2002.

CAMPODÓNICO, S.; MACCHI, G.; LASTA, M. (2004). Gonocorismo en la Vieira Patagónica *Zygochlamys patagonica* (King y Broderip, 1832) en el banco Reclutas, Argentina. *Revista Investigación y Desarrollo Pesquero* N° 16. pp: 7.

CARRETO, J.I.; CARIGNAN, M.O.; CUCCHI COLLEONI, A.D.; DE MARCO, S.G. (1995) Hydrography and chlorophyll-*a* in a transect from the coast to the shelf-break in the Argentinian Sea. *Continental Shelf Research*, 15: 315-336.

CARRETO, J.I.; LASTA, M.L.; NEGRI, R.M.; GLORIOSO, P.D. (1981). Los fenómenos de Marea Roja y toxicidad de moluscos bivalvos en el Mar Argentino. In: Angelesku, V. (ed.). Campañas de investigación pesquera realizadas en el Mar Argentino por los B/I “Shokay Maru” y “Walter Herwig” y B/P “Maburg”, años 1978 y 1979. Resultados de la parte Argentina. INIDEP, Mar del Plata, Argentina. Contribución 399, 20 pp.

CASTELLANOS, Z. (1982). Los moluscos de las campañas del “Shinkai Maru”. *Neotropica*, 28: 41-46.

CHALLENGER SCALLOP ENHANCEMENT COMPANY LIMITED. (2005). Southern Scallop Fishery Draft Fisheries Plan. Nelson, New Zealand. pp 30.

CIOCCO, N.; LASTA, M.; BREMEC, C. (1998). Pesquerías de bivalvos: mejillón, vieiras (tehuelche y patagónica) y otras especies. In: Boschi, E. (ed.). El Mar Argentino y sus recursos pesqueros, volumen 2: 143-166. INIDEP, Mar del Plata, Argentina.

CIOCCO, N.F.; LASTA, M.L.; NARVARTE, M.; BREMEC, C.; BOGAZZI, E.; VALERO, J.; ORENSANZ, J.M. (2006). Argentina. In: Shumway, S.E.; Parsons, G.J. (eds.). *Scallops: Biology, Ecology and Aquaculture. Developments in Aquaculture and Fisheries Science* 35: 1251-1292. (2nd Edition). Elsevier (Amsterdam).

COLLIE, J.S.; ESCANERO, G.A.; VALENTINE, P.C. (1997). Effects of bottom fishing on the benthic megafauna of Georges Bank. *Mar. Ecol. Progr. Ser.* 155: 159–172.

COLLIE, J.S.; HALL, S.J.; KAISER, M.J.; POINER, I.R. (2000). A quantitative analysis of fishing impacts on shelf-sea benthos. *J. Anim. Ecol.* 69: 785–798.

COUSSEAU, M.B. (1997). Peces, crustáceos y moluscos registrados en el sector del Atlántico Sudoccidental comprendido entre 34° y 55° S, con indicación de las especies de interés pesquero. Informe Técnico INIDEP N° 5, noviembre.

COWEN, R.; PARIS, C.B.; OLSON, D.B.; FORTUNA, J.L. (2002). The role of long distance dispersal versus local retention in replenishing marine populations. *Gulf and Caribbean Research*, 14 (2): 129-137.

CRANFIELD, H.J. (1984). Study of the Scallop *Patinopecten yessoensis*. Larval rearing in Japan and Canada. Larval sampling and spatfall prediction in Mutsu Bay Japan. Fisheries Research Division Internal Report. 12. (held in library, NIWA, Greta Point, Wellington NZ). pp 22.

CRANFIELD, H.J.; CARBINES, G.; MICHAEL, K.P.; DUNN, A.; STOTTER, D.R.; SMITH, D.J. (2001). Promising signs of regeneration of blue cod and oyster habitat changed by dredging in Foveaux Strait, southern New Zealand. *New Zealand Journal of Marine and Freshwater Research* 35: 897–908.

CRANFIELD, H.J.; MANIGHETTI, B.; MICHAEL, K.P.; HILL, A. (2003). Effects of oyster dredging on the distribution of bryozoan biogenic reefs and associated sediments in Foveaux Strait, southern New Zealand. *Continental Shelf Research*, 23: 51-60.

CRANFIELD, H.J.; MICHAEL, K.P.; DOONAN, I.J. (1999). Changes in the distribution of epifaunal reefs and oysters during 130 years of dredging for oysters in Foveaux Strait, southern New Zealand. *Aquatic Conservation: Marine and Freshwater Ecosystems*, 9: 461-483.

CRANFIELD, H.J.; ROWDEN, A.A.; SMITH, D.J.; GORDON, D.P.; MICHAEL, K.P. (2004). Macrofaunal assemblages of benthic habitat of different complexity and the proposition of a model of biogenic habitat regeneration in Foveaux Strait, New Zealand. *Journal of Sea Research* 52: 109–125.

CUCCHI COLLEONI, A.D.; CARRETO, J.I. (2001). Variación estacional de la biomasa fitoplanctónica en el Golfo San Jorge. Resultados de la campaña de invierno OB01/00, OB03/00, OB07/00 y OB10/00. INIDEP, Mar del Plata, Argentina. 30 pp.

DEFEO, O.; BRAZEIRO, A. (1994). Distribución, estructura poblacional y relaciones biométricas de la vieira *Zygochlamys patagonica* en aguas uruguayas. *Comunicaciones de la Sociedad Malacológica del Uruguay*, 7: 362-367.

DEFEO, O.; GUTIERREZ, N. (2003). Geographical patterns in growth estimates of the scallops *Zygochlamys patagonica*, with emphasis in uruguayan waters. *Journal of Shellfish Research*, 22: 643-646.

DELL, R.K. (1964). Antarctic and Subantarctic mollusca: Amphineura, Scaphopoda and Bivalvia. In: Discovery Reports. Natural Environmental Research Council. Institute of Oceanographic Sciences (1970). pp: 177-179.

DUPAUL, W.; SMOLOWITZ, R. (1994). A report on the field investigation into commercial potential of the Patagonian scallop, *Chlamys* sp. off Uruguay. BIVAR S.A., unpublished technical report. pp 22.

ERNST, B.; VALERO J. (2004). Are equilibrium-derived estimators good for stock assessment in data-poor situations? Wakefield Symposium. September 2003, Anchorage, Alaska.

FOURNIER, D.A.; SIBERT, J.R.; MAJKOWSKI, J.; HAMPTON, J. (1990). MULTIFAN a likelihood-based method for estimating growth parameters and age composition from multiple length frequency data sets illustrated using data for southern bluefish tuna (*Thunnus maccoyii*). *Canadian Journal of Fisheries and Aquatic Sciences*, 47: 301-317.

FROESE, R. (2004). Keep it simple: three indicators to deal with overfishing. *Fish and Fisheries*, 5 (1): 86-91.

GARCÍA, J.; ERCOLI, R. (1996). Análisis dinámico-teórico aproximado del funcionamiento de una red de arrastre para Vieira y estimación de su abertura horizontal para distintos niveles de carga. Informe Técnico Interno INIDEP N° 102. pp 6.

GARZOLI, S.L.; GIULIVI, C. (1994). What forces the variability of the southwestern Atlantic boundary currents? *Deep-Sea Research*, 41: 1527-1550.

GERPE, M.; AIZPUN DE MORENO, J.; MORENO, V. (1995). Distribución de metales pesados en *Chlamys lischkei*. Congreso Latinoamericano Ciencias del Mar, 23-27 October 1995, Mar del Plata, Argentina. (Summary)

GLORIOSO, P.; FLATHER, R. (1995). A barotropic model of the currents off SE South America. *Journal of Geophysical Research*, 100: 13427-13440.

GORDON, A.L. (1989). Brazil-Malvinas Confluence 1984. *Deep-Sea Research*, 36: 359-384.

GUTIÉRREZ, N.; DEFEO, O. (2002). Development of a new scallop *Zygochlamys patagonica* fishery in Uruguay: latitudinal and bathymetric patterns in biomass and population structure. *Fisheries Research*, 1480: 1-16.

HALL, S.J.; MAINPRIZE, B.M. (2005). Managing by-catch and discards: how much progress are we making and how can we do better? *Fish and Fisheries* 6: 134–155.

HARRINGTON, J.M.; MYERS, R.T.A.; ROSENBERG, A.A. (2005). Wasted fishery resources: discarded by-catch in the USA. *Fish and Fisheries* 6: 350–361.

HART, D.R. (2003). Yield- and biomass-per-recruit analysis for rotational fisheries, with an application to the Atlantic sea scallop (*Placopecten magellanicus*). *Fishery Bulletin*, 101: 44-57.

HEILMAYER, O. (2003). Environment, adaptation and evolution: scallop ecology across the latitudinal gradient. Doctoral Thesis, University of Bremen, Bremen, Germany. pp 157.

HEILMAYER, O.; BREY, T.; BREMEC, C.; LASTA, M.; ARNTZ, W.; VALERO, J. (2001). Why are there no Patagonic scallops (*Zygochlamys patagonica*) north of the Río de la Plata estuary? XIII International Pectinid Workshop, 18-24 de April 2001, Coquimbo, Chile.

HOUGHTON, R.W.; FLAGG, C.N.; PIETRAFESA, L.J. (1994). Shelf-slope frontal structure, motion and eddy heat flux in the southern Middle Atlantic Bight. *Deep-Sea Research II*, 41: 273-306.

INMAN, D.L.; NORDSTROM, C.E.; FLICK, R.E. (1976). Currents in Submarine Canyons: An air-sea-land interaction. *Annual Review of Fluid Dynamics*, 8: 275–310.

IRIBARNE, O.O.; LASTA, M.; VACAS, H.; PARMA, A.M.; PASCUAL, M.S. (1991). Assessment of abundance, gear efficiency and disturbance in a scallop dredge fishery: results of a depletion experiment. In: Shumway, S.E. and Sandifer, P.A. (eds.). *Scallop Biology and Culture*. The World Aquaculture Society, Selected Papers from the 7th International Pectinid Workshop, National Shellfisheries Association. The World Aquaculture Society, Parker Coliseum, Louisiana State Univ. (Baton Rouge): 244-248.

JOLL, L.M.; PENN, J.W. (1990). The application of high-resolution navigation systems to Leslie-DeLury depletion experiments for the measurement of trawl efficiency under open-sea conditions. *Fisheries Research*, 9: 41-55.

KLAPPENBACH, M.A. (1970). *Chlamys liskei* (Dunker 1850) tiene prioridad sobre *Chlamys patariae* (Doello-Jurado 1919) (Pelecypoda). *Notas Malacológicas II. Comunicaciones Zoológicas del Museo de Historia Natural de Montevideo*, 132 (X): 1-6.

LASTA, M. (1992). *Chlamys patagonica*: resultados del primer crucero de pesca experimental. 9° Simposio Científico de la Comisión Técnica Mixta del Frente Marítimo, 30 Nov. - 3 Dec. 1992, Mar del Plata, Argentina. pp 13. (Summary)

LASTA, M. (1996). DNI 052, 31-01-96. Solicitud de requerimientos para el estudio de la pesquería. INIDEP, Mar del Plata, Argentina.

LASTA, M. (1996). DNI 1062, 05-09-96. Pesquería de Vieira Patagónica. Banco SWSAO. Estimación del área del banco y área barrida realizada. INIDEP, Mar del Plata, Argentina.

LASTA, M. (1997a). Estadísticas de desembarco de callo de vieira patagónica (*Zygochlamys patagonica*) durante la temporada de pesca 1996 (1/1/96 al 31/12/96). Informe Técnico Interno INIDEP N° 16, 08 de febrero de 1997.

LASTA, M. (1997b). Estimación de capturas de vieira patagónica realizadas durante 1996. Informe Técnico Interno INIDEP N° 19, 20 de febrero de 1997.

LASTA, M. (1997c). Plan de manejo de la pesquería de vieira patagónica (*Zygochlamys patagonica*). Informe Técnico Interno INIDEP N° 48, 20 de mayo de 1997.

- LASTA, M.** (1997d). Pesquería de Vieira Patagónica: desembarques de callo enero-julio 1997. Informe Técnico Interno INIDEP N° 90, 13 de agosto de 1997.
- LASTA, M.** (1997e). Vieira Patagónica. Consideraciones sobre la evolución de la pesquería. Agosto de 1997. Informe Técnico Interno INIDEP N° 93, 28 de agosto de 1997.
- LASTA, M.** (1997f). Esquema de rotación de bancos de vieira patagónica para 1998. Informe Técnico Interno INIDEP N° 127, 10 de noviembre de 1997.
- LASTA, M.** (1998a). Ficha Técnica: *Zygochlamys patagonica*. Informe Técnico Interno INIDEP N°9, 03 de febrero de 1998.
- LASTA, M.** (1998b). Pesquería de vieira patagónica: 1997. Informe Técnico Interno INIDEP N° 16, 12 de febrero de 1998.
- LASTA, M.** (1998c). Nivel de captura 1998. Informe Técnico Interno INIDEP N° 19, 16 de febrero de 1998.
- LASTA, M.** (1998d). PPAM 070, 27-03-98. Plan de actividades: BP Erin Bruce. Muestreo pre-evaluación. INIDEP, Mar del Plata, Argentina.
- LASTA, M.** (1998e). Captura de vieira patagónica durante 1997. Informe Técnico Interno INIDEP N° 53, 08 de mayo de 1998.
- LASTA, M.** (1998f). PPAM 39, 11-06-98. Nota solicitando embarque de Observador en BP A. Surf I en respuesta a nota DNPYA 700/98 sobre incidencia de captura de vieira en zona de veda merluza. INIDEP, Mar del Plata, Argentina.
- LASTA, M.** (1998g). PPAM 51, 26-06-98. Nota sobre Plan de Manejo sobre reunión mantenida con Dirección de Pesca y Empresas. INIDEP, Mar del Plata, Argentina.
- LASTA, M.** (1998h). DNI 825, 11-09-98. Nota remitiendo datos de base logrados en la CC-11/98 a las empresas. INIDEP, Mar del Plata, Argentina.
- LASTA, M.** (1998i). Informe de Campaña “CC 14 - 1998” Estación Fija Banco Reclutas 1-1998. Informe Técnico Interno INIDEP N° 135. 08 de noviembre de 1998.
- LASTA, M.** (1998j). Informe de Campaña “CC 17-98” Estación Fija Banco Reclutas 11-1998. Provisión de semilla de mejillón. Provincia de Buenos Aires. Informe Técnico Interno INIDEP N° 141, 24 de noviembre de 1998.
- LASTA, M.** (1998k). Informe de Campaña “CC 17 - 1998”, Estación Fija Banco Reclutas 12-1998, Provisión de Semilla de Mejillón Provincia de Buenos Aires. Informe Técnico Interno INIDEP N° 150, 23 de diciembre de 1998.
- LASTA, M.** (1999a). DNI 78, 12-02-99. Recurso vieira patagónica en Zona Común de Pesca del Frente Marítimo. INIDEP, Mar del Plata, Argentina.

LASTA, M. (1999b). Informe de Campaña “CC 02-99” Estación Fija Banco Reclutas de Vieira Patagónica. Prospección de semilla de mejillón, Provincia de Buenos Aires. Informe Técnico Interno INIDEP N° 10, 26 de febrero de 1999.

LASTA, M. (1999c). DNI 224, 09-04-99. Nivel de captura de vieira patagónica (*Zygochlamys patagonica*) 1999. INIDEP, Mar del Plata, Argentina.

LASTA, M. (1999d). DNI 260, 28-04-99. Sugerencia cierre de área en SWSAO. INIDEP, Mar del Plata, Argentina.

LASTA, M. (1999e). Informe de Campaña “CC 07-1999” Estación Fija Banco Reclutas de vieira patagónica. Prospección de semilla de mejillón. Provincia de Buenos Aires. Informe Técnico Interno INIDEP N° 70, 18 de junio de 1999.

LASTA, M. (1999f). PD 50, 22-06-99. Estado de la pesquería de Vieira Patagónica.

LASTA, M. (1999g). Informe de Campaña CC 08-99. Vieira Patagónica-Unidad Sur de Manejo. Informe Técnico Interno INIDEP N° 77.

LASTA, M. (1999h). Informe de Campaña “CC 09-1999” Estación Fija Banco Reclutas de Vieira Patagónica. Informe Técnico Interno INIDEP N° 83, 05 de agosto de 1999.

LASTA, M. (1999i). Determinación de polígonos que integran Bancos de pesca de vieira patagónica (*Zygochlamys patagonica*) en las Unidades Norte y Sur de Manejo. Informe Técnico Interno INIDEP N° 89, 18 de agosto de 1999.

LASTA, M. (1999j). DNI 621, 02-09-99. Rendimiento de callo.

LASTA, M. (1999k). Mesa de Entradas INIDEP N° 112-99. BP Holberg de Bandera Uruguay en Unidad Norte de Manejo.

LASTA, M. (1999l). Informe de Campaña “CC 11-99” Estación Fija Banco Reclutas Vieira Patagónica. Informe Técnico Interno INIDEP N° 197, 18 de octubre de 1999.

LASTA, M. (1999m). Informe de Campaña “CC 15-99” Estación Fija Banco Reclutas de Vieira Patagónica. Informe Técnico Interno INIDEP N° 118, 24 de noviembre de 1999.

LASTA, M. (1999n). Informe de Campaña “CC 18-99” Estación Fija Banco Reclutas de Vieira Patagónica. Informe Técnico Interno INIDEP N° 127, 23 de diciembre de 1999.

LASTA, M. (2000a). Vieira patagónica (*Zygochlamys patagonica*). In: Bezzi S, Akselman, R. and Boschi, E. (eds.). Síntesis del estado de las pesquerías marítimas argentinas y de la cuenca del Río de la Plata, años 1997-1998, con una actualización de 1999. INIDEP, Mar del Plata, Argentina: 165-170.

LASTA, M. (2000b). DNI 99, 15-02-00. Informe de campaña CC-02-2000. Estación fija Banco Reclutas de Vieira Patagónica. INIDEP, Mar del Plata, Argentina.

- LASTA, M.** (2000c). DNI 181, 10-03-00. Informe de Campaña CC-06-2000. Evaluación de Biomasa de Vieira Patagónica. Unidad Sur de Manejo: bancos San Blas, SWSAO, Valdés, Tango B y SW Tango B. Complementariamente: Estación Fija Banco Reclutas. INIDEP, Mar del Plata, Argentina.
- LASTA, M.** (2000d). DNI 256, 27-3-00. Informe de Campaña CC-08-00. Estación Fija Banco Reclutas, vieira patagónica (*Zygochlamys patagonica*). INIDEP, Mar del Plata, Argentina.
- LASTA, M.** (2000e). DNI 383, 27-04-00. Informe de Campaña CC-10-00. Evaluación de vieira patagónica (*Zygochlamys patagonica*) en el Frente Común de Pesca Argentino-Uruuguayo. Año 2000. INIDEP, Mar del Plata, Argentina.
- LASTA, M.** (2000f). DNI 428, 08-05-00. Informe de Campaña CC-12-00. Estación Fija Banco Reclutas (Mayo-2000). Vieira Patagónica (*Zygochlamys patagonica*). INIDEP, Mar del Plata, Argentina.
- LASTA, M.** (2000g). DNI 502, 05/07/00. Informe de Campaña CC-18-00. Estación Fija Banco Reclutas (Junio 2000). Vieira Patagónica (*Zygochlamys patagonica*). INIDEP, Mar del Plata, Argentina.
- LASTA, M.** (2000h). DNI 610, 27-07-00. Informe de Campaña CC-20-2000. Estación Fija Banco Reclutas (Julio 2000). Vieira Patagónica (*Zygochlamys patagonica*). INIDEP, Mar del Plata, Argentina.
- LASTA, M.** (2000i). DNI 719, 29-08-00. Informe de Campaña CC-24-2000 (Agosto 2000). Golfo San Jorge. Convenio de Cooperación Empresa Shellfish-INIDEP. Vieira Patagónica (*Zygochlamys patagonica*). INIDEP, Mar del Plata, Argentina.
- LASTA, M.** (2000j). DNI 728, 01-09-00. Informe de Campaña CC-24-2000. Estación Fija Banco Reclutas (Agosto 2000). Vieira Patagónica (*Zygochlamys patagonica*). INIDEP, Mar del Plata, Argentina.
- LASTA, M.** (2000k). Evaluación de Biomasa CC-24-2000. Vieira patagónica (*Zygochlamys patagonica*). Convenio INIDEP-Shellfish S.A. Golfo San Jorge (Pcia. De Santa Cruz). Informe Técnico Interno INIDEP N° 70, 1 de septiembre de 2000.
- LASTA, M.** (2000l). DNI 833, 07-11-00. Informe de Campaña CC-31-2000. Estación fija Banco Reclutas (31 de octubre al 2 de noviembre 2000). Vieira Patagónica (*Zygochlamys patagonica*). INIDEP, Mar del Plata, Argentina.
- LASTA, M.** (2000l). DNI 877, 30-11-00. Informe de Campaña CC-36-2000. Estación Fija Banco Reclutas (27 al 29 de noviembre 2000). Vieira Patagónica (*Zygochlamys patagonica*). INIDEP, Mar del Plata, Argentina.
- LASTA, M.** (2000m). DNI 897, 26-12-00. Informe de Campaña CC-39-2000. Estación Fija Banco Reclutas (18 al 20 de diciembre 2000). Vieira Patagónica (*Zygochlamys patagonica*). INIDEP, Mar del Plata, Argentina.

LASTA, M. (2001a). DNI 16, 19-01-01. Informe de Campaña CC-02-2001. Estación Fija Banco Reclutas (17 al 19 de enero de 2001). Vieira patagónica (*Zygochlamys patagonica*). INIDEP, Mar del Plata, Argentina.

LASTA, M. (2001b). PD, 08-03-01. Informe Conjunto de Campaña INIDEP-INAPE. Evaluación de Vieira Patagónica (*Zygochlamys patagonica*) en el Frente Común de Pesca Argentino-Uruguayo. Año 2001. INIDEP, Mar del Plata, Argentina.

LASTA, M. (2003a). Informe de Campaña. *Zygochlamys patagonica*. Unidad Sur de Manejo 2003. Campaña CC – 02 – 03. INIDEP, Mar del Plata, Argentina.

LASTA, M. (2003b). Plan de Campaña. Evaluación de vieira patagónica (*Zygochlamys patagonica*). Unidad Norte de Manejo 2003. Bancos Reclutas, MDQ y Area “a”. INIDEP, Mar del Plata, Argentina.

LASTA, M. (2003c). Informe de Campaña CC – 07 – 2003. Evaluación de biomasa de vieira patagónica. Unidad Norte de Manejo: Bancos Reclutas, MDQ y Area “a”. INIDEP, Mar del Plata, Argentina.

LASTA, M. (2005). Expansion of the INIDEP researches in catch zones. In: Glaciar Pesquera S.A. Technical Report to OIA, Chapter 3, pp 3.

LASTA, M.; BOGAZZI, E. (2000). Unidades de Manejo: la necesidad de asumir el control de las unidades espaciales. Funcionamiento de la Flota, Captura y Desembarque de callo de Vieira patagónica (*Zygochlamys patagonica*) durante el año 1999. BP Holberg de bandera uruguaya. Informe Técnico Interno INIDEP N° 44, 2 de junio de 2000.

LASTA, M.; BOGAZZI, E.; BREMEC, C. (2001a). Development and present state of the scallop fishery (*Zygochlamys patagonica*) in the argentine sea. XIII International Pectinid Workshop, 18-24 April 2001, Coquimbo, Chile.

LASTA, M.; BOGAZZI, E.; CAMPODÓNICO, S. (2001b). Vieira patagónica (*Zygochlamys patagonica*), funcionamiento de la flota, captura y desembarco de callo durante el año 2000. Actividad del BP Holberg de bandera uruguaya. Informe Técnico Interno INIDEP N° 25, 11 de mayo de 2001.

LASTA, M.; BOGAZZI, E.; CAMPODÓNICO, S. (2001c). Capacidad bisógena y natatoria de la vieira patagónica (*Zygochlamys patagonica*). 2001. Informe Técnico Interno INIDEP N° 57, 17 de julio de 2001.

LASTA, M.; BOGAZZI, E.; CAMPODÓNICO, S. (2002a). Vieira patagónica (*Zygochlamys patagonica*), funcionamiento de la flota, captura y desembarco de callo durante el año 2001. Actividad de la flota de bandera uruguaya. Informe Técnico Interno INIDEP N° 9, 20 de febrero de 2002.

LASTA, M.L.; BREMEC, C. (1995). Investigación sobre vieira patagónica (*Zygochlamys patagonica*). Informe Final D.N.I. INIDEP 1026: 49 pp.

LASTA, M.; BREMEC, C. (1997). *Zygochlamys patagonica* (King and Broderip, 1832): development of a new scallop fishery in the Southwestern Atlantic Ocean. 11th International Pectinid Workshop, 10-15 April 1997, La Paz, Mexico: 138-139.

LASTA, M.; BREMEC, C. (1998). *Zygochlamys patagonica* in the Argentine Sea: a new scallop fishery. *Journal of Shellfish Research*, 17: 103-111.

LASTA, M.; BREMEC, C. (1999a). Vieira patagónica (*Zygochlamys patagonica* King & Broderip, 1832): una nueva pesquería en la plataforma continental argentina. *Revista Investigación y Desarrollo Pesquero* N° 12: 5-18.

LASTA, M.; BREMEC, C. (1999b). Development of the scallop fishery (*Zygochlamys patagonica*) in the Argentine sea. 12th International Pectinid Workshop, 5-11 May 1999, Bergen, Norway: 154-155.

LASTA, M.; CAMPODÓNICO, S. (2003a). Resultados de la prospección y la pesca sobre concentraciones de Vieira tehuelche (*Aequipecten tehuelchus*) realizadas por la flota vieirera. Informe Técnico Interno INIDEP N° 7, 30 de enero de 2003.

LASTA, M.; CAMPODÓNICO, S. (2003b). Vieira patagónica (*Zygochlamys patagonica*), funcionamiento de la flota, captura y desembarco de callo durante el año 2002. Informe Técnico Interno INIDEP N° 23, 19 de marzo de 2003.

LASTA, M.; CAMPODÓNICO, S. (2004). Vieira patagónica (*Zygochlamys patagonica*), funcionamiento de la flota, captura y desembarco de callo durante el año 2003. Informe Técnico Interno INIDEP N° 19, 15 de marzo de 2004.

LASTA, M.; CAMPODÓNICO, S. (2005). Vieira Patagónica (*Zygochlamys patagonica*): actividad de la flota, captura y desembarco de callo durante el año 2004. Informe Técnico Interno INIDEP N° 12, 18 de febrero de 2005.

LASTA, M.; CAMPODÓNICO, S.; BOGAZZI, E. (2001d). Exploración de la distribución espacial de la actividad pesquera del BP HOLBERG sobre el recurso vieira patagónica en el Sector Argentino de la Zona Común de Pesca Argentino-Uruguaya (abril 1999 – agosto 2001). Informe Técnico Interno INIDEP N° 75, 17 de septiembre de 2001.

LASTA, M.; CIOCCO, N.; BREMEC, C.; ROUX, A. (1998a). Moluscos Bivalvos y Gasterópos. In: Boschi, E.E. (ed.). El Mar Argentino y sus Recursos Pesqueros. Tomo 2. Los Moluscos de interés pesquero. Cultivos y estrategias reproductivas bivalvos y equinoideos. INIDEP, Mar del Plata, Argentina. pp: 115-142.

LASTA, M.; HERNÁNDEZ, D. (1998a). Determinación del tamaño muestral para la estimación de la abundancia de vieira. Informe Técnico Interno INIDEP N° 62, 22 de mayo de 1998.

LASTA, M.; HERNÁNDEZ, D. (1998b). Evaluación de biomasa de vieira de talla comercial Campaña CC 11-98. Informe Técnico Interno INIDEP N° 118. 25 de septiembre de 1998.

LASTA, M.; HERNANDEZ, D. (1999a). Geostatistical techniques to estimate scallop (*Zygochlamys patagónica*) biomass and to evaluate associated uncertainty. Spatial Processes and Management of Fish Populations. XVII Lowell Wakefield Fisheries Symposium, 27-30 October 1999, Anchorage, Alaska, U.S.A. pp 13. (Summary)

LASTA, M.; HERNÁNDEZ, D. (1999b). Vieira Patagónica. Unidad Sur de Manejo. Evaluación de biomasa 1999. Informe Técnico Interno INIDEP N° 79, 15 de julio de 1999.

LASTA, M.; HERNÁNDEZ, D. (2000). Vieira Patagónica. Unidad Sur de Manejo. Evaluación de biomasa año 2000. Informe Técnico Interno INIDEP N° 12, 16 de marzo de 2000.

LASTA, M.; HERNÁNDEZ, D. (2002). Vieira Patagónica. Unidad Sur de Manejo. Evaluación de biomasa año 2002. Informe Técnico Interno INIDEP N° 26, 29 de abril de 2002.

LASTA, M.; HERNÁNDEZ, D.; BOGAZZI, E. (2000). Vieira Patagónica. Unidad Norte de Manejo - CTMFM. Evaluación de biomasa año 2000. Informe Técnico Interno INIDEP N° 38, 10 de mayo de 2000.

LASTA, M.L.; HERNÁNDEZ, D.; BOGAZZI, E.; BURGOS, G.; VALERO, J.; LUCIFORA, L. (2001e). Uso de técnicas geoestadísticas en la estimación de la abundancia de Vieira patagónica (*Zygochlamys patagonica*). *Revista Investigación y Desarrollo Pesquero* N° 14: 95-107.

LASTA, M.; HERNÁNDEZ, D.; BOGAZZI, E.; CAMPODÓNICO, S. (2002b). Vieira Patagónica. Unidad Norte de Manejo. Evaluación de biomasa año 2002. Informe Técnico Interno INIDEP N° 77, 6 de septiembre de 2002.

LASTA, M.; HERNÁNDEZ, D.; BREMEC, C. (1998b). Determinación del tamaño muestral para la estimación de la abundancia de vieira, incorporando la incertidumbre asociada con la evaluación del rendimiento de vieira en la captura. Informe Técnico Interno INIDEP N° 93, 29 de julio de 1998.

LASTA, M.; HERNÁNDEZ, D.; CAMPODÓNICO, S. (2003a). Vieira Patagónica. Unidad Sur de Manejo. Evaluación de biomasa año 2003. Informe Técnico Interno INIDEP N° 89, 11 de agosto de 2003.

LASTA, M.; HERNÁNDEZ, D.; CAMPODÓNICO, S. (2003b). Vieira Patagónica. Unidad Norte de Manejo. Evaluación de biomasa año 2003. Informe Técnico Interno INIDEP N° 126, 23 de diciembre de 2003.

LASTA, M.; HERNÁNDEZ, D.; CAMPODÓNICO, S. (2004a). Vieira Patagónica. Unidad Sur de Manejo. Evaluación de biomasa año 2004. Informe Técnico Interno INIDEP N° 74, 3 de agosto de 2004.

LASTA, M.; HERNÁNDEZ, D.; CAMPODÓNICO, S. (2004b). Vieira Patagónica. Unidad Norte de Manejo. Evaluación de biomasa año 2004. Informe Técnico Interno INIDEP N° 98, 4 de octubre de 2004.

LASTA, M.; HERNÁNDEZ, D.; CAMPODÓNICO, S. (2005). Vieira Patagónica, Unidad Sur de Manejo. Evaluación de biomasa año 2005. Informe Técnico Interno INIDEP N° 38, 30 de mayo de 2005.

LASTA, M.; IRIBARNE, O. (1997). Southwestern Atlantic Scallop (*Zygochlamys patagonica*) fishery: Assessment of gear efficiency through a depletion experiment. *Journal of Shellfish Research*, 16: 59-62.

LASTA, M.; LOPEZ, F.; GUERRERO, R.; BREMEC, C. (1998c). Distribución espacial de vieira patagónica (*Zygochlamys patagonica*) en la plataforma continental argentina: régimen oceanográfico y deriva larval. Resúmenes XIII Simposio Científico-Tecnológico, Comisión Técnica Mixta del Frente Marítimo, 23-25 November 1998, Mar del Plata, Argentina: 49-50.

LASTA, M.; ROUX, A.; BREMEC, C. (1997). Moluscos gasterópodos y bivalvos. In: Cousseau, M.B. (ed.). Peces, crustáceos y moluscos registrados en el sector del atlántico sudoccidental comprendido entre 34° y 55°, con indicación de las especies de interés pesquero. INIDEP, Informe Técnico 5: 63-96.

LASTA, M.; VALERO, J.; BREY, T.; BREMEC, C. (2001f). *Zygochlamys patagonica* beds on the Argentinian shelf. Part II: Population dynamics of *Z. Patagonica*. *Archive of Fishery and Marine Research*, 49: 125-137.

LASTA, M.; ZAMPATTI, E. (1981). Distribución de capturas de moluscos bivalvos de importancia comercial en el mar argentino. Resultados de las campañas de los B/I “Walther Herwig” y “Shinkai Maru”, años 1978 y 1979. INIDEP, Mar del Plata, Argentina. Contribución 383: 128-135.

LINK, J.S., ALMEIDA, F.P. (2002). Opportunistic feeding of longhorn sculpin (*Myoxocephalus octodecemspinosus*): are scallop fishery discards an important food subsidy for scavengers on Georges Bank? *Fishery Bulletin*, 100: 381-385.

LOPEZ, F. (1998). Caracterización oceanográfica de la Plataforma Continental Argentina entre los 40° y 48° de latitud sur: causalidad de la distribución espacial de bancos de vieira patagónica (*Zygochlamys patagonica* (King y Broderip, 1832). Tesis Lic. Cs. Biológicas, Universidad Nacional de Mar del Plata, Argentina. pp 44.

MADIROLAS, A.; LASTA, M.; TRÍPODE, M.; COLOMBO, A.; CAMPODÓNICO, S. (2005). Experiencias con la ecosonda multihaz SIMRAD EM1002 instalada a bordo del BIP Cap. Oca Balda (período 2004-2005): estudios sobre el hábitat de la vieira patagónica. Informe Técnico Interno INIDEP N° 84, 24 de octubre de 2005.

MANN, K.H. (1992). Physical influences on biological processes: how important are they? *South African Journal of Marine Science*, 12: 107-121.

MANN, K.H.; LAZIER, J.R.N. (1991). Dynamic of Marine Ecosystems. Boston: Blackwell Scientific Publications Inc., 466 pp.

- MCGARVEY, R.; SERCHUK, F.M.; MCLAREN, I.A.** (1993). Spatial and parentage analysis of stock-recruitment in the Georges Bank Sea Scallop (*Placopecten magellanicus*) population. *Canadian Journal of Fisheries and Aquaculture*, 50: 564-574.
- MICHAEL, K.P.; CRANFIELD, H.J.** (2001). A summary of the fishery, commercial landings, and biology of the New Zealand queen scallop, *Zygochlamys delicatula* (Hutton, 1873). *New Zealand Fisheries Assessment Report 2001-68*. pp 24.
- NATURAL RESOURCES CONSULTANT INC., Seattle, Washington.** (1995). A Plan for Development of a Scallop Fishery off Argentina. Prepared for Clearwater Fine Foods, Inc. 15 July 1995. Draft. pp 81.
- OLIVIER, S.; SCARABINO, V.** (1972). Distribución ecológica de algunos moluscos recogidos por la expedición del "Walther Herwig" (R.F.A.) al Atlántico Sudoccidental (1996). *Revista Brasileira de Biología*, 32(2): 235-247.
- OLSON, D.B.; PODESTA, G.P.; EVANS, R.H.; BROWN, O.B.** (1988). Temporal variations in the separation of Brazil and Malvinas Currents. *Deep-Sea Research*, 35: 1971-1990.
- ORELLANA, A.** (1979). Ostión de Magallanes *Chlamys (Zygochlamys)* patagónica (King & Broderip, 1832) Lamelibranquia, Anisomyaria, Pectinidae. Estado actual de las principales Pesquerías Nacionales: Moluscos. Inst. Fomento Pesquero, Chile. pp 20.
- ORENSANZ, J.M.; PARMA, A.M.; IRIBARNE, O.O.** (1991a). Population dynamics and management of natural stocks. In: Shumway, S.E. (ed.). *Scallops: Biology, Ecology and Aquaculture. Developments in Aquaculture and Fisheries* 21: 625-714. Elsevier, Amsterdam.
- ORENSANZ, J.M.; PARMA, A.M.; TURK, T.; VALERO, J.** (2006). Dynamics, Assessment and Management of Exploited Natural Population. In: Shumway, S.E.; Parsons, G.J. (eds.). *Scallops: Biology, Ecology and Aquaculture. Developments in Aquaculture and Fisheries Science* 35: 765-868. (2nd Edition). Elsevier (Amsterdam).
- ORENSANZ, J.M.; PASCUAL, M.; FERNANDEZ, M.** (1991b). Fisheries and Aquaculture: Argentina. In: Shumway, S.E. (ed.). *Scallops: Biology, Ecology and Aquaculture. Developments in Aquaculture and Fisheries* 21: 981-1000. Elsevier, Amsterdam.
- PAREDI, M.E.; CRUPKIN, M.** (2000). Propiedades bioquímicas y funcionales de actomiosina de músculo aductor de vieira (*Zygochlamys patagonica*). Almacenamiento a 2-4° C. Jornadas nacionales de Ciencias del Mar, 11-15 September 2000, Puerto Madryn, Argentina. pp 98. (Summary)
- PARKER, G.; PATERLINI, M.C.; VIOLANTE, R.A.** (1997). The sea floor. In: Boschi, E. (ed.). *El Mar Argentino y sus Recursos Pesqueros*, I. INIDEP, Mar del Plata, Argentina. pp: 65-88.

PENCHASZADEH, P.E.; ARRIGHETTI, F.; CLEDON, M.; LIVORE, J.P.; BOTTO, F.; IRIBANE, O. 2006. Bivalve contribution to shallow sandy bottom food web off Mar del Plata (Argentina): Inference from stomach contents and stable isotope analysis. *Journal of Shellfish Research*, 25: 51-54.

PINGREE, R.D.; PUGH, P.R.; HOLLIGAN, P.M.; FORSTER, G.R. (1975). Summer phytoplankton blooms and red tides along tidal fronts in the approaches to the English Channel. *Nature*, 258: 673-677.

PODESTA, G. (1997). Utilización de datos satelitarios en investigaciones oceanográficas y pesqueras en el Océano Atlántico Sudoccidental. In: Boschi, E. (ed.). El Mar Argentino y sus Recursos Pesqueros, I. INIDEP, Mar del Plata, Argentina. pp: 195-222.

RIESTRA, G. (2000). Análisis de la fauna acompañante asociada a la pesquería de *Zygochlamys patagonica* en aguas uruguayas. In: Rey, M. (ed.). Recursos Pesqueros no Tradicionales: Moluscos Bentónicos Marinos. INAPE/ PNUD (Uruguay), Technical Report: 153-157.

RIESTRA, G.; BAREA, L. (2000). La pesca exploratoria de la vieira *Zygochlamys patagonica* en aguas uruguayas. In: Rey, M. (ed.). Recursos Pesqueros no Tradicionales: Moluscos Bentónicos Marinos. INAPE/ PNUD (Uruguay), Technical Report: 145-152.

RIVAS, A.L. (1997). Current-meter observations in the Argentine Continental Shelf. *Continental Shelf Research*, 14: 1539-1554.

ROBERTS, C.M.; HAWKINS, J.P.; GELL, F.R. (2005). The role of marine reserves in achieving sustainable fisheries. *Philosophical Transactions of the Royal Society of London*, 360: 123-132.

SALVINI, L.; BARTOZZETTI, J.; IZZO, A. (1997). Análisis del funcionamiento de una red de arrastre para la captura de la especie vieira del BP Atlantic Surf I. Informe Técnico Interno INIDEP N° 86. pp 6.

SCHEJTER, L.; BREMEC, C.; AKSELMAN, R.; HERNANDEZ, D. (2000). Composición cualitativa de la dieta de *Zygochlamys patagonica* durante la primavera de 1996 en banco Reclutas (39° S – 55° W). IV Jornadas Nacionales de Ciencias del Mar, 11-15 September 2000, Puerto Madryn, Argentina. pp 114. (Summary)

SCHEJTER, L.; BREMEC, C.; AKSELMAN, R.; HERNANDEZ, D. (2001). Feeding of the patagonic scallop *Zygochlamys patagonica* (King & Broderip, 1832) in Reclutas Bed (39° S - 55° W). XIII International Pectinid Workshop, 18-24 April 2001, Coquimbo, Chile.

SCHEJTER L.; BREMEC, C.; AKSELMAN, R.; HERNANDEZ, D.; SPIVAK, E. (2002). Annual feeding cycle of the Patagonian scallop *Zygochlamys patagonica* (King and Broderip, 1832) in Reclutas bed (39° S – 55° W), Argentine Sea. *Journal of Shellfish Research*, 21: 553-559.

- SHEPARD, F.P.** (1965). Effect of submarine valleys on water masses and currents. *Oceanography from space*, 65: 243.
- SHEPARD, F.P.; MARSHALL, N.F.** (1973). Currents along the floors of submarine canyons. *American Association of Petroleum Geologists Bulletin*, 57: 244–264.
- SHEPARD, F.P.; SULLIVAN, G.G.; WOOD, F.J.** (1981). Greatly accelerated currents in a submarine canyon head during astronomical tide-producing conditions. *Shore and Beach Journal, Rockville. MD* 49: 32–34.
- SICARDI, O.; FIGUERAS, A.** (1971). Presencia de *Chlamys noronhensis* (E. A. Smith, 1885) en aguas uruguayas. *Comunicaciones de la Sociedad Malacológica del Uruguay*, Vol. III: 97-98.
- SILVA, R.; CALVO, J.** (1993). Patrones espacio-temporales de asentamiento larval de moluscos bivalvos en el Canal Beagle. Jornadas Nacionales de Ciencias del Mar, 19-25 September 1993, Puerto Madryn, Argentina. (Summary)
- STEVENS, P.M.** (1987). Response of excised gill tissue from the New Zealand scallop *Pecten novaezelandiae* to suspended silt. *New Zealand Journal of Marine and Freshwater Research*, 21: 605–614.
- TREMBLAY, M.J.; SINCLAIR, M.M.** (1992). Planktonic sea scallop larvae (*Placopecten magellanicus*) in the Georges Bank region: broadscale distribution in relation to physical oceanography. *Canadian Journal of Fisheries and Aquatic Sciences*, 49: 1597-1618.
- VALERO, J.** (1999). Variación estacional, espacial e interanual en el crecimiento de vieira patagónica (*Zygochlamys patagonica*) en la plataforma argentina. INIDEP, Mar del Plata, Argentina, IICA, Informe Final. pp 75.
- VALERO, J.** (2002). Analysis of Temporal and Spatial Variation in Growth and Natural Mortality Estimation with an Integrated Dynamic Model in the Patagonian Scallop (*Zygochlamys patagonica*). Thesis of Master of Science (School of Aquatic and Fishery Sciences, University of Washington, Seattle, USA).
- VALERO, J.; ERNST, B.; LASTA, M.; BOGAZZI, E.** (2001). An integrated dynamic model for estimating growth and natural mortality in *Zygochlamys patagonica*. XIII International Pectinid Workshop, 18-24 April 2001, Coquimbo, Chile.
- VALERO, J.; LASTA, M.; ARMSTRONG, D.** (2000). Temporal and spatial variation in growth in the Patagonian Scallop (*Zygochlamys patagonica*) in the Argentinean Continental Shelf. IV Jornadas Nacionales de Ciencias del Mar, 11-15 September 2000, Puerto Madryn, Argentina. (Summary)
- VALLADARES, C.; ANDRADE, S.** (1991). Estado actual de los bancos naturales de ostiones en los fiordos Brookes y S Palma. In: Andrade *et al.* (ed.). Estudios repoblamiento ostión del sur en XII^a Región de Magallanes, Chile. Cap 1. pp 28.

VALLADARES, C.; STOTZ, W. (1996). Crecimiento de *Chlamys patagonica* (Bivalvia: Pectinidae) en dos localidades de la Región de Magallanes, Chile. *Revista Chilena de Historia Natural*, 69: 321-338.

WALLER, T.R. (1991). Evolutionary relationships among commercial scallops (Mollusca: Pectinidae). In: Shumway, S.E. (ed.). *Scallops: Biology, Ecology and Aquaculture. Developments in Aquaculture and Fisheries* 21: 1-72. Elsevier, Amsterdam.

WALOSZEK, D. (1979). Untersuchungen zum Wachstum, zur Variabilität an *Chlamys*-Fängen des Fischerei-forschungsschiffes "Walther Herwig" des Jahres 1978 vom Argentinischen Schelf mit Klärung des systematischen Status, nebst einigen Angaben zur Biologie und möglichen kommerziellen Nutzbarkeit. Diplomarbeit im Fachbereich Biologie, Hamburg. pp 160.

WALOSZEK, D. (1984). Variabilität, taxonomie und Verbreitung von *Chlamys patagonica* (King & Broderip, 1832) und Abnerkungen zu weiteren *Chlamys*-Arten von der Südspitze Süd-Amerikas (Mollusca, Bivalvia, Pectinidae). *Verhandlungen naturwiss. Ver. Hamburg, (NF)* 27: 207-276.

WALOSZEK, D. (1991). *Chlamys patagonica* (King and Broderip, 1832), a long "neglected" species from the shelf off the Patagonian Coast. In: Shumway, S.E. and Sandlifer, P.A. (eds.). *An international compendium of Scallop Biology and Culture. Selected papers from the 7th International Pectinid Workshop, National Shellfisheries Association. The World Aquaculture Society, Parker Coliseum, Louisiana State Univ. (Baton Rouge):* 256-263.

WALOSZEK, D.; WALOSZEK, G. (1986). Ergebnisse der Forschungsreisen des FFS 'Walther Herwig' nach Südamerika, LXV. Vorkommen, Reproduktion, Wachstum und mögliche Nutzbarkeit von *Chlamys patagonica* (King & Broderip, 1832) (Bivalvia, Pectinidae) auf dem Schelf von Argentinien. *Arch. Fish. Wiss.*, 37: 69-99.

WOOD, L.; HARGIS, W.J.JR. (1971). Transport of bivalve larvae in a tidal estuary. In: Crisp, D.J. (ed.). *Fourth European Marine Biology Symposium*, 29-44. Cambridge University Press, Cambridge.

ZELAYA, D.; SCHEJTER, L. (2001). Shell composition of *Zygochlamys patagonica* (King & Broderip, 1832) along a latitudinal gradient. XIII International Pectinid Workshop, 18-24 April 2001, Coquimbo, Chile.

1.5.2 Operational Manuals

On Board Observers Manual – Instituto Nacional de Investigación y Desarrollo Pesquero (INIDEP). In preparation.

1.5.3 On Board Observers Programme – Final Trip Reports

Note. The numbers between brackets represent number of reports with the same date.

2000

15 de marzo
12 de mayo
12 de junio
27 de septiembre
28 de septiembre

2001

20 de junio
4 de abril
25 de junio
20 de julio
6 de agosto
3 de septiembre
22 de octubre

2002

28 de enero
14 de enero
5 de febrero
4 de abril
11 de abril
18 de abril
13 de mayo
11 de junio
24 de junio
28 de junio
2 de agosto
12 de agosto
26 de agosto
3 de septiembre
12 de septiembre
16 de septiembre
19 de septiembre (2)
23 de octubre
30 de octubre
14 de noviembre
27 de noviembre
6 de diciembre

2003

2 de enero (2)
28 de febrero
5 de marzo
19 de mayo
28 de mayo
23 de junio
17 de julio
15 de agosto
20 de agosto
28 de agosto
26 de septiembre
21 de octubre (2)
27 de octubre

30 de octubre (2)
 24 de noviembre
 17 de diciembre (2)

2004

11 de febrero
 12 de febrero
 10 de marzo
 31 de mayo (2)
 7 de junio
 11 de junio (2)
 3 de noviembre
 5 de noviembre
 24 de noviembre
 3 de diciembre
 9 de diciembre

2005

4 de enero (2)
 19 de enero
 20 de enero
 3 de febrero
 9 de febrero (3)
 18 de febrero
 24 de febrero

1.5.4 REDES National Fishing Industry Magazine

LASTA, M. (1996). Una nueva pesquería está en marcha and Callos de vieira. N° 89: 38-48.

LASTA, M. (1999). Vieiras. Un plan de manejo por cuatro años. N° 107: 20-25.

ANONIMO. (2000). Vieira (*Zygochlamys patagonica*). N° 112: 150-151

1.5.5 Laws, Resolutions and other Official Government Requirements (examples only)

- Régimen Federal de Pesca. Ley 24.922. Buenos Aires, 9 de Diciembre de 1997.
- Resolución 16/95. Ministerio de Economía y Obras y Servicios Públicos, Secretaría de Agricultura, Pesca y Alimentación, Buenos Aires, 28 de Diciembre de 1995.
- Resolución 150/96. Ministerio de Economía y Obras y Servicios Públicos, Secretaría de Agricultura, Pesca y Alimentación, Buenos Aires, 19 de Marzo de 1996.
- Disposición 17/99. Subsecretaría de Pesca y Acuicultura de la Nación, Buenos Aires, 17 de Marzo de 1999.
- Decreto 749/99. Poder Ejecutivo Nacional, Buenos Aires 14 de julio de 1999.
- Resolución 829/99. Secretaría de Agricultura, Ganadería, Pesca y Alimentación, Buenos Aires, 7 de Diciembre de 1999.
- Resolución 107/2001. Secretaría de Agricultura, Ganadería, pesca y Alimentación, Buenos Aires, 16 de Febrero de 2001.
- Resolución 4 y 5/2005. Consejo Federal Pesquero, Buenos Aires 5 de agosto de 2005.

- Ley 25675 – Ley General del Ambiente – Bien jurídicamente protegido.
- Ley 24375 – Aprobación del Convenio de la Diversidad Biológica.
- Decreto 1347/1997 – Autoridad de Aplicación de la Ley sobre Diversidad Biológica (creación de la CONADIBIO).
- Ley 23968 – Ley sobre espacios marítimos.
- Ley 22584 – Convención sobre conservación de los recursos marinos vivos antárticos.
- Ley 24608 – Apruébase un Acuerdo para promover el cumplimiento de las medidas internacionales de conservación y ordenación por los buques pesqueros que pescan en alta mar.
- Ley 18398 – Prefectura Naval Argentina. Misión y funciones.
- Ley 24051 – Residuos peligrosos.
- Ley 22421 – Conservación de la Fauna.
- Decreto 522/1997 – Especies amenazadas de fauna y flora silvestre.
- Ley 25577 – Prohíbese la caza de cetáceos en todo el territorio nacional, comprendiendo este el mar territorial, la zona económica exclusiva y sus aguas interiores.
- Ley 25052 – Prohibición de cazar orcas en territorio nacional.

WEB SITES

- Consejo Federal Pesquero (CFP): www.cfp.gov.ar
- Secretaría de Agricultura, Ganadería, Pesca y Alimentación (SAGPyA): www.sagpya.gov.ar
- Honorable Senado de la Nación: www.senado.gov.ar
- Honorable Cámara de Diputados de la Nación: www.diputados.gov.ar
- Información legislativa del Ministerio de Economía y Producción: www.infoleg.gov.ar
- Instituto Nacional de Investigación y Desarrollo Pesquero (INIDEP): www.inidep.edu.ar
- Centro en Defensa de la Pesca (CeDePesca): www.cedepesca.org.ar
- Fundación Vida Silvestre Argentina (FVSA): www.vidasilvestre.org.ar

1.6 PREVIOUS ASSESSMENTS

No previous certification evaluations have been carried out for this fishery.

1.7 KEY ISSUES FOR THE ASSESSMENT

The Assessment Team found abundant information on the target species, some non-target species, fishing activities and the management system. The Total Allowable Catch recommended by INIDEP at the end of 1995 was approximately 50.000 tons of entire scallops, for capture by four factory vessels. SAGPyA following the advice of INIDEP, decided to authorize that number of vessels. There are two companies with 2 vessels each in the fishery. It is a new fishery (10 years old), with its technical development led by the scientific personal of INIDEP supported by the FFC, and the two fishing companies. As a result a study of the most relevant aspects related to commercial fishing and the establishment of a solid management system have been feasible.

Nevertheless, the Assessment Team considers that some aspects related to research and management system, could be improved. These are discussed in more detail in Section 6 “Assessment Team Evaluation”, where conditions and recommendations decided during the assessment process are established, together with the rationales for any decision about the assessment of the fishery against the MSC Principles and Criteria.

2 THE PATAGONIAN SCALLOP FISHERY

A short description of the Patagonian scallop fishery assessed in this report, aspects of its biology and ecology and environmental features, is provided in this section. This is general in nature, since a good deal of this information is discussed more fully in Section 6 Assessment Team Performance Evaluations.

The Target Species

The Patagonian scallop (*Zygochlamys patagonica*, King and Broderip, 1832; Figure 1) appears to be the dominant species of the benthic ecosystem of the beds located on the Argentine Continental Shelf (See Bremec *et al.*, 2000). It is the target species for a new small fishery limited to two Argentine registered companies, each with two factory trawl vessels (Figure 2 A, B), which operate year round.



Figure 1. Patagonian scallop (*Zygochlamys patagonica*, King and Broderip, 1832).

A.



B.



Figure 2 A, B. The vessel “Atlantic Surf III”, Glaciar Pesquera S.A.

A.





Figure 3 A, B. On board catch.

Commercial populations are mainly found along the shelf-break frontal system at a depth of approximately 100 meters in zones with the highest concentrations of plankton (See Bogazzi *et al.*, 2005).

2.1 BIOLOGICAL AND ECOLOGICAL ASPECTS OF PATAGONIAN SCALLOP

The Patagonian scallop, *Zygochlamys patagonica* is distributed from 42° S in the Pacific to 35° S in the Atlantic, between 40 to 200 m depth (Lasta and Zampatti, 1981; Waloszek and Waloszek, 1986; Defeo and Brazeiro, 1994). It inhabits soft bottom, mainly muddy-sandy substrates. Studies on reproduction indicate that sexes are separate (Waloszek and Waloszek, 1986; Campodónico *et al.*, 2004) and that the sex ratio is not significantly different from 1:1 (Campodónico *et al.*, 2001b). Sexual maturity is reached at 45 mm shell height, at approximately 2 years of age (Waloszek and Waloszek, 1986). Gametes are emitted in two pulses during spring and late summer to early autumn. The spring pulse is the largest (Waloszek and Waloszek, 1986).

Estimated asymptotic height ranges between 53 – 90 mm (Waloszek and Waloszek, 1986; Orensanz *et al.*, 1991; Lasta *et al.*, 1998a). There is a significant decrease in asymptotic height as latitude increases. Maximum shell growth rates in *Zygochlamys patagonica* were found between June and end of August (winter) whereas tissue growth rates were maximum during spring. Seasonal variations in temperature have been reported as one of the processes that lead to shell growth reduction (the bottom temperatures are 1-2°C higher in winter than in summer). Food availability may also be responsible for decreasing rates of growth. *Zygochlamys patagonica* is a filter-feeding species, mainly ingesting phytoplankton. The period of high cell abundance in gut contents (November) and maximum growth in tissue mass are coincident with the peak of spring primary production (Schejter *et al.*, 2002).

The legal commercial size of 55 mm of height is reached at ages varying from 3 to 5 years, over much of the longitudinal range. The early life history is known, but mortality on each stage and recruitment dynamics are insufficiently researched. In some oceanic beds, juveniles may be fixed to living adult scallops sometimes several months after settlement (Bogazzi and Lasta, 2000). In contrast, in San Jorge Gulf and surrounding waters the empty scallop shells appear to be the primary substrate for settlement of larvae (M. Lasta, pers. comm.). Recruitment into the benthos of new

generations indicates spatial and temporal variation between years and beds (Lasta and Bremec, 1998 and 1999). New beds are established by larvae successfully colonizing acceptable substrate. Factors that favor reproduction related to density, recruitment of larvae, the longevity of pelagic stages and spatial distribution of them are not well understood. Annual natural mortality of adults has been estimated to be in the range 0,29-0,46 by an integrated dynamic based model (Valero, 2002).

The population is structured as several discrete, variable and discontinuous sized beds. Macro-scale spatial distribution of the Patagonian scallop matches the location of three major frontal systems in the Southwest Atlantic (Bogazzi *et al.*, 2005). These fronts (areas with steep gradients of oceanographic variables such as salinity and temperature) constitute important feeding and reproductive habitats, often acting as concentration areas for pelagic larvae or as barriers to their dispersal. Beds influenced by the shelf break front and less than 90 km apart could be interconnected by larval drift (Lasta *et al.*, 1998c).

2.2 HISTORICAL

There are records of the existence of the resource in Argentine waters since 1973, when exploitable concentrations of *Zygochlamys patagonica* were evaluated during an exploratory survey by the vessel, Fishing Research Vessel (FRV) *Prof. Sieldlecki*. Since then various evaluations with research and commercial vessels have been conducted (FRV “*Walter Herwing*”, 1978 and 1979; FRV “*Shinkay Maru*”, 1978; and Fishing Vessel (FV) “*Sea Bay Alpha*”, 1989), with the double objective to study the resource and estimate the viability for its commercial exploitation.

In 1991, 1993 and 1994 exploratory fishery surveys were conducted in Uruguayan waters using commercial vessels authorized by the Uruguayan Government, to study the resource within their marine jurisdiction. The surveys showed that a small portion of the resource is located within the Uruguayan shelf and established that it was too small to promote and maintain commercial production, using factory vessels.

In the decades '70 and '80 a number of pectinid fisheries were developed elsewhere in the world making the commercialization of the Patagonian scallop fishery infeasible, maybe because of the relatively small adductor muscle obtained. It wasn't until the early 1990s, due to the diminution of catches in established fisheries and the increasing demand of scallop muscles in the international market, that the value of other species, including the Patagonian scallop, was appreciated and re-evaluated (E. González Lemmi, pers. comm.).

During 1995, the FV “*Erin Bruce*”, one of the vessels involved with the Uruguayan surveys, was authorized by the Argentine Government to develop a fishery research programme directed by the Federal Government. Throughout that year 15 surveys were made on the Continental Shelf. At the end of 1995 the Argentine Government by means of Resolution SAGPyA N°19 dated on 28 December 1995 approved both fishery projects for the exploitation of Patagonian scallop presented by Glaciar Pesquera S.A. and Wanchese Argentina S.A. for a fleet composed by four vessels consisting of two vessels from each company.

Glaciar Pesquera S.A. is a partnership between an Argentine businessman and the Canadian fishing company Clearwater Seafood Inc. The owner of Wanchese Argentina S.A. is a North American family, which trades as the Wanchese Fish Company Inc.

In addition, the Secretary of Agriculture, Livestock, Fisheries and Food established Resolution SAGPyA N° 150/96 dated on March 1996, which established a legal regulation in order to ensure that the Patagonian scallop fishery is developed in a way

that follows scientific advice. This resolution also established basic principles for the Management Plan which was implemented in March 1999. This Resolution meant a noticeable advance in the regulation and management of this new fishery in Argentina, in that it prevented any vessel with “unrestricted” authorization to fish within Argentine waters from catching Patagonian scallop. In Argentina, most of the fishing authorizations given to the fishing fleet are “unrestricted” and for this reason the FFC and SAGPyA have made changes in the regulations to avoid higher than recommended fishing effort and catches.

In 1999, the Uruguayan Government authorized two factory vessels to catch Patagonian scallop in the Argentine-Uruguayan Common Fishing Zone (ZCPAU) established by the Treaty of the Rio de la Plata and its Maritime Front (TRPFM). Since then until the end of 2001 five vessels operated on the ZCPAU, but mainly within the Argentine sector. During 2000 a dispute between both countries over the mobility of the resource and the geographic location of the beds arose. Since 2002, in consideration that the Patagonian scallop is a sedentary resource, Argentina has applied Article 77 of CONVEMAR (Convención sobre el derecho del Mar) (Agreement on Sea Rights), by which the country where the resource is located has the power to prevent the other country fishing over resources which are located exclusively on the Continental Shelf of the other. As a consequence since January 2003 the Uruguayan scallop fleet has been obliged to withdraw from Argentine waters within the ZCPAU.

Of the four vessels that established the Argentine fishery, one left it in 1997 and wasn't replaced until 2001. The precautionary approach developed by INIDEP and the FFC, in regard to the number of vessels approved is appropriate for this new fishery. Accordingly SAGPyA, the authority for application of Federal Fishing Law, acting on the scientific advice of INIDEP and the decision of the FFC, has always rejected applications for new fishing permits for Patagonian scallops.

2.3 CURRENT OPERATION

At present the fishery is operated by four factory vessels (two from each company), working 24 hours per day, throughout the year. Glaciar Pesquera S.A. has bigger vessels with higher horse power and higher fishing capacity. Each of Wanchese Argentina S.A. vessels have about 2.000 horse power in the main engine, while Glaciar Pesquera S.A. vessels have 3.000 and 5.400. The vessels (45-59 m long) perform between 6 and 13 trips/year. The duration of fishing trips ranges between 20 and 55 days. The vessels each operate with two otter trawl nets with booms and make 40-60 tows/day/net. The nets used by Wanchese Argentina S.A. are 16 mts. long whilst Glaciar Pesquera S.A. are 22 mts. long. The average towing time is 15 minutes (See Table 1). The catch is processed mechanically on board. The fishing gear is claimed to be non-selective. Its efficiency was estimated to range between 21 – 31 % (Lasta and Iribarne, 1997). A limited experiment by Lasta and Bremec (1997) offers direct evidence of the lack of size selectivity, even when the gear mesh sizes have been increased from 80 mm to the current 120 mm. The fishermen are interested in the improvement of the gear selectivity in order to decrease the catches of incidental non-commercial species and other non living material which complicate the productivity of the on board factories. One of the companies expressed its intention to try with square mesh nets in order to meet this objective.

The catch, composed of scallops, other benthic invertebrates and shell hash, is mechanically processed on board. The by-catch and free living non-commercial size scallops (less than 55 mm – Resolution FFC N° 4/2005) are separated by drums (Figure

4) and returned to the sea during the first 5 minutes after the haul is finished, whilst the commercial sized scallops are processed as follows:

- (i) steaming to open and separate soft tissues from the valves (Figures 5 and 6), which are discarded and thrown to the sea,
- (ii) peeling of the callus (muscle) to remove soft tissues (Figure 7),
- (iii) freezing (Individually Quick Frozen or in clusters, depending on the fishing company),
- (iv) muscle classification by size (Glaciar Pesquera S.A., Figure 8) or unclassified (Wanchese Argentina S.A.),
- (v) packed in 15 Kg. cartons, and
- (vi) stored frozen.

During a normal fishing day, the time taken to select individuals by size until the muscles are stored lasts approximately 30 minutes when the product is frozen individually. When it is block frozen it takes 2-3 hours with plate freezer.

Year	Towing Time (min)	SD	N	Max	Min
1995	11.11	1.26	14.565	24.6	3.4
1996	12.87	1.86	12.368	18.6	4.5
1997	16.32	1.74	9.254	21.4	5.7
1998	18.67	1.16	7.542	22.35	4.2
1999	17.34	6.82	8.131	26.5	5
2000	17.2	6.2	24.853	26.3	5.2
2001	15.37	5.52	14.143	23.5	2.5
2002	16.69	3.3	15.982	22.5	3.2
2003	13.89	3.85	39.652	20	4
2004	12.61	5.75	35.707	20.4	4.6
2005	11.71	5.8	32.785	26	1

Table 1. Average towing time per year for the fleet. Standard Deviation (SD), number of tows (N) and maximum and minimum values.



Figure 4. Drum for separating commercial size scallops from catch.



Figure 5. Steaming machinery.



Figure 6. Unpeeled scallops after steaming process.



Figure 7. Peeling machinery.



Figure 8. IQF scallops on quality inspection table of Atlantic Surf I.

The annual landings have reached approximately 6.000 t of muscle derived from 42.000 t of commercial sizes scallops (Table 2, Figure 9). Nevertheless, the capacity of the authorized fleet could allow a production of approximately 8.000 t of callus per year from 57.150 t of commercial size scallops (E. González Lemmi, pers. comm.).

A. Tonnes of callus landed and total commercial catch.

Year	Callus (tm)	Entire scallop (tm)	CC	CC
	NMU+ONMU+ SMU+OSMU	NMU+ONMU+ SMU+OSMU	Patagonian scallop	Tehuelche scallop
1995	1312,9	10592,0	8,07	
1996	3038,9	36957,0	12,16	
1997	3822,7	39817,0	10,42	
1998	3413,5	28441,0	8,33	
1999	5013	42700	8,51	
2000	5111,9	36514	7,14	
2001	5295,2	38960	7,36	
2002	4294,9	30666	7,14	10,0
2003	6018,1	42969	7,14	
2004	5890,4	42065	7,14	
2005	5535,3	39522	7,14	

B. Catches of commercial entire scallop (tm).

Year	Patagonian scallop		Tehuelche scallop	Total Fishery
	NMU+SMU	NMU+ONMU+ SMU+OSMU	ONMU	NMU+ONMU+ SMU+OSMU
1995	10592	10592		10592
1996	36952	36952		36952
1997	39817	39817		39817
1998	19842	28441		28441
1999	27408	42700		42700
2000	36514	36514		36514
2001	13157	38960		38960
2002	28189	30666	20300*	50966
2003	27622	42969		42969

2004	19828	42065		42065
2005	21018	39522		39522

NMU North Management Unit

SMU South Management Unit

ONMU Outside North Management Unit

OSMU Outside South Management Unit

CC Conversion Coefficient

Table 2. Captures and landings of Patagonian scallop (*Zygochlamys patagonica*) in the Republic of Argentina. The conversion coefficient (CC) used by INIDEP and the fishing companies has varied from 7.14 to 12.16. The CC established by the FFC for Patagonian scallop has been 7.70 since 2000. The data are updated until 31 November 2005.

Note 1. *In 2002, 20.300 tonnes of entire Tehuelche scallop were included in the total taken. The fleet is authorized to fish only Patagonian scallop (*Zygochlamys patagonica*). During late 2001 and part of 2002 a very interesting bed of Tehuelche scallop (*Aequipecten tehuelchus*) located in national waters, was found. The FFC invited the non factory vessels to exploit Tehuelche scallop in national waters, but no one showed interest in doing it. The FFC authorized temporarily the fleet of Patagonian scallop to fish Tehuelche scallop, with the aim to reduce the fishing pressure on the former, mainly in beds within the NMU. Prior to initiation of the fishing activity on Tehuelche scallop, a monitoring program was implemented for approximately 20 days, with a strong participation of the fishing fleet and on board observers.

Note 2. The Conversion Coefficient value is calculated taking in account the potential losses during the processing. The value is an average for the fleet and the year. It is obtained relating the estimation of biomass of commercial scallops per haul or trip and the biomass of muscles in the data series of commercial scallops. That relation was established assuming steady values and loss of muscles in different steps of the on board process: a) grading by size, b) steaming, c) peeling and d) control of peeling.

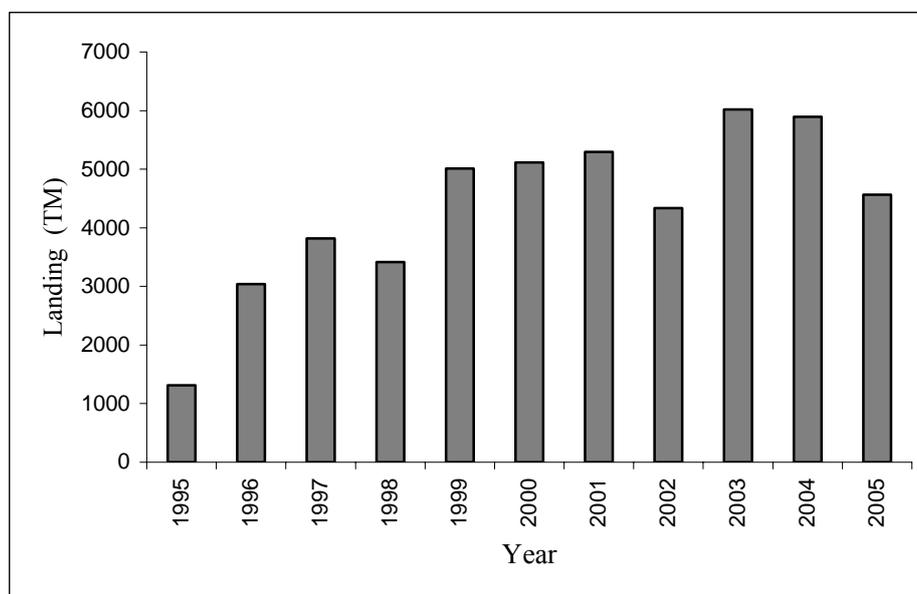


Figure 9. Annual landings of Patagonian scallop (callus) throughout the history of the fishery. Note. From 1998 to 2001 and during 2005, only 3 vessels operated in the fishery.

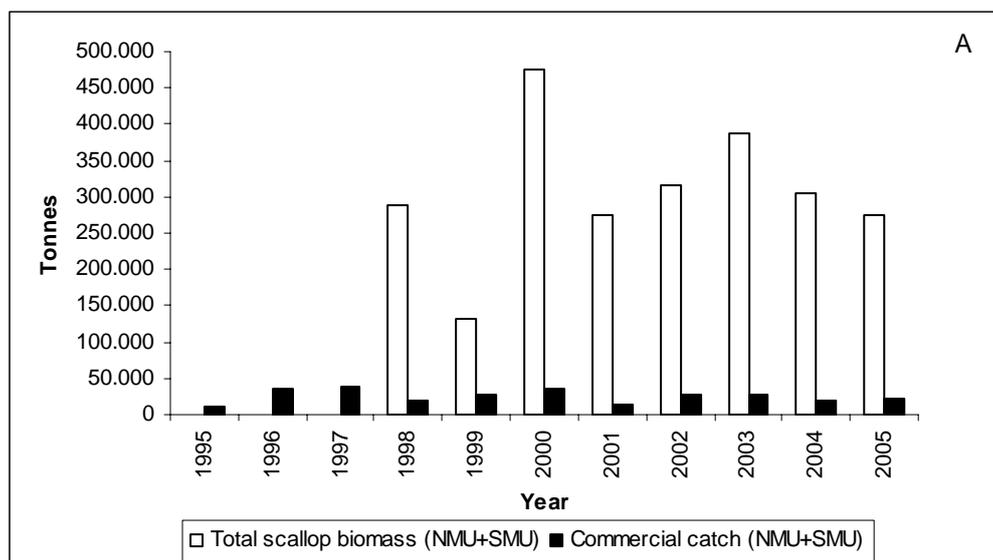
Biomass estimates

Biomass is estimated from annual survey, taking random samples from some beds and in a regular grid in others, located within each of the two management units. The results of these surveys are presented in Table 3.

Year	Estimated biomass (t) and Coefficient of Variation (%)					
	NMU		SMU		NMU+SMU	NMU+SMU
	Total	Commercial	Total	Commercial	Total scallops	Commercial scallops
1995						
1996						
1997						
1998	287.345 (6.36)	148.208 (4.01)			287.345	148.208
1999			131.800 (10.34)	96.000 (11.56)	131.800	96.000
2000	320.319 (4.37)	161.940 (5.18)	154.520 (8.60)	115.504 (8.97)	474.839	277.444
2001	273.794 (6.30)	173.669 (6.41)			273.794	173.669
2002	209.026 (4.90)	93.493 (4.47)	105.804 (10.72)	64.215 (10.03)	314.830	157.708
2003	302.017 (4.53)	76.031 (6.76)	84.470 (8.67)	48.027 (8.24)	386.487	124.058
2004	210.408 (5.38)	57.486 (7.07)	94.585 (15.06)	40.098 (11.68)	304.993	97.584
2005	206.409 (4.34)	120.128 (4.15)	69.237 (11.78)	25.649 (11.17)	275.646	145.777

Table 3. Estimates of biomass and Coefficient of Variation in percentage (Calculated as the Standard Deviation from estimation of the biomass divided by biomass in percentage) of total and commercial scallops for the management units.

The total scallop biomass and the commercial catch for the two management units and overall the platform (NMU+ONMU+SMU+OSMU) (See Table 2) for each year are presented in Figure 10 A, B.



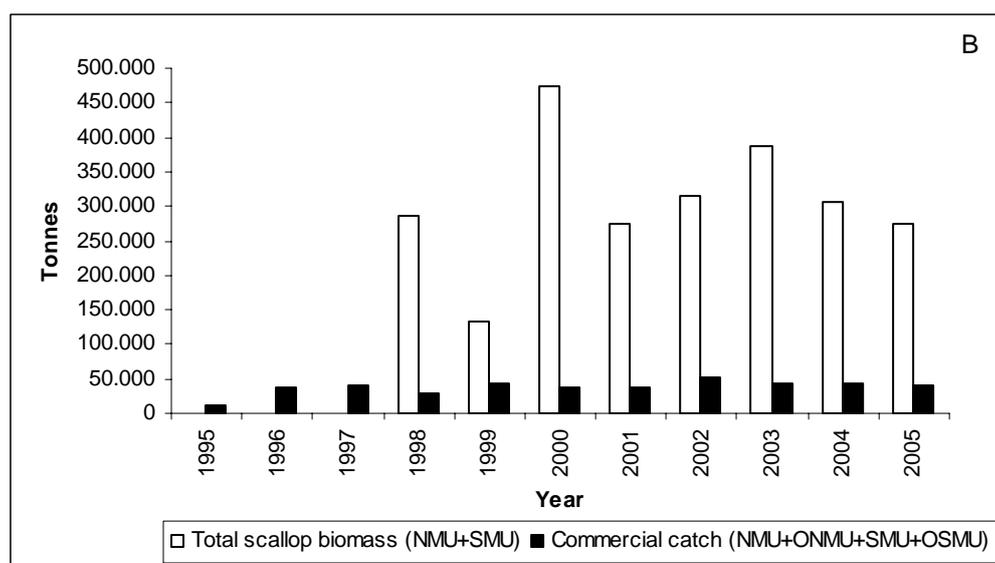


Figure 10. Estimated total biomass and commercial catch per year. A. Total scallop biomass and commercial catch within the two management units. B. Total scallop biomass estimated from within the two management units and commercial catch over the total platform.

Note. Commercial catch is relatively uniform from year to year. Biomass estimates fluctuate around a mean of 306.000 tonnes for commercial and non commercial scallops.

2.4 MANAGEMENT SYSTEM

The FFC establish the national fishery policy and some management operational matters (Federal Fishing Law 24.922, Articles 7, 9, 10, 11, 14, 17, 18, 21, 26, 27, 28, 29, 36, 40, 44 y 45). The Management Plan is proposed by National Institute of Fisheries Research and Development (INIDEP) to the FFC, who includes the legal and administrative aspects and approve it. The Sub-Secretariat of Fisheries and Aquaculture (SSPyA, SAGPyA) has the responsibility to implement the Management Plan. INIDEP is financed by the National Fund, National Fishing Fund, the two private companies involved in the Patagonian scallop fishery and external sources of funding. The President of the FFC is designated by law as the Secretary of Agriculture, Livestock, Fisheries and Foods (Article 8° of the Federal Fishery Law 24.922) or his delegate. At present the Presidency is delegated to the Sub-Secretary of Fisheries and Aquaculture. The first management measures were outlined in 1996 (FFC Resolution 150/96), after an experimental research phase.

Two companies (Glaciar Pesquera S.A. and Wanchese Argentina S.A.) were authorized to fish, starting from 1996, incorporating adaptive criteria through operational measures with short- and long-term impacts. Some measures are related to annual survey results, like open-closed areas and establishment of a Total Allowable Catch (TAC) (Table 4). Other measures implemented include:

1. establishment of two management areas (North and South Management Units), comprising several beds each.
2. a minimum legal size for scallops set at 55 mm of total height (3-5 years of age).
3. no-take zones in each bed for protection of the parental stock.
4. no-take zones in each bed for research purposes.

5. a minimum relation of juvenile – commercial scallops established at 1:1 in order to open a fishing bed.
6. no fishing season imposed.
7. fishing effort fixed at four vessels.
8. harvest rate fixed at 0.4 of commercial sized scallops in order to establish the TAC.
9. immediate return to the sea of all individuals smaller than 55 mm in order to allow their survival.
10. creation of a Technical Commission to analyze and monitor the fishery, representing SAGPyA, INIDEP and each of the two fishing companies.

Year	Total Allowable Catch (tm)				
	NMU	SMU	NMU+SMU	ONMU	OSMU
1996					
1997					
1998					
1999	15500	18500	34000	Free	Free
2000	13420	37800	51220	Free	Free
2001	17521	15000	32521	Free	Free
2002	13700	20534	34234	Free	Free
2003		16045	16045	Free	Free
2004		20312	20312	Free	Free
2005	14045	2024	16069	Free	Free

Table 4. Total Allowable Catch established in tonnes of entire scallop. The TAC for the North Management Unit in 2002 and 2003 is not indicated because the starting date of the TAC was changed from January to the 1st of October in 2002 until the 30th of September in 2003. The TAC was established at 13.700 tonnes.

During 1999, a formal Management Plan structured for 4 years + 1 was established. Two Management Units were defined: “North”, between 36° 45’ – 39° 30’ SL, and “South”, between 39° 30’ - 43° 30’ SL. Figure 11 indicates the limits of the North and South Management Units, established by the FFC. Figure 12 and Table 5 give the position of each bed of scallops recognized for management purposes on the Continental Shelf.

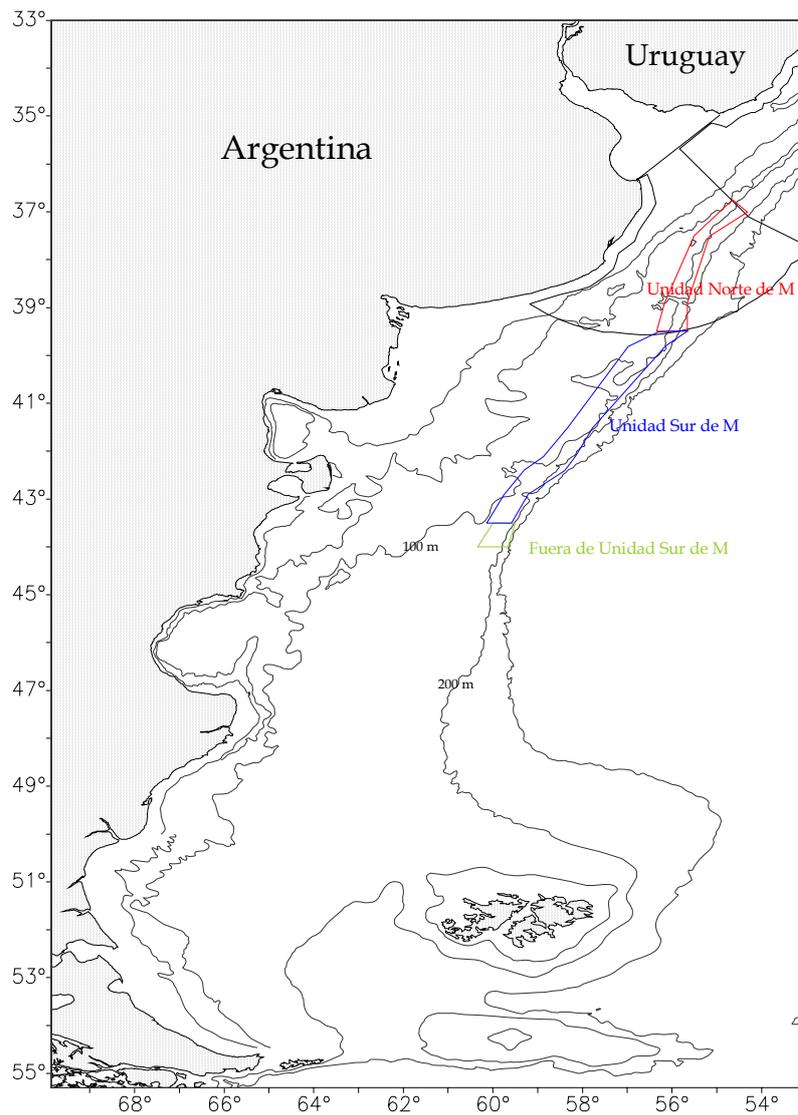


Figure 11. Map of the Argentine Sea, indicating the location of the North and South Management Units for Patagonian scallop, and one zone fished outside of the South Management Area.

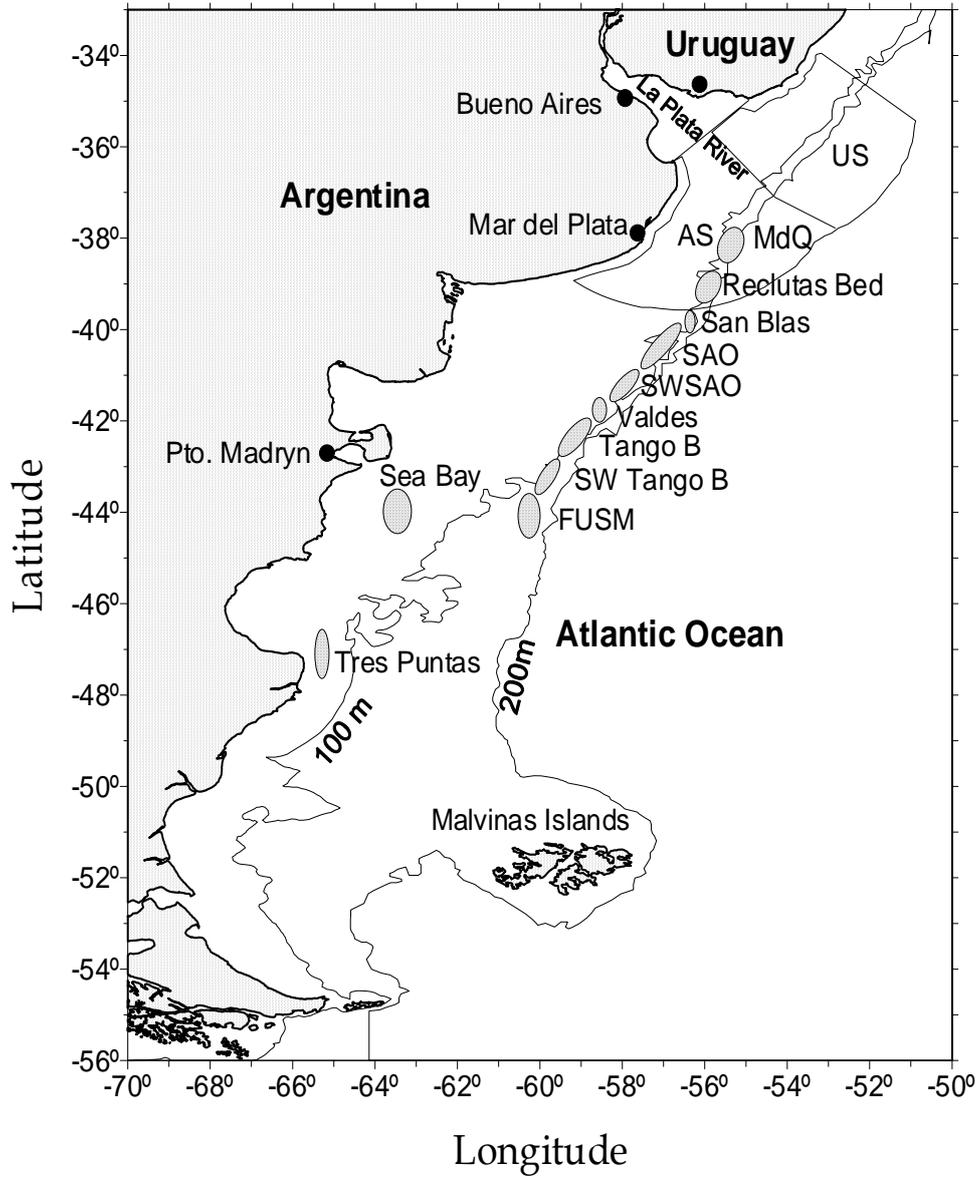


Figure 12. Schematic representation of main Patagonian scallop’s beds. AS and US: Argentine and Uruguayan Sectors (respectively) of the Common Fishing Zone. FUSM: Outside South Management Unit .

Management Unit	Bed	South Latitude	West Longitude
North	“MDQ”	36°45' 00	54°40' 00
		37°00' 00	54°20' 00
		37°30' 00	55°10' 00
		37°30' 00	55°30' 00
		38°54' 00	55°40' 00
		38°54' 00	56°20' 00
	“Reclutas “	38°54' 00	55° 40' 00
		38°54' 00	56° 20' 00
		39° 30' 00	56° 20' 00
		39° 30' 00	55° 40' 00
South	“San Blas”	39° 30' 00	56° 20' 00
		39° 30' 00	55° 40' 00
		39° 48' 00	56° 10' 00
		39° 48' 00	57° 00' 00
	“SAO”	39° 48' 00	56° 10' 00
		39° 48' 00	57° 00' 00
		41° 30' 00	57° 48' 00
		41° 30' 00	58° 20' 00
	“SWSAO”	41° 30' 00	57° 48' 00
		41° 30' 00	58° 20' 00
		42° 06' 00	58° 09' 00
		42° 06' 00	58° 54' 00
	“Valdes”	42° 06' 00	58° 09' 00
		42° 06' 00	58° 54' 00
		42° 24' 00	58° 24' 00
		42° 24' 00	59° 18' 00
	“Tango B”	42° 24' 00	58° 24' 00
		42° 24' 00	59° 18' 00
		42° 54' 00	59° 12' 00
		42° 54' 00	59° 48' 00
	“SW- Tango B”	42° 54' 00	59° 12' 00
		42° 54' 00	59° 48' 00
		43° 30' 00	59° 36' 00
		43° 30' 00	60° 10' 00
Outside South Management Unit		43° 30' 00	60° 10' 00
		43° 30' 00	59° 30' 00
		44° 00' 00	59° 40' 00
		44° 00' 00	60° 20' 00

Table 5. The location of the beds associated with the North and South Patagonian scallop management units and the polygon called OSMU.

Absolute biomass is assessed in both management areas by research surveys that are carried out annually using a research vessel (40 m long). The fishing companies financially support the costs of research. A TAC is defined annually for each bed, within both management areas. The beds are loosely delineated by CPUE, profitability

and minimum economic density. In reality, the proportion of commercial scallops is variable and sometimes higher in less densely populated areas (See Lasta et al, 2001). It is difficult to define the limits of the beds biologically, as the densities vary spatially, according to a complex of factors that change with time, including new recruitment events.

The commercial activities are monitored in five complementary ways:

- (i) Specific fishing and processing logbooks by haul are required at the end of each fishing trip. Additionally, a fishing logbook every 72 hours is required to be sent by e-mail or fax from each vessel to the fishing authorities (control of fishing activity).
- (ii) The On Board Observer Program which is responsible to the Directorate of INIDEP (biological and ecological monitoring). 100 % compulsory coverage of all fishing.
- (iii) Comprehensive control of discharge in ports by inspectors from the Sub-Secretariat of Fisheries and Aquaculture (SSPyA, SAGPyA).
- (iv) A conversion factor legally established to convert callus to whole raw scallops.
- (v) Cross-over check of information with the Sanitary Control Organization (Se.Na.S.A.), which controls quality and safety of primary products.

INIDEP and fishing companies exchange information in order to establish an exploitable biomass within a specific area. As one would expect in all commercial fisheries, the average size of scallops taken has reduced. Consequently closures to allow increase in size of the remnant individuals, until they reach commercial size have been implemented.

The formal Management Plan established in 1999 was abolished 1 year later (2000). Since then the FFC has demonstrated, through the management measures adopted, to have selected criteria that support its adaptive informal management plan. In addition to the formal delimitation of the beds within the management units, in order to spatially control the catches, fishing has been encouraged outside the management zones from the beginning of the fishery. The catches outside the management zones are reflected in the total annual catches registered. Because these catches are not formally established and there is a lack of knowledge, experimental closures have been implemented in order to obtain information on fished areas in order to implement a rotational management system.

In August 2005, the FFC approved management measures (Resolution N° 4/05) that complement the Federal Fishing Law and its Complementary Decree, and give guidance for the overall management of the fishery contributing towards a tactical and strategic Management Plan. These measures (Appendix II) will regulate the Patagonian scallop fishery over the next 4 (+ 1) years. As well, the FFC confirmed that only four vessels were authorized to fish in this fishery (Resolution N° 5/05), thus ratifying the measures established by Resolution SAGPyA N° 150/96.

Currently, the Commission created by Resolution FFC N° 4/05 for the Analysis and Monitoring of the Patagonian Scallop Fishery, is analyzing proposals in relation to the management of the fishery, namely:

1. Re-definition of the limits of the beds, related to the information available, in order to include areas of lower density of scallops.
2. Treatment of the beds as individual management units.
3. Review of the magnitude and location of no-take zones or reproductive and experimental reserves established in 1996.

2.5 INSTITUTIONAL AND LEGAL FRAMEWORK

The marine fishing activities in Argentina are regulated by the Federal Fishing Law N° 24.922, its Complementary Decree N° 748/99 and several resolutions and norms dictated by the FFC, the SAGPyA and the SSPyA. The Argentine Provinces have their own fishing laws, which are valid within 12 nautical miles from the coast. The Federal Fishing Law specifies all the requirements that control fishing activities, a regimen of sanctions and the responsibilities of the agencies in charge of its implementation (FFC and SAGPyA). In addition to the abundance of regulations in use, some resolutions merit highlighting, including Resolution SAGPyA N° 150/96 and the Resolutions FFC N°s 4 y 5, 2005. These include specific measures specifically designed to achieve effective administration of the Patagonian scallop fishery. A copy of the Law 24.922 and its Complementary Decree are appended to this report as Appendix III.

2.5.1 Federal Fishery Council

The FFC is a Federal Entity which is not dependent on either the Federal Government or the Provincial Governments and, in accord with Law 24.922, is integrated as follows (Article 8 of the Law):

ARTICLE 8: The Federal Fishery Council is hereby created, and shall be composed of:

- a) One representative by every province with maritime coast;
- b) The Secretary of Fisheries;
- c) One representative for the Secretariat of Natural Resources and Sustainable Development (Secretaria de Recursos Naturales de Desarrollo Sustentable);
- d) One representative of the Ministry of Foreign Affairs, International Trade and Culture (Ministerio de Relaciones Exteriores, Comercio Internacional y Culto);
- e) Two representatives designated by the National Executive Power (Poder Ejecutivo Nacional);
- f) The Secretary of Fisheries shall be the President. All the members of the Council shall have only one vote. A qualified majority shall adopt the resolutions.

The primary responsibilities of the FFC are (Article 9 of the Law):

ARTICLE 9: The Federal Fishery Council shall:

- a) Establish the national fishing policy;
- b) Establish the fishing research policy;
- c) Establish the maximum licensed catch per species, bearing in mind the maximum sustainable production of each one of them according to data provided by the National Institute of Fisheries Research and Development (INIDEP). Furthermore, establish the quotas of annual catch per vessel, per species, per fishing zones and per type of fleet;
- d) Approve the licenses of commercial and experimental fishing;
- e) Advise the Undersecretariat of Fisheries in matters of international negotiation;
- f) Plan the national fishing development;
- g) Fix the guidelines of co-participation in the National Fishing Fund (Fondo Nacional Pesquero FONAPE.);
- h) Pronounce on experimental fishing;
- i) Establish the catching fees and fix canons for the practice of fishing;

- j) Modify the distribution percentages of the National Fishing Fund (FONAPE) established in the sub section e) of section 45 of the present Act;
- k) Rule on the practice of the artisanal fleet establishing a reserve of the fishing quota for the different species assigned to this sector;
- l) Establish the items to be considered by the Federal Fishery Council that require a qualified majority in the voting of its members;
- m) Promulgate its own functioning regulations, which shall be approved with the affirmative vote of the two third parts of the total of its members.

In addition to the responsibilities mentioned above, the FFC shares several others with the Management Authority (SAGPyA), which are specified in most of the articles of the Law 24.922. The FFC has an Advisory Commission integrated by all the fishing unions and working groups.

2.5.2 SAGPyA

The Secretary of Agriculture, Livestock, Fisheries and Food (SAGPyA) is the national fishing agency of the Argentine Government and is responsible for the implementation of the national fishing legislation and resolutions emitted by the FFC. Some of its responsibilities as specified in the Law 24.922 are (Article 7 of the Law):

ARTICLE 7: The Undersecretariat of Fisheries shall:

- a) Conduct and execute the national fishing policy, regulating the exploitation, control and research;
- b) Conduct and execute the objectives respecting the technical and scientific investigation of the fishing resources;
- c) Control the maximum licensed catch by species established by the Federal Fishery Council and issue the quotas of annual catch per vessel, per species, per fishing zone and per type of fleet, pursuant to being granted by the Federal Fishery Council;
- d) Issue the licenses for fishing, with prior authorization of the Federal Fishery Council;
- e) Calculate the available surplus and establish with the prior approval of the Federal Fishery Council the restrictions with respect to areas or closed seasons;
- f) Establish with prior authorization of the Federal Fishery Council the requirements or conditions that vessels and fishing companies must fulfill in order to conduct the fishing activity approved;
- g) Establish the methods and techniques of catching, and specification of prohibited equipment and nets, etc., with the advice of the National Institute of Fisheries Research and Development (INIDEP) and according to the fishing policy established by the Federal Fishery Council;
- h) Impose sanctions, pursuant to the rules of infractions and create a record of transgressors within the prescriptions of the present Act and, inform the Federal Fishery Council of the sanctions applied;
- i) Work on and develop statistical systems for the fishing activity;
- j) Intervene in bilateral or multilateral international negotiations related to the fishing activity pursuant to the national fishing policy;
- k) Establish regulations of the fishing record created by this Act;
- l) Collect the catching fees established by the Federal Fishery Council;
- m) Intervene in the granting of the benefits that come from promotion per sector granted or to be granted to the fishing sector;

- n) Intervene in the plans of investment that require or count on specific international financing entities and/or that have been granted or to be granted to the Argentine Republic, pursuant to the criteria that it should determine together with the Federal Fishery Council.
- o) Issue authorization for experimental fishing with prior approval of the Federal Fishery Council;
- p) Establish and implement necessary and sufficient control systems to really determine the catch in the territorial sea and the exclusive economic zone and the catch unloaded in authorized Argentine ports and the fulfillment and truthfulness of the affidavits of catching;
- q) Carry out national campaigns of promotion for the consumption of live resources of the sea and missions abroad to promote the commercialization of the products of the national fishing industry;
- r) Exercise all the faculties and responsibilities that the Undersecretariat of Fisheries is hereby granted.

To meet its mission SAGPyA includes the Sub-Secretariat of Fisheries and Aquaculture (SSPyA), which has a National Direction for Fishery Coordination, an Aquaculture Direction with several Departments and, the National Fisheries Research Institute (INIDEP).

For the control of the fishery activity SAGPyA receives support from the Navy and Prefecture, and has cooperative agreements with both entities. FONAPE gives financial support to the Army and Navy, who control the fishing activities within the Argentine Economic Exclusive Zone.

2.5.3 INIDEP

INIDEP is a decentralized Marine Sciences Research Institute dependent on SAGPyA. Its mission and functions were announced in the Law of Creation N° 21.673 dated on 21 October 1977, and its institutional objectives and the responsibilities and function of each of its Directions are defined in Decree N° 1.187 dated on 20 June 1991, and modified in the Decree N° 2.837 dated, 29 December 1992, Decree N° 1.458 dated, 13 December 1996 and the Federal Fishing Law N° 24.922 dated, 12 January 1998.

Its mission and functions are the formulation, exertion and control of research projects in regard to prospection, evaluation and development of fisheries, aquaculture technologies, fishing gears, technology processes and fishery economics, complying with the guidelines and priorities established by the management authority (SAGPyA and the FFC).

In the framework of the regulations in force, the INIDEP research programme generates and adapts knowledge, information, methods and technology for the development, utilization and conservation of Argentine fisheries. INIDEP is the only Argentine Institution that encompasses scientific, technological and economic aspects, which are essential for the implementation and development of the national fishing policy. Recently, INIDEP has adjusted its objectives and activities to adapt its functions to the profound changes that have occurred in the fishing sector and the legal requirements that cover its conduct; in addition to being strategically prepared for the changes anticipated that will occur in the near future. To meet that objective, INIDEP has reviewed its activities not only in relation to fishery research, but also in regard to its

relationship to other institutions and countries which are linked by fact or right to the renewable fisheries resources of the South Atlantic Ocean.

Institutional objectives and goals

1. To generate and adapt knowledge, information, methods and technology for the development, utilization and conservation of the Argentine fisheries in coastal, continental shelf, oceanic (mile 201) and continental waters.
2. To establish economic technical bases which permit their conservation and sustainable management and contribute to increase the benefits obtained from the aquatic living resources.
3. To adapt its functioning to the deep changes which have occurred in the fishing sector and its legal context, and to satisfy the increased demand of scientific and technical knowledge required for the sustainable management and use of Argentine fishing resources and those shared with other countries.

The fundamental basis to meet the objectives mentioned above has been the oceanographic-fishing research surveys carried out with the three national research vessels belonging to INIDEP. The sustained use of these vessels (each with unique characteristics) in Argentina since 1993 has permitted, adequate and timely prospecting of the Argentine Continental Shelf and Slope, including the surrounding waters of the Malvinas Islands and South Georgia Islands.

In hierarchical order, the lines of action to meet the goals are:

1. Re-equipment and preparation of the research vessels to guarantee them fully operative and available, and increase its research capacities in deep oceanic and sub-Antarctic waters.
2. Annual evaluation of the status of all fishery resources (freshwater, coastal, continental shelf and adjacent oceanic resources) and their associated environments.
3. Prediction of the future tendencies in the evolution of the resources and interpretation of the causes for fluctuations in them based on the results of the annual evaluations.
4. To adequately advise and report scientific information in a timely manner with associated uncertainty levels, to management authorities, the fishing sector, other users and clients.
5. Encourage research to develop alternative fisheries in order to compensate for the decreases in capture from traditional resources.
6. Improvement and development of the fishing methods, fishing gears and new products and technological processes.
7. Development and adaptation of aquaculture technologies for marine and freshwater organisms of commercial interest.
8. Purchase information and knowledge to economically evaluate the fisheries, fishery resources and coastal marine biodiversity.
9. To increase the number of studies which permit the identification of management units.
10. To provide technical support in order to implement Individual Transferable Quota management systems.

11. To strengthen the activity of the On Board Observer Programme on commercial vessels and sampling of landings, in order to fulfill the new fishing requirements.
12. To establish INIDEP as a regional training center for oceanographic and fishing research, thus creating opportunity for participation and interchange of knowledge between the various scientific-technological sectors in Latin America who deal with fishery resource assessment problems, through a Seminar on Methods for the Assessment and Monitoring of Fisheries Resources, with the technical cooperation of Japan and the assistance of JICA (Japan International Cooperation Agency).

2.6 POLITICAL STABILITY OF THE GOVERNMENT

Even though in some years the stability of the Federal and Provincial Governments has been variable, it hasn't influenced the integrity of the FFC that has maintained relative stability in its membership. In fact, the current Sub-Secretary of Fisheries and Aquaculture is one of its founding members.

Half of the members of the FFC represent each of the five maritime provinces. Over the past decade the Provinces have been politically more stable than the Federal Government.

Article 9° of the Federal Fisheries Law 24.922 gives the FFC responsibility to fix the National Fisheries and Research Policies, so that in matters of fishery policy an acceptable level of stability can be maintained in Argentina.

In the case of the Patagonian scallop the aforesaid has ensured this objective. Further proof of this is that the Management Plan, which was formally abolished in February 2001, was informally respected until Resolution FFC N° 4/05 was passed in 2005. In addition, the most important management measures, such as the limit on the number of vessels that operate in the fishery, has been respected, in spite of changes in the office bearers of SAGPyA and SSPyA.

2.7 DOMESTIC CONSUMPTION AND EXPORTATION

Patagonian scallop catches are processed on-board. There is no sale of entire scallops (within shells). The adductor muscle is extracted from the animal, individually frozen, classified and packed in 15 Kg. boxes (Glaciar Pesquera S.A.), or the adductor muscle frozen ungraded, in block form (Wanchese Argentina S.A.) rather than being individually quick frozen; packed and maintained in freezers at -30°C. Once in port the product is unloaded directly into containers that are immediately dispatched to international markets.

The final products from the Patagonian scallop fishery are exported mainly to France, Canada and USA. Nearly all the product from Glaciar Pesquera S.A. is distributed to factories which prepare dishes that are commercialized in restaurants, hotels and supermarkets. Practically nothing is sold on the Argentine market, as consumption of scallops is not traditional in Argentina and the product has high value compared to Argentine meat.

2.8 NEIGHBORING AND ASSOCIATED FISHERIES

The Patagonian scallop fishery does not have any associated fisheries because it is selective and has no incidental capture of other commercial species.

Nevertheless, two other fisheries, squid (*Illex argentinus*) and common hake (*Merluccius hubbsi*) exist in the same area. Neither of the two interact with the Patagonian scallop fishery because of the highly selective jigs used in the squid fishery and by the inability of trawl nets used in the hake fishery to capture scallops. As a result, no incidental catch of Patagonian scallop occurs in either fishery (and vice-versa). In synthesis, no conflictive relationship exists between Patagonian scallop and any other neighboring fishery.

2.9 ENVIRONMENTAL FEATURES

As in all trawl fisheries this one has an impact on the ecosystem derived from:

- a) fishing actions (removal of sediment, and modification of habitat and community composition) and,
- b) on-board procedures (increment in the amount of empty shells on the bottom) (Bremec and Lasta, 1999).

The fishery is located within the Argentine Continental Shelf at approximately 100 m below the ocean surface. The South Western Atlantic Shelf is a broad shelf of smooth topography and variable width. Its extension covers 1.000.000 km² and is defined by a narrow shelf of 210 km wide in the north (38°S) and an extension 850 km from the coast in the south (55°S) to include the Malvinas Islands rise. About 70% of the total depth is greater than 70 m.

Sediments along the shelf are of variable composition, predominating soft sediments composed mainly of sand with variable shell content. In some areas of San Jorge Gulf, southern Patagonian coast and at the shelf-break, mud sediment is abundant. Rocky bottoms are found on the area offshore from the San Jorge Gulf as well as in some places of the central continental shelf (Parker *et al.*, 1997).

The outer shelf where the bottom slope increments abruptly define the position of the shelf-break. Its depth is generally associated with the 200 m isobath. The slope is characterized by the presence of submarine canyons of diverse depth and width (Parker *et al.*, 1997).

Two major currents influence the boundary of surface oceanic circulation: the southward flowing subtropical Brazil Current (BC) and the northward sub-antarctic flow of the Malvinas Current (MC), a branch of the Antarctic Circumpolar Current (ACC) (Figure 13). Both currents circulate parallel to the continental slope and turn seaward after its collision in a frontal region known as the Confluence Zone (CZ). The CZ, located between 35° and 40°S (Gordon, 1989), is a highly dynamic region characterized by intense near surface velocities associated with a complex array of eddies, rings and filaments and high spatial-temporal variability (Garzoli and Giulivi, 1994).

The system is complemented by lateral currents, the inshore Patagonian Current (PC) and their associated frontal systems. In reality currents wax and wane and change direction regularly, but the dynamics of this in relation to the dependent biological systems is poorly understood, as understanding of the current dynamics is based on oceanographic averages.

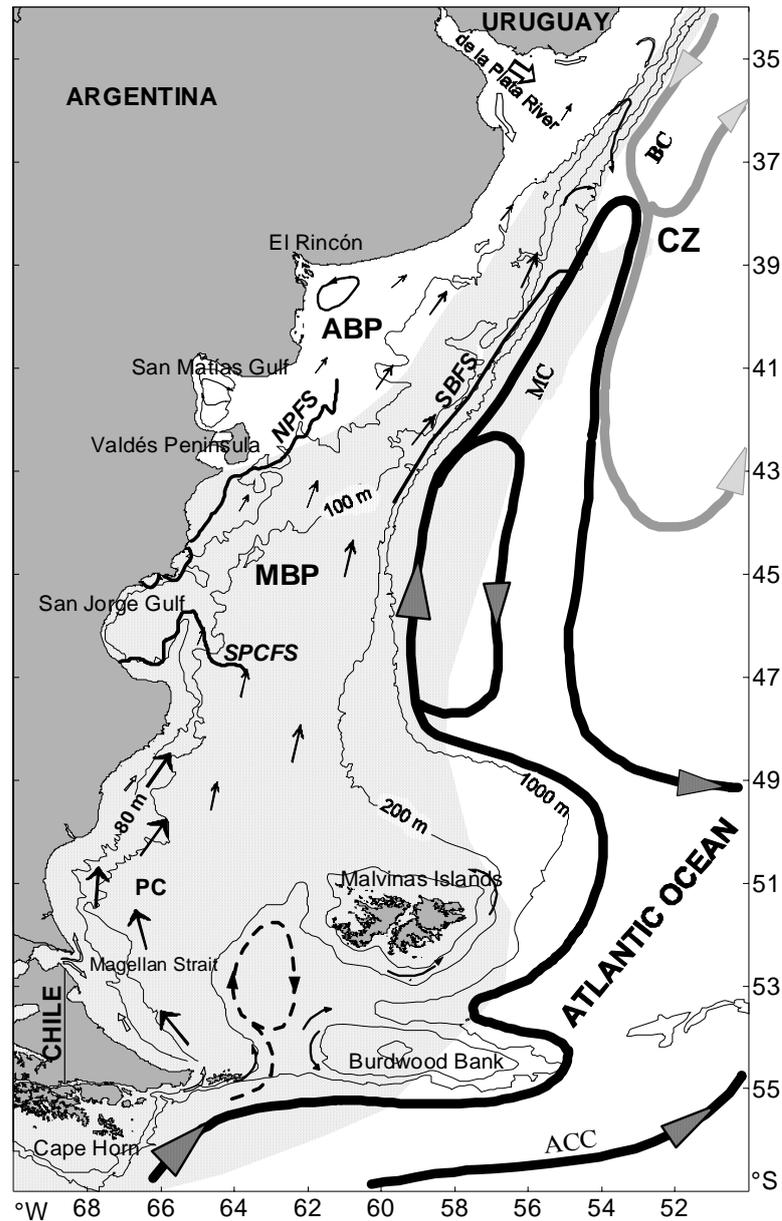


Figure 13. Southwestern Atlantic schematic ocean circulation: Malvinas (MC), Antarctic Circumpolar (ACC), Patagonian (PC) and Brazil Currents (BC), Confluence Zone (CZ). Arrows indicate the general circulation pattern over the continental shelf, whilst the grey arrows represent continental runoff. Shaded area represents the Magellanic Biogeographic Province (MBP), whilst white areas represent the Argentine Biogeographic Province (ABP). Shelf Break (SBFS), Northern Patagonian (NPFS) and Southern Patagonian Coastal Frontal Systems (SPCFS). Adapted from Piola and Rivas, 1997.

Even though the Patagonian scallop is distributed over the entire Magellanic Biogeographic Province, it is found in macro scale aggregations that match the location of frontal systems, which differ in their nature. Although substrate is a determinant factor of scallop spatial distribution, the megascale pattern of aggregation of the Patagonian scallop does not appear to be determined by bottom type, which is relatively homogeneous over the uneventful bottom-scapes of the Southwestern Atlantic Shelf (SAS). While substrate does not appear to be related to the location of major aggregations, the latter match three major frontal systems that define oceanographic and biological discontinuities over the SAS: the Shelf-break Beds located between 81 m and 195 m depth with the Shelf Break Frontal System (SBFS); the Sea Bay Bed located off

Isla Escondida between 75 m and 84 m depth with the Northern Patagonian Frontal System (NPFS); and the Tres Puntas Bed, located to the east of Cape Tres Puntas shoal, between 60 m and 100 m depth with the northern segment of the Southern Patagonia Coastal Frontal System (SPCFS) (Bogazzi *et al.*, 2005).

Frontal regions, defined as areas where there are steep horizontal gradients in oceanographic variables, are usually associated with high biological productivity (Mann, 1992). They constitute important feeding and/or reproductive habitats, often acting as retention/concentration areas for pelagic larvae or as barriers to dispersal (e.g. Tremblay and Sinclair, 1992, for the George Bank sea scallop stocks).

Shelf Break Frontal System (SBFS). A weak density gradient forms the boundary between shelf waters (less saline) and slope waters (saltier, nutrient rich) defining the SBFS, which develops all around the year. Additionally, the differential heating between these two regimes during warm periods increases the temperature of surface layers, resulting in the formation of a surface thermal-density front (Bogazzi *et al.*, 2005). Two phytoplankton peaks, one during spring, and the other one during autumn, are associated with development of the thermal surface front. The second peak happens when the thermocline breakdown begins (Carreto *et al.*, 1995). A maximum of chlorophyll-a is followed by decreasing nitrate concentration in the euphotic layers of the shelf due to phytoplankton activity (Carreto *et al.*, 1995). Several processes influence the circulation and exchange that may explain enrichment and high productivity in the system: topographic waves over the slope (Olson *et al.*, 1988), mesoscale processes, and the detachment of the bottom boundary layer (Houghton *et al.*, 1994). Eddies and mid-level intrusions were density-compensated features present mostly at the thermocline level of the SBFS.

Seasonal weak stratification and the occurrence of vertical movements produced by internal tides, together with episodic wind stress (Glorioso and Flather, 1995; Podestá, 1997; Rivas, 1997), are some coupling mechanisms that may facilitate the sinking of algal cells from the euphotic zone to the benthos (Bogazzi *et al.*, 2005).

Northern Patagonian Frontal System (NPFS). A seasonal thermocline develops between spring and summer, defining a well mixed area close to the coast and a stratified one on the other side of the front. The system is highly productive in spring and summer, which appears to be associated with enhanced phytoplankton biomass and high chlorophyll-a concentration (Carreto *et al.*, 1981). Growth of phytoplankton populations can possibly be explained by at least two mechanism of transport across the front, moving either cells or nutrients: the spring-neap cycle and baroclinic eddies (Pingree *et al.*, 1975; Mann and Lazier, 1991).

Southern Patagonian Coastal Frontal System (SPCFS). This thermohaline front represents the transition between tidally mixed low salinity waters of the Patagonian Current (PC) and seasonally stratified saltier waters of the continental shelf, forced mainly by advection of cold and low salinity waters of the PC and strong tidal currents over the shelf. The mixed side, closer to the coast, is maintained by tidal movements. The front develops through the year but with a maximum gradient during summer. During the winter, when shelf waters are vertically homogeneous, the salinity gradient between the PC and shelf water persists and maintains the frontal density distribution (Bogazzi *et al.*, 2005).

Two phytoplanktonic productivity peaks occur during spring and autumn (Cucchi Coleoni and Carreto, 2001). As is the case of tidal fronts, the spring-neap cycle may

also be proposed as a cross-frontal exchange mechanism which enhances the productivity of the system (Mann and Lazier, 1991).

Although circulation in the SPCFS is complex (specially with regard to topographically-steered flows) and is not completely understood, it offers opportunities for physical and biological retention/concentration mechanisms (e.g. energetic processes like surface convergence and upwelling-downwelling) that may explain the presence of associated scallop beds, and other commercially important species: squid, southern blue whiting, Patagonian hoki, austral cod and Patagonian toothfish (Brunetti *et al.*, 2000).

The plankton is of pelagic and benthic origin. Zooplankton distribute through the water column. In the Shelf Break Frontal System it has been shown that phytoplankton sink to the scallop beds in spring before development of the seasonal thermocline. The maximum growth in tissue mass of Patagonian scallops is coincident with the peak of primary production followed by the sinking to the bottom.

The composition of associated invertebrates in the by-catch represents a conspicuous epibenthic assemblage along the latitudinal range (Bremec and Lasta, 2002). All the incidental catch (composed by 82 invertebrate taxa; see Table 6) is returned to the sea together with non-commercial scallops. All juvenile scallops fixed to the adults are detached from the valves with washing in the size selection drum and are immediately returned to the sea (M. Lasta, pers. comm.). Survival of the different components of the incidental catch remains under study.

In relation to abundance of benthic species, Bremec and Lasta (2001) have demonstrated diminution of biomass of sessile filter-feeders like sponges and coelenterates. In general, the number of species has not been reduced (C. Bremec, pers. comm.). To date, there are no studies which demonstrate the rate of recruitment of invertebrate species into fished areas with larvae coming from non-fished areas. Trophic inter-relationships are well established.

Long term environmental damage is not considered a significant problem, because there are large areas with sub-economic populations of scallops which are not fished. This reflects many potential factors including, currents, availability of food, and type of substrate for example.

The recent application by INIDEP and Glaciar Pesquera S.A. of multi-beam analysis to map the sea bottom experimentally, has potential to allow more directed fishing, if it is possible to relate scallop populations to type of substrate. This has been successfully achieved in the "Browns Bank" in Canada (M. Pittman, pers. comm.).

Table 6. List of taxa collected in the *Zygochlamys patagonica* beds during 1995 in the Argentine Sea.

PORIFERA	<i>Pagurus comptus</i> White, 1847
<i>Callyspongia</i> sp.	<i>Pagurus gaudichaudi</i> H. Milne Edwards, 1836
<i>Tedania</i> sp.	<i>Eurypodius letreillei</i> Guérin, 1828
<i>Iophon</i> sp.	<i>Libinia spiosa</i> Milne Edwards, 1934
<i>Axinella</i> sp.	<i>Libidoclaea granaria</i> Milne Edwards & Lucas, 1842
COELENTERATA	<i>Peltarion spinosulum</i> (White, 1843)
<i>Sertularia</i> sp.	ECHINODERMATA
Hydrozoa	<i>Psolus patagonicus</i> (Ekman, 1925)
<i>Alcyonium</i> sp.	<i>Pseudocnus dubiosus leoninus</i> (Semper, 1868)
<i>Sphinteractis</i> sp.	<i>Hemiodema spectabilis</i> (Ludwig, 1882)
<i>Choryactis</i> sp.	<i>Austrocidaris canaliculata</i> (A. Agassiz, 1863)
<i>Actinostola crassicornis</i> (Hertwig, 1882)	<i>Arbacia dufresnei</i> (Blainville, 1825)
Pennatulacea	<i>Pseudechinus magellanicus</i> (Philippi, 1857)
<i>Flabellum</i> sp.	<i>Sterechinus agassizii</i> Mortensen, 1910
POLYCHAETA	<i>Ctenodiscus australis</i> Lüt ken, 1871
<i>Chaetopterus variopedatus</i> (Ranier, 1807)	<i>Astropecten brasiliensis</i> Müll ler & Troschel, 1890
<i>Aphrodita longicornis</i> Kinberg, 1855	<i>Cycethra verrucosa</i> (Philippi, 1857)
<i>Eunice argentiensis</i> (Treadwell, 1929)	<i>Heliaster</i> sp.
<i>Eunice magellanica</i> McIntosh, 1885	<i>Calyptaster vitreus</i> Bernasconi, 1971
<i>Idanthyrsus armatus</i> Kinberg, 1867	<i>Henricia obesa</i> (Stade, 1889)
Sabellidae	<i>Diplasterias brandti</i> (Bell, 1881)
<i>Serpula narconensis</i> Baird, 1865	<i>Cosmasterias lurida</i> (Philippi, 1858)
Spirorbidae	<i>Labidiaster radiosus</i> Lüt ken, 1871
BRYOZOA	<i>Gorgonocephalus chilensis</i> (Philippi, 1858)
Membraniporidae	<i>Amphiodia planispina</i> (von Martens, 1867)
<i>Porella</i> sp.	<i>Ophiuroglypha liman</i> (Ljungman, 1870)
Ascophora	<i>Ophiacanta vivipara</i> Ljungman, 1870
Bryozoa unid.	<i>Ophiactis asperula</i> (Philippi, 1858)
BRACHIOPODA	TUNICATA
<i>Magellania venosa</i> (Solander, 1786)	<i>Didemnum</i> sp.
<i>Terebratella dorsala</i> (Gmelin, 1790)	<i>Molgula</i> sp.
MOLLUSCA	<i>Culeolus</i> sp.
<i>Calliostoma consimilis</i> (Smith, 1881)	Ascidiacea 1
<i>Photinula coerulescens</i> (King, 1831)	Ascidiacea 2
<i>Calyptrea pileolus</i> (d'Orbigny, 1841)	Ascidiacea 3
<i>Argobuccinum magallanicum</i> (Chemnitz, 1788)	Ascidiacea 4
<i>Murex clenchi</i> Carcelles, 1953	Ascidiacea 5
Buccinidae (unidentified)	
<i>Glyptheutria</i> sp.	
<i>Paraeuthria</i> sp.	
<i>Odontocymbiola magallanica</i> Gmelin, 1791	
<i>Volvarina patagonica</i> (Martens, 1881)	
<i>Admete magallanica</i> Strebel, 1905	
<i>Chaetopleura isabellei</i> (d'Orbigny, 1841)	
<i>Zygochlamys patagonica</i> (King & Broderip, 1832)	
<i>Mytilus edulis platensis</i> d'Orbigny, 1846	
<i>Aulacomya ater ater</i> (Molina, 1782)	
<i>Hiatella solida</i> Sowerby, 1834	
PICNOGONIDA	
Callipallenidae	
CRUSTACEA	
<i>Ornatoscalpellum</i> sp.	
Amphipoda	
<i>Serolis schytei</i> Lüt ken, 1858	
Isopoda	

3 THE ASSESSMENT PROCESS

The Organización Internacional Agropecuaria (OIA) conducted a pre-assessment of the Patagonian scallop fishery in 2004. In 2005 the formal, full assessment of the fishery commenced. All aspects of the assessment process were carried out by OIA, an approved MSC certification body, and in direct accordance with MSC requirements.

3.1 GENERAL STEPS FOLLOWED

- *Team Selection*
Initially the experts selected to be part of the Patagonian Scallop Fishery Assessment Team were:
Dr. Peter Pottinger, OIA, Team Leader
Dr. Enrique Morsan, IBMPAS, San Antonio Oeste, Río Negro, Argentina
Dr. Jaime Mendo, UNALM, Lima, Perú
Dr. John Cranfield, Seabed Processes Consultancy Ltd, Wellington, New Zealand.
Short Curriculum vitae of the Assessment Team and OIA staff involved are presented in Section 3.3.
- *Setting Performance Indicators and Scoring Guideposts*
As required by the MSC assessment process, the assessment team drafted a set of performance indicators and scoring guideposts to correspond to the MSC Principles and Criteria. These were posted on the MSC web site for a comment period that lasted 30 days.
- *Input on fishery performance*
Once performance indicators were finalized, OIA requested that the applicant and stakeholders compile and submit written information to the assessment team illustrating the fishery's compliance with the required performance indicators.
- *Meetings with industry, managers, and stakeholders*
OIA planned for and conducted meetings with stakeholders, industry, fishery managers, and fishery scientists. As the assessment team reviewed submitted written material, a series of issues needing clarification were identified. Meetings with fishing organizations, fisheries scientists, fishery managers, and stakeholders were set to obtain additional clarification until the assessment team felt it had obtained the necessary understanding of the information associated with the fishery to complete its assessment. The meetings were held between 31 October and 10 November 2005.

The following stakeholders were directly contacted by OIA:

ORGANIZATION	CONTACT
Wanchese Argentina SA	Mr. Pedro Böhnsdalen
National University of Mar del Plata	Dr. Oscar Iribarne
National University of Buenos Aires	Dr. Pablo Penchaszadeh
National University of La Plata	Dr. Roberto Menni
INIDEP	Eng. Luis Miguel Barletta (Director)

ORGANIZATION	CONTACT
INIDEP	Lic. Mario Lasta
INIDEP	Dr. Claudia Bremec
INIDEP – On Board Observers	Lic. Gabriel Blanco
CENPAT	Dr. Néstor Ciocco (Director)
	Lic. Eugenia Bogazzi
Research Institute Puerto Deseado – Santa Cruz Province	Dr. Alejandro Pettovello
CADIC (Research Institute) - Ushuaia Province	Dr. Gustavo Gonzalez Bonorino (Director)
SAGPyA	Ing. Miguel Campos (Secretary)
SAGPyA - SSPyA	Mr. Gerardo Nieto (Subsecretary)
Inspectors - SAGPyA	Mr. Alejandro Moscato
FFC	Eng. Marcelo Santos (President)
Coastguard	PM Luis Alberto BERTA (Chief Department of Fishery Police)
“Shepherd y Asociados” - Custom’s Agent	CPN Jorge Shepherd
GREENPEACE	Mr. Juan Carlos Villalonga
Fundación Vida Silvestre Argentina	Lic. Javier Corcuera (Director)
	Lic. Guillermo Cañete - Marine Program
	Moisés Mug-Villanueva - WWF-LAC Senior Fisheries Programme Officer
CEDEPESCA	Eng. Ernesto Godelman (President)
Fundación Patagonia Natural	Lic. Guillermo Caille
Secretariat of Environment and Sustainable Development	Dr. Atilio Armando Savino (Secretary)
Chancellery	Minister Holger Martinsen
Subsecretariat of Fishing Activities of Buenos Aires Province	Mr. Oscar Fortunato
Fishery Direction of Río Negro Province	Dr. Pablo Filippo (Legal Issues Advisor)
Secretariat of Fishing – Chubut Province	Mr. Juan Carlos Verón
	Lic. Maria Colombo
Sub-Secretariat of Fishing – Santa Cruz Province	Mrs. Liliana Scioli
Ministry of Production - Tierra del Fuego Province	Minister ND Marcelo Morandi
Municipality of Mar del Plata	Mr. Victor Katz (Quartermaster)
	Eng. Marcela Del Prete
CHAMBERS	
ORGANIZATION	CONTACT
CAIPA - Fishing Industry Chamber	Mr. Antonio Solimeno (President) CPN Mariano Pérez
CAPeCA – Freezing Fishery Chamber	Mr. Enrique Díaz
CEPA – Argentine Fishing Companies Council	Dr. Eduardo Pucchi (Executive Director)

ORGANIZATION	CONTACT
CAPA – Argentine Jiggers Chamber	Captain Mario Redini (President)
Fishing Industries Argentine Chamber	Mr. Miguel Dobarro (President)
Oceanic Fishing Vessels Chamber	Lic. Darío Sócrate (Manager)
UDIPA – Argentine Fishing Interests Union	Dr. Lecuna (President)
SOMU-Maritime Workers Union	Mr. Claudio Gross (Secretary – Puerto Madryn) Mr. Mario Morato (Secretary – Buenos Aires)
Fisher’s Society	Mr. Luis Ignoto

More than 200 International NGOs were contacted but no one responded. Only four stakeholders presented written evidence, namely:

ORGANIZATION	CONTACT
FVSA	Lic. Guillermo Cañete
CEDEPESCA	Eng. Ernesto Godelman
CENPAT – CONICET	Lic. M. Eugenia Bogazzi
CAIPA	CPN Mariano Pérez

The main concerns are included in Section 5. FVSA, who represent the interests of WWF in Argentina and CEDEPESCA, both supported the conduct, management and sustainability of the fishery. Lic. Bogazzi submitted comments on the sub-criteria, indicators and scoring guideposts for the Assessment Tree. These were all considered by the Assessment Team.

- *Scoring the fishery*
The assessment team scored the fishery using the required MSC methodology and without input from the client group or stakeholders.
- *Drafting report*
The assessment team drafted the report in accordance with MSC required process, which was provided to Glaciar Pesquera S.A. for comment on the accuracy of the stated facts.

During the meetings, scoring process and drafting of the report Lic. Jorge Bridi acted as a substitute of Dr. Peter Pottinger, who was unable to be present for medical reasons. Dr. Pottinger rejoined the team in mid-December.

- *Selection of peer reviewers*
OIA, as required, released an announcement of potential peer reviewers soliciting comment from stakeholders on the merit of the selected reviewers for a period of 10 days. Dr. Oscar O. Iribarne (National University of Mar del Plata, Mar del Plata, Argentina) and Dr. William D. DuPaul (Virginia Institute of Marine Science, Virginia, USA) were selected as the final peer reviewers.
- *Peer Review on Draft Report*

Following client agreement on the draft report, a report with the Client's comments included was issued for peer review for a 2 weeks period. The peer review reports produced are appended to this report (Appendix IV).

- *Public Comment on Draft Report*

The MSC requirements are that the draft report be made available for public comment for a period of no less than 30 days.

3.2 STANDARD USED FOR THE ASSESSMENT

The MSC Principles and Criteria for Sustainable Fisheries are the standard against which the fishery was assessed. These are arranged in terms of three principles. Principle 1 is concerned with the need to maintain the target stock at a sustainable level; Principle 2, considers the need to maintain the integrity of the ecosystem in which the target stock exists; and Principle 3 addresses the need for an effective fisheries management system to fulfill the requirements of Principle 1 and 2 and ensure compliance with national and international regulations and agreements. These Principles and the supporting Criteria are presented below. These were used as guides by the Assessment Team, who considered them in relation to the characteristics of the fishery under consideration. This involves the creation of Subcriteria; deciding relevant indicators for each; setting scoring guidelines (Fail (less than 60), 60, 80 and 100 pass levels) and weighting the importance of the Criteria and Subcriteria relevant to their importance in the fishery.

PRINCIPLE 1

A fishery must be conducted in a manner that does not lead to over-fishing or depletion of the exploited populations and, for those populations that are depleted, the fishery must be conducted in a manner that demonstrably leads to their recovery.

Intent

The intent of this principle is to ensure that the productive capacities of resources are maintained at high levels and are not sacrificed in favour of short term interests. Thus, exploited populations would be maintained at high levels of abundance designed to retain their productivity, provide margins of safety for error and uncertainty, and restore and retain their capacities for yields over the long term.

Criteria:

1. The fishery shall be conducted at catch levels that continually maintain the high productivity of the target population(s) and associated ecological community relative to its potential productivity.
2. Where the exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level consistent with the precautionary approach and the ability of the populations to produce long-term potential yields within a specified time frame.

3. Fishing is conducted in a manner that does not alter the age or genetic structure or sex composition to a degree that impairs reproductive capacity.

PRINCIPLE 2

Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.

Intent

The intent of this principle is to encourage the management of fisheries from an ecosystem perspective under a system designed to assess and restrain the impacts of the fishery on the ecosystem.

Criteria:

1. The fishery is conducted in a way that maintains natural functional relationships among species and should not lead to trophic cascades or ecosystem state changes.
2. The fishery is conducted in a manner that does not threaten biological diversity at the genetic, species or population levels and avoids or minimises mortality of, or injuries to endangered, threatened or protected species.
3. Where exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level within specified time frames, consistent with the precautionary approach and considering the ability of the population to produce long-term potential yields.

PRINCIPLE 3

The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable.

Intent

The intent of this principle is to ensure that there is an institutional and operational framework for implementing Principles 1 and 2, appropriate to the size and scale of the fishery.

A. Management System Criteria:

1. The fishery shall not be conducted under a controversial unilateral exemption to an international agreement.

The management system shall:

2. demonstrate clear long-term objectives consistent with MSC Principles and Criteria and contain a consultative process that is transparent and involves all interested and affected parties so as to consider all relevant information, including local knowledge. The impact of fishery management decisions on all those who depend on the fishery for their livelihoods, including, but not confined to subsistence, artisanal, and fishing-dependent communities shall be addressed as part of this process;
3. be appropriate to the cultural context, scale and intensity of the fishery – reflecting specific objectives, incorporating operational criteria, containing procedures for implementation and a process for monitoring and evaluating performance and acting on findings;
4. observe the legal and customary rights and long term interests of people dependent on fishing for food and livelihood, in a manner consistent with ecological sustainability;
5. incorporates an appropriate mechanism for the resolution of disputes arising within the system;
6. provide economic and social incentives that contribute to sustainable fishing and shall not operate with subsidies that contribute to unsustainable fishing;
7. act in a timely and adaptive fashion on the basis of the best available information using a precautionary approach particularly when dealing with scientific uncertainty;
8. incorporate a research plan – appropriate to the scale and intensity of the fishery – that addresses the information needs of management and provides for the dissemination of research results to all interested parties in a timely fashion;
9. require that assessments of the biological status of the resource and impacts of the fishery have been and are periodically conducted;
10. specify measures and strategies that demonstrably control the degree of exploitation of the resource, including, but not limited to:
 - a) setting catch levels that will maintain the target population and ecological community's high productivity relative to its potential productivity, and account for the non-target species (or size, age, sex) captured and landed in association with, or as a consequence of, fishing for target species;
 - b) identifying appropriate fishing methods that minimise adverse impacts on habitat, especially in critical or sensitive zones such as spawning and nursery areas;
 - c) providing for the recovery and rebuilding of depleted fish populations to specified levels within specified time frames;
 - d) mechanisms in place to limit or close fisheries when designated catch limits are reached;

- e) establishing no-take zones where appropriate;
- 11. contains appropriate procedures for effective compliance, monitoring, control, surveillance and enforcement which ensure that established limits to exploitation are not exceeded and specifies corrective actions to be taken in the event that they are.

Operational Criteria

Fishing operation shall:

- 12. make use of fishing gear and practices designed to avoid the capture of non-target species (and non-target size, age, and/or sex of the target species); minimise mortality of this catch where it cannot be avoided, and reduce discards of what cannot be released alive;
- 13. implement appropriate fishing methods designed to minimise adverse impacts on habitat, especially in critical or sensitive zones such as spawning and nursery areas;
- 14. not use destructive fishing practices such as fishing with poisons or explosives;
- 15. minimise operational waste such as lost fishing gear, oil spills, on-board spoilage of catch, etc.;
- 16. be conducted in compliance with the fishery management system and all legal and administrative requirements; and
- 17. assist and co-operate with management authorities in the collection of catch, discard, and other information of importance to effective management of the resources and the fishery.

3.3 ASSESSMENT TEAM

Team Leader: Dr. Robert Peter Pottinger, OIA

His career has spanned 46 years and includes experience as an University Academic (Reader in Agricultural Zoology), as National Science Leader Plant Protection (MAF Technology, New Zealand) and more recently the Certification of primary production and processing systems (OIA), over the past decade. Dr. Pottinger has degrees in science, agriculture, plant protection and ecology. His academic career centred around teaching pure and applied ecology and zoology. His interests now are directed to development of sustainable production systems. Dr. Pottinger was awarded the annual Bledisloe Medal (1990) for outstanding contribution to New Zealand Agriculture and is a Fellow of the NZ Institute of Agriculture Science. He has been involved in national and international science reviews and assessment processes in South America, Australia and New Zealand. Since 1995 he has been involved with development of sustainable primary production systems in Argentina. As Director, Sustainable Systems he is responsible for the certification of MSC sustainable fisheries. Dr. Pottinger is a member of two certification committees and is qualified in various areas of primary production

and processing certification. As well he is Technical Director for FUSES (Fundación Selvas Sustentables), which is dedicated to integration of sustainable production, environmental protection and indigenous fauna and flora conservation, based on ecological values and social responsibility. The Foundation's interests span terrestrial and fisheries production. It's mission is to increase production and add value to it, meanwhile protecting the social structure of rural communities, isolating valuable macro and micro ecosystems, enhancing the quality of soil and water resources and the biodiversity of the productive systems.

Assessor **Principle 1:** Dr. Jaime Mendo (UNLM, Peru)

Prof. Dr. J. Mendo. "Diplom Biologe" at the University of Kiel (Germany) and Dr. rer. Nat at the University of Bremen (Germany); 15 years as Principal Professor at the Fishery Faculty of the Universidad Nacional Agraria La Molina (Peru) teaching aquatic ecology, stock assessment and management of aquatic resources; 20 years research on population dynamics and assessment of coastal fish and invertebrates, biology and management of scallops, otolith analysis, ecological experiments in feeding and settlement of scallops, growth experiments and new management strategies of scallops; Chief of the Research Office and Coordinator of the Resources and Environment Area at the Fishery Faculty (1994-2002). Leader of Research and development projects supported by IFS, GTZ, USAID, FAO, VW. Adviser for fishery research studies in the Caribbean and Pacific Colombian waters. Around 50 publications in national and international journals. Supervision of several Bachelor and M.Sc. Theses.

Assessor **Principle 2:** Dr. John Cranfield (Seabed Processes Ltd., New Zealand)

Dr. John Cranfield has over 40 years experience as a fisheries scientist involved in fisheries management issues and fisheries research in New Zealand with the Ministry of Agriculture and Fisheries, then as a senior scientist with the National Institute of Water and Atmosphere Research Limited, and latterly as a fisheries consultant. He graduated from Canterbury University, commenced studies on freshwater recreational fisheries of New Zealand and then studied the fishery for *Ostrea chilensis* in Foveaux Strait, southern New Zealand. He subsequently studied the morphology and settlement behaviour of the European oyster, *Ostrea edulis*, at the Marine Sciences Laboratory, Menai Bridge, University College of North Wales. On return to New Zealand, Dr. Cranfield studied the Foveaux Strait oyster fishery further, studied the recruitment mechanisms of *Pecten novaezelandiae*, studied the biological data available for the scallop species *Zygochlamys delicatula* for which a small fishery was then developing on the Otago Shelf, and studied the biology, distribution and fisheries potential of seven species of surf clams of the families Mesodesmatidae (*Paphies donacina*), Mactridae (*Spisula aequilatera*, *Mactra murchisoni*, and *M. discors*) and Veneridae (*Dosinia anus*, *D. subrosea*, and *Bassina yatei*).

Dr Cranfield is a specialist in stock assessment of molluscs and the effects of fisheries for these species on the seafloor. He has experience on how fishing modifies sediment composition of the seafloor, how fishing affects benthos, and how these changes alter physical and biological processes at the seabed and affect fishery production. Dr Cranfield has identified successional stages in regenerating benthic habitat and indicator species and highlighted methods for avoiding, remedying, and mitigating the effects of fishing on the environment. He has expert knowledge of the biology and ecology of shellfish, especially growth, breeding biology, larval morphology and distribution in the

plankton as well as larval fine structure, and histochemistry and how these effect settlement behaviour. Dr Cranfield also has experience in distribution, recruitment, biology, and zonation of surf clams on beaches around New Zealand coasts, the burying behaviour of surf clams and how variation in the dilatant and thixotropic properties of sand affects recruitment and mortality of surf clams as well as the efficiency of hydraulic dredges.

Assessor **Principle 3**: Dr. Enrique Morsan (IBMPAS, Argentina)

Dr. Enrique Morsan has 20 years experience as a fisheries scientist and 6 as a Professor in Marine biology in the Universidad Nacional del Comahue, Argentina. He graduated from the Universidad Nacional del Sur in Argentina and has worked as a scientist with the Instituto de Biología Marina y Pesquera “Alte. Storni”, the Universidad Nacional del Comahue and the Río Negro Province Government. Since 1998 he has held the positions of Professor of Fishery Biology and from 2000 Director of Student Research. He is a specialist in stock assessment of fish and molluscs and has considerable experience in marine invertebrate biology, ecology and resource assessment, and improved fishing methods, particularly in relation to the overall fishery in the San Matías Gulf. Dr. Morsan has been responsible for major studies on population dynamics of Purple clam (*Amianthus purpurea*), Southern geoduck (*Panopea abbreviata*), Common mussel (*Mytilus edulis platensis*), Argentine squid (*Illex argentinus*), Tehuelche scallop (*Aequipecten tehuelchus*) and Yellow clam (*Mesoderma mactroides*), and the parasitology of the Puelche oyster (*Ostra puelchana*).

This evaluation is his first as the specialist invited science reviewer for the MSC Assessment of the Patagonian scallop *Zygochlamys patagonica*.

Team Assistant: Lic. Jessica Curelovich, OIA

Lic. Curelovich graduated in Marine Biology from the Faculty of Exact and Natural Sciences (FCEyN), University of Buenos Aires in 2001. Her research thesis was completed on the feeding of Argentine anchovy (*Engraulis anchoita*), during the intense period of spawning, and the impact of cannibalism on the embryonic stages.

Lic. Curelovich has made presentations on her research at National and International Congresses, and has completed many courses in relation to marine ecology, environmental management, interactions between plankton and benthic systems, and on board observer activities. During the period 2002-2003 she worked in the Tunicate Laboratory of the Faculty of Exact and Natural Sciences, during which time she studied the seasonal occurrence of Appendicularians in temperate waters of the SW Atlantic Ocean, and their biomass and secondary production. Since 2003 she has been associated with OIA in regard to Certification of the MSC Sustainable Fisheries. She participated in the MSC Pre-assessments of the Patagonian scallop (*Zygochlamys patagonica*) fishery in the Argentine Continental Shelf and Common hake (*Merluccius hubbsi*) fishery in the San Matías Gulf, Río Negro Province.

4 CONSULTATION PROCESS

The assessment team met with Glaciar Pesquera S.A. and the stakeholders between 31 October and 10 November 2005. Furthermore, the team met with INIDEP personnel to discuss aspects of the research and analyze scientific results in support of the fishery.

The visit to INIDEP also included observation of sample processing in the Benthic Laboratory. In addition, the evaluation team collected information during a visit to one of the scallopers (Atlantic Surf I) which operates in the fishery. OIA also met with INIDEP personnel to discuss the scientific research and analyses provided in support of the fishery. In addition to the meetings that were held, a significant number of exchanges were made by email and telephone with many of the same people and organizations contacted in an attempt to clarify issues/concerns, or in pursuit of specific data identified as missing and important during the Assessment Team's review. Table 7 below is a list of the meetings held with fishing industry participants, INIDEP scientists, navigation and fishing operation control entities, NGOs, and Federal Fishery Council staff. The result of these consultations together with all written material and scientific papers, technical reports, and all pertinent maritime and fisheries laws were considered and used to make the determinations under each principle and criterion.

Table 7. List of industry and management personnel, conservation organizations and other non-industry stakeholders interviewed for the project.

DATE	ORGANIZATION	CONTACT	ISSUE
31 Oct 2005	Glaciar Pesquera S.A.	CPN Eduardo González Lemmi, President	Current and future aspects of the certification process. General information on the fishery and fishing operations. General aspects of the Patagonian scallop fishery management.
	Visit to the scalloper "Atlantic Surf I"	Mr. Miguel Lucero, Ships Officer	Details of the information collected during the fishing operations. Catch and on board processing activities. Visit to all the vessel areas. Samples of commercial scallops and by-catch.
1 Nov 2005	Argentine Fishing Industry Chamber	CPN Mariano Pérez	Analysis of the fishery. CAIPA's concerns (see Section 5).
2 Nov 2005	Custom's Agent	CPN Jorge Shepherd	Details of landing process and product exportation. Compulsory procedures and documentation.

	Inspectors	<ul style="list-style-type: none"> • Mr. Alejandro Moscato • Mr. Angel Roig • Mr. Marcos Russich • Mr. Jorge Moyano 	<p>Analysis of the fishery. Structure and functioning of the control systems. Control activity in the Patagonian scallop fishery. Documentation on capture, gears and processing required to the shipowners. Record of infractions in the fishery.</p>
	CeDePesca	Eng. Ernesto Godelman	<p>Analysis of the current status of the fishery and aspects to be improved. Endangered and threatened species. Environmental issues related to the fishery.</p>
7 Nov 2005	INIDEP	<ul style="list-style-type: none"> • Lic. Mario Lasta • Lic. Silvana Campodónico • Dr. Otto Whöler 	<p>Analysis of the fishery. Details on past, on-going and future scientific studies. Fishery and scientific knowledge of the target species. Approved research programme. Management areas and no-take zones. Dissemination of the research results. Internal and external reviews. Other issues.</p>
8 Nov 2005	INIDEP	<ul style="list-style-type: none"> • Lic. Mario Lasta • Dr. Claudia Bremec 	<p>Analysis of the fishery. Details on past, on-going and future scientific studies. Fishery and scientific knowledge of target and non target species. Research funding. Other issues.</p>
	INIDEP Hidroacoustic Laboratory	<ul style="list-style-type: none"> • Eng. Adrián Madirolas • Lic. Martín Tripode 	<p>Functioning of the Multibeam system. Progress, results and perspectives of Multibeam research.</p>

	On Board Observers	Lic. Gabriel Blanco	Structure and functioning of the observers on board programme. Goals and objectives. Dissemination of the results. Current and future observer coverage in this fishery. Protocols used and sample system.
10 Nov 2005	Coastguard	<ul style="list-style-type: none"> • Prefecto Principal Juan Carlos Salvarezza • Prefecto Principal Oscar Maineti • Prefecto Norberto Pasqualino • Ayudante Néstor Baez • Cabo Walter Sena • Cabo Walter Sandoval 	Structure and functioning of the Fishery Police Department. Agreements between PNA and both the maritime provinces and other relevant institutions. Functioning of the satellital control system. Record of infractions in the fishery. Agreements with SAGPyA.

	Federal Fishery Council	<ul style="list-style-type: none"> • Eng. Marcelo Santos, in charge of the Presidency of Federal Fishery Council. • Embassy Secretary Javier Figueroa, Representative of INTERNATIONAL RELATIONSHIPS and FOREIGN TRADE MINISTRY • Eng. Jorge Khoury, Representative of the ENVIRONMENT AND SUSTAINABLE DEVELOPMENT SECRETARIAT • Mr. Carlos Cantú, Representative of NATIONAL EXECUTIVE POWER • Dr. Lisandro Belarmini, Representative Substitute of Buenos Aires Province • CPN Italo Sangiuliano, Representative of RIO NEGRO Province • Lic. Omar Rapoport, Representative of CHUBUT Province • Lic. Omar Rapoport, Representante de la Provincia de CHUBUT • Lic. Lidia Prado, Technical Secretary of the FFC 	<p>MSC Certification.</p> <p>General aspects of the fishery and management system.</p> <p>Structure and functioning of the national fishery administration.</p> <p>Legal founding of the fishery.</p> <p>Functioning of the FFC.</p> <p>Patagonian scallop fishery policy.</p> <p>Fishing management measures.</p> <p>Management Plan of the Patagonian scallop fishery. Management objectives.</p> <p>Dissemination of the scientific and management information.</p> <p>Treatment of the scientific and technological information. Stakeholders relationships.</p> <p>Relationship with other fishing management institutions.</p> <p>Administration and research funding.</p> <p>Internal and external reviews of the management system.</p>
--	-------------------------	--	---

5 STAKEHOLDER CONCERNS

During the stakeholder consultation process the Argentine Fishing Industry Chamber (CAIPA in Spanish) located in Mar del Plata, expressed the only opposition to the certification of the fishery. In accord with the MSC procedures, the certification body has to respond to any concern formally expressed and not only lay the foundations for all the decisions taken, but document them, prior to the use of a mechanism for dispute resolution in the event that the objecting party is dissatisfied with the certification body's response.

Taking into account that the concern presented by CAIPA was a legal issue, lawyers with experience in administrative rights were consulted, in relation to the management measure sanctioned by the FFC, in the context of the attributes established in the Article 9° of the Federal Fishing Law 24.922.

During the consultation process, the assessment team met with the FFC and asked the authorities if they had received any administrative complaint against Resolutions FFC N° 4 and 5/2005. The answer was negative. As well, they indicated that the deadline to present complaints had already expired.

CAIPA'S COMPLAINT

CAIPA made a formal presentation to the Assessment Team during the consultation process (See Appendix IV for Spanish (original submission) and English versions). The concerns are in essence the following two:

- The fishery or the exploitation of the resource is conducted as a monopoly, and does not comply with the specific instructions of the Law 24.922.
- The norms sanctioned by the FFC include the "Fishing Authorizations" given to the fishing companies. These were created by the Law 24.922 but currently they are not fully operative or they would not be valid until the fishing regime is changed to Individual Transferable Quotas.

OIA decided to consult the Control Authority about the issue, who declared that no legal objections from interested parties had been made following the procedures established. After that, OIA consulted the lawyers who advised the Organization in regard to Argentine fishing law and administrative legal issues. The lawyers indicated that the complaint of CAIPA is not legally valid. The foundations of this decision are coincident with those expressed by the FFC.

For these reasons, the assessment team believes that there is not a valid basis to CAIPA's claim that the fishery does not meet the minimum requirements in regard to Principle 3 and, in particular to Performance Indicator 3.1.4.

6 ASSESSMENT TEAM PERFORMANCE EVALUATIONS

After completing all the reviews and interviews, the assessment team evaluated the performance of the fishery using all the information provided. Under the MSC program, the evaluation process is performed by prioritizing and weighting the indicators relative

to others within the same hierarchical level. These weights were established when the assessment team developed the set of performance indicators and scoring guideposts for the fishery. Subsequent to this, the assessment team assigned numerical scores between 0 and 100 to each of the performance indicators in a discrete scale increasing by intervals of five. All of this is accomplished using decision support software known as Expert Choice, which utilizes a technique known as AHP (Analytical Hierarchy Process). A full description of the AHP process can be found on the MSC web site (www.msc.org). All team members worked together to discuss and evaluate the information they had received for a given performance indicator and came to a consensus decision on weights and scores. Scores and weights were then combined to get overall scores for each of the three MSC Principles.

The MSC Principles and Criteria, the sub-criteria, indicators and scoring guidelines for them, and the weightings for the indicators and sub-criteria developed by OIA's Assessment Team and the comments of the Team for each indicator used to score the fishery are presented in the scoring tables (Section 6.2).

A fishery must have normalized scores of 80 or above for each of the three MSC Principles, in order to be recommended for certification. Should an individual indicator receive a score of less than 80, a 'Condition' is established that when met, would bring the fishery's performance for that indicator up to at least the 80 level score representing a well-managed fishery. Additionally, the assessment team felt that when some indicators reached a score of 80 or more, improvements could be made in the fishery without to much effort by the responsible institutions. In this case the recommendations made are specified below.

6.1 ASSESSMENT RESULTS

Using the MSC Methodology, the Assessment Team found that the Patagonian scallop fishery meets the objectives of the three independent Principles. For each Principle the fishery attained the following scores:

PRINCIPLE	DESCRIPTION	SCORE	CONCLUSION
Principle 1	Research and information on the resource.	82.7	Pass
Principle 2	Ecological impacts	91.6	Pass
Principle 3	Management system	92.4	Pass

As a consequence, the Assessment Team recommends to the OIA Certification Committee that the fishery be considered for certification according to the Principles and Criteria of the Marine Stewardship Council as a "*WELL-MANAGED AND SUSTAINABLE FISHERY*".

6.2 ASSIGNED SCORES AND COMMENTS

The following are the observations for each indicator by the Assessment Team, together with the relative weights assigned and scores reached.

SCORING INDICATORS		Comments	Weight	Score
PRINCIPLE 1	A fishery must be conducted in a manner that does not lead to over-fishing or depletion of the exploited populations and, for those populations that are depleted, the fishery must be conducted in a manner that demonstrably leads to their recovery.			
1.1	The fishery shall be conducted at catch levels that continually maintain the high productivity of the target population(s) and associated ecological community relative to its potential productivity.		0.50	
1.1.1	There should be sufficient information on the target species and stock(s) to allow the effects of the fishery on the stock(s) to be evaluated.		0.20	
1.1.1.1		The identification and reporting of target species is well documented.		
60	There is confusion between the target species and other species by fishermen, such that misidentification is possible, but catch data are not compromised to unacceptable levels.	There are two species of pectinids described from the Argentine Sea, a bay scallop, the “tehuelche scallop”, <i>Aequipecten tehuelchus</i> (with two subspecies, <i>Z. madrynensis</i> , and <i>Z. felipponei</i>) and the open sea scallop, <i>Zygochlamys patagonica</i> . Each are clearly distinguishable (Ciocco <i>et al.</i> , 1998; Lasta <i>et al.</i> , 1998a; Orensanz <i>et al.</i> , 1991b; Waloszeck, 1991). The species is easily identifiable by scientists, on board observers and fishermen, so that there is no possibility of misidentification. There is no doubt that the landings of this fishery can be clearly attributed to <i>Z. patagonica</i> .	0.10	100
80	The target species is unlikely to be confused with any other species.			
100	The target species is readily identifiable by fishermen and regulators, such that catch data are recorded appropriately.			

SCORING INDICATORS		Comments	Weight	Score
1.1.1.2		The life history of the species is understood.		
60	There are significant gaps in information but the basis of the life history is understood adequately to support a rudimentary evaluation of the fishery.	The basic life history of <i>Zygochlamys patagonica</i> is understood. The early life history has not been studied intensively, but can be inferred from knowledge on the free swimming stages and settlement of similar species (Ciocco <i>et al.</i> , 1998). The sexes are separate and hermaphrodites are rarely found (Campodónico <i>et al.</i> , 2001b). The age at sexual maturity is 2 years at a size of 40 mm (Waloszek and Waloszek, 1986). There are two spawnings, one in spring and the other in late summer-early autumn (Orensanz <i>et al.</i> , 1991b). The size at settlement identified from the prodisoconch stage is 200 microns (Lasta <i>et al.</i> , 1998a).	0.10	80
80	The life history of the species is clearly documented and understood well enough to support an acceptable degree of confidence in the evaluation of the fishery.	The species lives up to thirteen years and reaches a maximum size of 90 mm (Lasta <i>et al.</i> , 1998a). The life history of the species is understood well enough with an acceptable degree of confidence to evaluate the fishery.		
100	All aspects of the life history of the species, including its behaviour, are clearly documented and understood so as to support a very high degree of confidence in the evaluation of the fishery.			

SCORING INDICATORS	Comments	Weight	Score
1.1.1.3		The population dynamics of the species (including age at maturity, natural mortality, growth, and fecundity) are understood.	
60	Initial estimates are available for key population-dynamic parameters, including age at maturity, natural mortality rate and growth rate.	<p>The age and size at first maturity are known (Waloszek and Waloszek, 1986). Growth rates and natural mortality rate of <i>Z. patagonica</i> are well established (Valero, 2002,). Shell growth was maximum in the winter and somatic growth was maximum in the summer (Valero, 2002). The von Bertalanffy growth equation has been fitted; parameter estimates are 53-98 mm asymptotic height with a strong latitudinal variation, and 0.17-0.50/year for <i>k</i> (Ciocco <i>et al.</i>, 2005; Valero <i>et al.</i>, 2001). Valero (2002) analysed growth and found spatial variation in one bed.</p> <p>The total mortality rate estimated by Valero (2002) fell between 0.31 and 0.46. So far the spatial variations in mortality rate have not been investigated.</p> <p>Studies on fecundity are programmed (M. Lasta, pers. comm.). An integrated model for growth and mortality has been constructed (Valero, 2002). There is sufficient information to select an appropriate model to initiate the study of the dynamics of the species.</p>	0.15
80	Well-founded estimates are available for key population-dynamic parameters, including age at maturity, variations in fecundity with age or size, natural mortality rate and growth rate. There is some understanding of spatial variations in those parameters. There is sufficient knowledge of the population dynamics of the species for appropriate model structures to be selected.		75
100	Well-founded estimates are available for key population-dynamic parameters, including age at maturity, variations in fecundity with age or size, natural mortality rate and growth rate. There is some understanding of spatial variations in those parameters. There is		

SCORING INDICATORS		Comments	Weight	Score
	<p>sufficient knowledge of the population dynamics of the species for appropriate model structures to be selected.</p> <p>The factors controlling natural mortality are monitored. The factors controlling variations in the natural mortality rate are understood.</p>			
1.1.1.4		The geographical range of the target species and stock is known.		
60	Estimates of the geographic ranges of the target species and stock(s) are available.	<p>The geographic range of the target species have been established by both surveys and fishing activity to extend from 40 to 200 m of water depth from 42° S in Chile to 35° S on the eastern seaboard of South America. The species extends its southern range to the Burwood Bank (Lasta and Zampatti, 1981; Waloszek and Waloszek, 1986; Defeo and Brazeiro, 1994; Lasta and Bremec, 1998). The species is restricted to waters with a temperature range of 3° to 9° C (Helmayer <i>et al.</i>, 2001).</p> <p>The biomass surveys carried out by dredging on a grid pattern over the area of the fishery has permitted the generation of very detailed maps of spatial distribution of scallop density and has identified the nature and shape of beds along the Argentine Shelf using kriging (Lasta <i>et al.</i>, 2001e,f) as well those beds along the Uruguayan Shelf (Gutierrez and Defeo, 2002). These data are complemented by kriging analysis of trawl lines of the commercial fishery (Bogazzi, unpublished data).</p>	0.10	100
80	Reliable estimates of the geographic ranges of the target species and stock(s) are available.			
100	The range of the target species is well established and the distribution of the target stock(s) is comprehensively mapped.			

SCORING INDICATORS	Comments	Weight	Score
1.1.1.5	The spatial structure of the target stock is known.		
60	There is some knowledge on spatial structure of the target stock.	0.15	90
80	The range of the target stock(s) is subdivided into management units which have some biological justification. Only very minor parts of the range are outside any management unit.		
100	The biological and oceanographic basis for the spatial structure of the target stock(s) is known. Patterns of movement (including larval drifts) by the target stock(s) are understood. Management units are based on the known biological structure.		

SCORING INDICATORS		Comments	Weight	Score
1.1.1.6		Information on the relationship of recruitment to parental stock is understood.		
60	Indices of recruitment and spawning stock are available but are not sufficient to track year-class strengths nor to examine spawner/recruit relationships with high confidence.	Recruitment and spawning stock have been estimated for each management zone and each bed fished. Orensanz <i>et al.</i> (2005) have hypothesized that larval settlement depends mainly on physical, environmental or biological parameters within the distribution area of the species, and not necessarily on the number of larvae from the spawning stock. The dynamic nature of ocean currents over the Argentine Continental Shelf, suggests they are important in the distribution and settlement of larvae (Bogazzi <i>et al.</i> , 2005). Should larvae act as passive particles in these currents, few that are spawned on any one bed would remain and settle there (Bogazzi <i>et al.</i> , 2003). However, there is growing evidence that invertebrate larvae do not act as passive particles (Wood and Hargis, 1971; Baker, 2003) and that in spite of the mean current appearing unidirectional, at the local scale eddies and minor counter currents influence distribution. Thus there could be a relationship between spawning stock biomass and recruitment and the data collected will allow the testing of this hypothesis within beds and between beds (Bogazzi <i>et al.</i> , 2005).	0.10	80
80	Estimates of recruitment and spawning stock are available, for each of the principal management areas. Enough years of data are available to track changes in recruitment and detect recruitment trends.			
100	Estimates of recruitment and spawning stock are available for each management unit in the spatial structure of the target stock(s). The impacts of environmental factors and density of the spawning stock on recruitment are understood.			

SCORING INDICATORS		Comments	Weight	Score
1.1.1.7		Information is collected on the biomass/density of the stock.		
60	<p>Either fishery-dependent or fishery-independent indices of the biomass and density of biomass in each of the principal management areas are available for some years. Qualitative information exists on the appropriateness of the indices as proportional indicators of stock size, sufficient to support a rudimentary evaluation of the fishery.</p>	<p>Annual fishery-independent assessments of each bed within both zones in order to estimate the biomass by bed, using grid pattern dredge surveys, are carried out by INIDEP (Lasta <i>et al.</i>, 2001e; annual INIDEP Survey Reports). These direct estimates of biomass allow trends in the size of the stock to be analysed within beds.</p> <p>The fishery-dependent information is collected at a very fine scale allowing analysis of CPUE and total catch for each bed. The CPUE data provides an index of biomass allowing changes in biomass of each bed to be followed. The conversion coefficient data (muscle weight per scallop; Table 2) allows estimates of biomass of commercially processed scallops to be estimated from the muscle landed.</p>	0.15	90
80	<p>Fishery-dependent and/or fishery-independent indices of the biomass and density of biomass in each management area are available. The indices are appropriate and generate confidence as indicators of biomass and density.</p>			
100	<p>Multiple fishery-dependent and/or fishery-independent indices of the biomass and density of biomass in each unit of the spatial structure of the stock(s) are available for enough years that trends in biomass are understood. The indices are based on survey designs and data-collection</p>			

SCORING INDICATORS	Comments	Weight	Score
protocols that are statistically rigorous and robust. There is clear evidence that they are proportional to the biomass and density of the stock(s) and of sufficient precision to support a very high degree of confidence in the indicated trends in biomass and density.			

SCORING INDICATORS		Comments	Weight	Score
1.1.1.8		The age and/or size structure of the stock is measured.		
60	There is some information available, sufficient to support a rudimentary evaluation of the fishery, on the age and/or size structure in each of the principal management areas in some years.	<p>The size of scallops on each bed is measured in samples taken in annual dredge surveys allowing the size structure of each bed to be analysed (annual INIDEP Technical Reports). Each sample represents approximately 7% of the total catch per haul (catch average: 140 Kg, SD: 110; n: 148; sample average: 6,7 Kg, SD: 4,8, n: 148). These data are analysed and used to monitor recruitment by bed and include the proportion of undersized scallops in the total catch, so management can be modified. The calculation is based on the proportion of commercial size scallop to total catch.</p> <p>The relationship between age and size of <i>Zygochlamys patagonica</i> was established by Valero (2002), so the size structure of scallop populations can also be used to estimate the age structure.</p>	0.15	90
80	There is sufficient information to allow estimates to be made of the age and/or size structure in each management area each year, those estimates being adequate to generate confidence in the evaluation of the fishery.			
100	There are accurate estimates of the age and size structure in each unit of the spatial structure of the stock(s), sufficient to support a very high degree of confidence in the evaluation of the fishery.			

SCORING INDICATORS		Comments	Weight	Score
1.1.2		There should be sufficient information on the fishery to allow its effects on the target stock(s) to be evaluated.	0.20	
1.1.2.1		Fishery removals are recorded/estimated (including landings, discards and incidental mortality).		
60	Sufficient information is available on annual landings of the target stock(s), from each principal management unit, by the principal fisheries to support a rudimentary evaluation of the fishery. Estimates of discards and incidental mortality, of the target stock(s), are available.	<p>Fishers record the position of each trawl and the unsorted catch of each trawl shot is recorded as meat weight allowing estimates of the catch of each bed. The biomass of commercially processed scallops is estimated using the conversion ratio of meat weight to scallop (See Table 2).</p> <p>Discards of undersized scallops are estimated by bed by analysis of the on board observer samples which record the numbers of commercial and undersized scallops. The proportion of the total catch represented by the sub-sample, is estimated from the fullness of the trawl net (previously calibrated for weight) and used to estimate total discard of undersized scallops, as well as total catch.</p> <p>Incidental mortality of trawl caught and sorted scallops has been experimentally studied by Bremec <i>et al.</i> (2004), who found 95.9% survival of undersized scallops returned to the sea. This experiment was carried out in 1995 and 1997 after two years of fishing.</p> <p>Estimates of discarding are verified by the on board observers (G. Blanco, per. comm.)</p> <p>Incidental mortality caused by other fisheries is negligible or non-existent.</p>	0.20	80
80	Annual landings, discards and incidental mortality (including those caused by minor directed and incidental-catch fisheries) of the target stock(s), in each management unit, are sufficiently well recorded or estimated to generate confidence in the evaluation of the fishery. The estimates of discarding and incidental mortality are verified by observers or some form of statistical sampling.	Bogazzi and Lasta (2000) stated that 98.8% of the juveniles between 3 and 30 mm are attached to the adult scallops. From observational data, the washing process removes nearly all of these, which are immediately returned to the sea (M. Lasta, pers. comm.; G. Blanco, pers. comm.).		
100	Landings, discards, incidental mortality and all other removals by all fishing activities are recorded and/or estimated			

SCORING INDICATORS	Comments	Weight	Score
<p>sufficiently to support a very high degree of confidence in the evaluation of the fishery. Spatio-temporal locations of removals by the principal fisheries are recorded at high precision, sufficient that they can be attributed to their sources within the spatial structure of the stock(s). A high proportion of sets by the principal fisheries are observed or otherwise monitored, to record discarding independently of logbooks.</p>			

SCORING INDICATORS		Comments	Weight	Score
1.1.2.2		The age and/or size structure of catches is measured.		
60	Available data on the age and/or size compositions of catches and other removals, from each principal management unit of the target stock(s), are sufficient to support a rudimentary evaluation of the fishery.	Comprehensive, accurate information is gathered on the size composition of all catches of the target stock over the whole fishery. The On Board Observer Programme takes sub-samples (10 Kg.) of the catch (approximately 1500 Kg.) three times a day, or more if the vessel moves to other fishing area (On Board Observers Manual, in preparation; G. Blanco, pers. comm.; M. Lasta, pers. comm.). The size of all scallops in the sub-samples is measured and the size structure of the catch from the fishing area can be estimated precisely from these data. The age-size key developed by Valero (2002) allows the age structure to be estimated. Further studies on age and size are being undertaken more widely (M. Lasta, pers. comm.).	0.20	95
80	Available data on the age and/or size compositions of catches and other removals, from each management unit of the target stock(s), are of adequate accuracy to generate confidence in the evaluation of the fishery. A high proportion of the catch is reliably sampled for its age and/or size composition.			
100	There is comprehensive and reliable data, collected, on the age and size composition of all catches from the target stock(s), sufficient to support a high degree of confidence in the evaluation of the fishery. Size and age composition estimates for catches by the principal fisheries are available for each unit of the spatial structure of the			

SCORING INDICATORS	Comments	Weight	Score
<p>target stock(s) and with an adequate temporal resolution, sufficient to support a highly-reliable evaluation of the fishery. Adequate data are available on the sizes and ages of members of the target stock(s) that are lost to incidental mortality and of other non-catch removals. A high proportion of sets is monitored, for size compositions, by observers.</p>			

SCORING INDICATORS		Comments	Weight	Score
1.1.2.3		Fishing effort is recorded or estimated, and standardized to effective fishing effort.		
60	Annual nominal effort data are available and can be used to estimate effective fishing effort well enough to support a rudimentary evaluation of trends in fishing mortality.	All four vessels in the fleet operate in a similar way and use the same gear. This result in a standardization of fishing effort. The size and fishing capacity of the vessels varies between the companies (See Section 2.3). Comprehensive records of fishing effort in all beds/areas fished for <i>Z. patagonica</i> is recorded by fishery companies per vessel, the Coastguard and INIDEP (E. González Lemmi pers. comm.; J.C. Salvarezza, pers. comm.; M. Lasta, pers. comm.). The records have high temporal and spatial precision (± 40 m). These data are cross referenced by observations recorded daily by on board observers (G. Blanco, pers. comm.).	0.10	
80	Accurate estimates of annual effective fishing effort (based on recorded nominal effort data) are made, sufficient to generate confidence in the evaluation of the fishery. The relationship between the nominal fishing effort measure and the fishing mortality rate, including any changes in that relationship over time, has been established.	The logbooks record vessel characteristics, equipment, fishing gear, fishing operations, treatment and processing of the catch, and basic data of hauls. The same gear has been used since the inception of this fishery (M. Lasta, pers. comm.). There are no signs of changes in the seafloor structure or habitat as indicated by the by-catch (C. Bremec and M. Lasta, pers. comm.) so catchability is unlikely to have changed due to fishing activities.		
100	Comprehensive records are kept of fishing effort in all fisheries which take the target stock(s), effort by the principal fisheries being recorded at a high temporal precision. Nominal effort is standardized to effective fishing effort (including standardization for changes in catchability over time and for the effects of environmental factors)			

SCORING INDICATORS		Comments	Weight	Score
	using well-founded relationships and providing an index of fishing mortality which can support a high degree of confidence in the evaluation of the fishery.			
1.1.2.4		Spatial distribution of the effort is known.		
60	Available effort data for the principal fisheries are separately recorded for each principal management unit.	Trawl positions are recorded from Global Positioning System and allow the area of seafloor swept (tow length multiplied by trawl door spread) in each tow to be estimated with a precision of ± 40 m for the length and width of the trawl (M. Lasta, pers. comm.). These data are cross checked in real time by on board observers as well as the Coastguard and INIDEP through on line connections. All data is recorded at this precision, allowing analysis that preserves this precision and production of fine scale maps of fishing effort for comparison with the precise maps of stock structure produced by the dredge surveys (INIDEP Report, 2005).	0.10	100
80	The estimates of effective fishing effort are made separately for each management unit.			
100	Fishing effort by the principal fisheries is recorded at a high spatial precision, sufficient to attribute that effort to the units of the spatial structure of the target stock(s) on which it is exerted. Analyses of the fishing-effort information preserve that spatial resolution.			

SCORING INDICATORS		Comments	Weight	Score
1.1.2.5		Fishing methods and gear types are known throughout the fishery.		
60	Main fishing methods and gear types used in the principal fisheries are known well enough to support a rudimentary evaluation of the fishery.	All vessels use the same otter trawl (M. Lasta, pers. comm.). The fishing method utilized consists of two trawl nets that operate on each side of the vessel. This gear has a total length of 13 m. The otter boards are conventional rectangular, steel-framed doors with timber panels, 1 m in height, 3.4 m long, and weighing 490 kg each. Doors are attached to a single trawl warp by a 26 m long bridle. The head rope and foot rope are 15 m long and attached directly to the doors. There are two tickler chains (4.3 kg per meter each) attached to the foot rope. The net is constructed of 6 mm polypropylene twine and has a 10 cm mesh size.	0.20	100
80	Main fishing methods and all gear types used in fisheries are known sufficiently to generate confidence in the evaluation of the fishery.	The cod-end is made of 8 mm nylon twine with a 10 mm mesh size. The top and bottom panels are identical and the bottom has pulley chaffing gear attached to protect the net. Net mouth opening varies from 10.6 m to 12.6 m depending on load. Each vessel operates two nets towed by a cable and using a length-to-depth ratio of 3:1 (Lasta and Iribarne, 1997). In general, assuming that the vessel is operating to 100 m depth, the length of the tow line is 300 m and 325-350 m for each net, depending of the state of the sea.		
100	All fishing methods used in fisheries which take the target stock(s) are known and comprehensively documented. Fishing practices are routinely observed and recorded. The fishing behaviours of the fishermen have been described and their controlling factors are well understood. The information and observations support a high degree of confidence in the evaluation of the fishery.	On board observers on all vessels record fishing methods and fishing behaviour (G. Blanco, pers. comm.) giving a high degree of confidence in the evaluation of the fishery.		

SCORING INDICATORS		Comments	Weight	Score
1.1.2.6		Selectivity is known for the fishery (including incidental catches).		
60	Some information is available on gear selectivity and qualitative changes in that selectivity, sufficient to support a rudimentary evaluation of the fishery.	Only one gear is used in the entire fishery. The selectivity of this trawl gear was initially investigated in 1997 (M. Lasta, pers. comm.). Valero (2002) modelled selectivity of this gear and found that scallops were 95% selective by the end of their first year. The selectivity of this gear could probably be improved by using square mesh (M. Pittman, pers. comm.; M. Lasta, pers. comm.) reducing the take of undersized scallops and also by-catch. Scallops are not captured in any other fisheries and therefore suffer no incidental mortality, outside the scallop fishery.	0.20	95
80	Size, sex and maturation-stage selectivities of the principal gear type are established, whilst the selectivities of all other gear types which take the target stock(s), including those used in incidental-catch fisheries, are adequately estimated, sufficient to generate confidence in the evaluation of the fishery. Information is available to evaluate any changes in selectivity over time. Information is available on targeting and culling practices.	Sorting of the catch occurs mechanically in a rotating drum cushioned in water and undersized scallops and by-catch are discarded to the seafloor within 10-20 minutes (G. Blanco, pers. comm.). The size range of these discards is routinely recorded by on board observers (G. Blanco, pers. comm.).		
100	Selectivities have been accurately estimated for all gears which take the target stock(s), for all locations and time of fishing, including changes in those selectivities over time. Targeting, culling and discarding practices are			

SCORING INDICATORS		Comments	Weight	Score
	comprehensively described and routinely monitored.			
1.1.3	Appropriate reference levels have been developed for biomass and fishing mortality rate.			
1.1.3		Appropriate reference levels have been developed for biomass and fishing mortality rate.		
60	Limit and target reference points for biomass and fishing mortality rate have been proposed in a preliminary way.	The appropriateness of whole stock fishing mortalities as target or limit reference points for fisheries of sedentary stocks that include rotational fishing or area closures (such as occurs in this fishery) has been seriously questioned (Hart, 2003). The TAC is established for each bed within both management units, taking into account commercial biomass and minimum legal size. The TAC is 40% of the commercial biomass (Resolution FFC N° 4/2005). Areas where juveniles exceed 50% (in numbers) of the population are closed to protect recruitment. The fishing strategy of individual fishers leads to the development of a loose rotational fishing pattern.	0.10	70
80	Limit and target reference points for biomass and fishing mortality rate have been determined based on stock biology.	Within the concept of Rotational Harvest the upper and lower thresholds, related to biomass (= number and/or proportion of commercial sized adults to juveniles and first year reproductive adults) are in effect reference points for sedentary invertebrates. In the case of the Patagonian scallop fishery these are expressed as,		
100	Limit and target reference points for biomass and fishing mortality rate have been established and adjusted for stock biology, uncertainty, variability and data limitations.	1) Upper threshold for fishing activity: Cessation of fishing when 40% of commercial sized adults allowed by law are captured. 2) Lower threshold for fishing activity: Is when more than 50% (in numbers) of the juvenile scallops established by previous surveys make up the population. Fishing is prohibited. Obviously the fishing mortality added to the natural mortality does not exceed the total mortality rate for the bivalvular stages of the scallops as there has been no need to close the fishery. The fishery resource under current adaptive management over 10 years has allowed for closure and recovery of beds and is therefore sustainable. The commercially available biomass (the biological reference point) is used to drive the rotational harvest strategy.		

SCORING INDICATORS		Comments	Weight	Score
1.1.4		There is a well-defined and effective harvest strategy for managing the target stock(s).	0.10	
1.1.4.1		There is a management strategy in place to adjust harvest as required for management of the stock(s).		
60	Mechanisms exist to monitor and reduce harvest to avoid overfishing.	Many common fishery models that aim to achieve MSY sustainability are inappropriate for sessile and sedentary stocks with spatially persistent structures (or distribution). These are more appropriately managed under a rotational fishing regime, which is a more precautionary strategy protecting the fishery from both growth and recruitment overfishing as well as protecting benthic habitats (Hart, 2003).	0.33	100
80	Mechanisms are in place to reduce harvest when required to maintain the target stock(s) at productive levels. Measures to demonstrate the effectiveness of those mechanisms are in place.	Biomass levels are maintained with a TAC of 40% of commercial biomass (Resolution FFC N° 4/2005). A loose rotational fishing pattern is developed from the fisher's strategy to harvest areas on which they can achieve an optimum catch rate. The lowest acceptable commercial production (about 5 tonnes of meat weight per day, E. González Lemmi, pers. comm.) provides an informal limit reference point for biomass before the vessels move on to another area.		
100	Mechanisms are in place to promptly reduce harvest as and when required to maintain the target stock(s) at productive levels. There is a high degree of confidence in the effectiveness of those mechanisms.	Recruitment is maintained by closing areas of high juvenile densities (where juveniles represent more than 50% (in numbers) of the total scallop population) and the use of Marine Protected Areas (MPA) within the limits of individual beds in order to preserve breeding stocks (See Hart, 2003). INIDEP monitors juvenile levels in catches on the different areas and both INIDEP and industry discuss closures and advise SSPyA, who make recommendations to the FFC and action the decisions taken by it. The TAC is designed to prevent overfishing. The amount of scallops caught is closely monitored by INIDEP, the SSPyA and the fishing companies and area closures can be implemented by the FFC within 1-3 days of the fleet reaching the TAC. The use of fixed density of scallops per unit area is not guaranteed to control fishing because it is dependent on economic factors such as profitability and trade.		

SCORING INDICATORS		Comments	Weight	Score
1.1.4.2		There are clear, tested decision rules set out for effective management of the stock(s).		
60	Decision-making is logical and appropriate, although not fully documented. Decision rules have not been tested.	The decision rules for this fishery are well documented in Federal Fishing Law, its complementary Decree, resolutions and minutes of the FFC (See Section 2.5.1). The measures are adjusted to reality and are consistent with the limitations of the data. The decision rules are periodically evaluated, once or twice a year. The fishery has the potential to score 100 when it establishes formal reference points.	0.33	95
80	Clear decision rules exist and are fully documented but have not been fully tested. Decision rules are consistent with reference levels and with data and assessment limitations.			
100	Clear, documented and tested decision rules are fully implemented, are fully consistent with reference levels and with data and assessment limitations. The decision rules are evaluated periodically.			

SCORING INDICATORS		Comments	Weight	Score
1.1.4.3		There are appropriate management tools specified to implement decisions in terms of input and/or output controls for management of the stock(s).		
60	Management tools are specified and relevant to the characteristics of the fishery. There is some evidence that the tools used lead to sustainable management of the fishery.	<p>The management objective is to develop a sustainable fishery (See Resolution FFC N° 4/2005). Management tools such as closures and opening of fishing beds based on TAC and the proportion of juveniles to adults, the adaptive management system and the establishment of no-take zones, all appear to be appropriate management tools in order to meet the management objective. Even though the fishery is relatively new, the measures and tools implemented are consistent and the decision making is reactive, relevant and timely.</p> <p>Over the last 6 years of the fishery the biomass has remained relatively constant (Figure 10) in spite of variation in fishing pressure indicating that the measures implemented are effective and are achieving the objective set for the fishery.</p>	0.33	90
80	Management tools are specified. They have been adapted to this fishery but are lacking in some details. There is reliable evidence that they are effective in improvement of sustainable management of the fishery.			
100	Management tools designed for and appropriate to the fishery have been specified. Application of those tools is responsive, relevant and timely. Their performance has been evaluated and clearly shown to achieve management objectives.			

SCORING INDICATORS		Comments	Weight	Score
1.1.5		There is an appropriately-accurate, spatially-structured assessment of the stock(s).	0.10	
1.1.5.1		There is a scientifically-rigorous stock assessment methodology that is relevant to the biology of the target species and the nature of the fishery. The assessment uses all available relevant data.		
60	Stock assessments using robust evaluation methods are used to periodically assess the health of the fishery. The assessments are appropriate in time and design to the characteristics of the targeted stock and generate confidence that the stocks are not overfished.	Neither fishing mortality nor recruitment (spatially and over time) are uniform in the system. Therefore, the management centers on the use of a rotational harvest strategy which is driven by the commercially available biomass in each bed. Sustainability of this management is assessed in annual surveys of the total fishery (M. Lasta pers. comm.; INIDEP Technical Reports). The adaptive management system used for the Patagonian scallop fishery, mainly based in the annual direct evaluation (data-based) of the spatial distribution of commercial biomass and a model-based biomass estimation does not use population dynamics models or yield models approaches, because of the high spatial and temporal variability in fishing mortality and recruitment (See Hart, 2003), that characterize populations that show persistent spatial structure. However, Valero (2002) has estimated natural mortality using an integrated age-structured size based model (Fournier et.al., 1990) in order to describe monthly dynamics of abundance and shell growth of the Patagonian scallop in an area closed to fishing (small area in Reclutas Bed). This is a predictive model and could be used by scientists to evaluate the impact of fishery mortality. At the time of the Pre-assessment study, emphasis was being given to the use of Valero's predictive model and this influenced the wording of the guides for indicator 1.1.5.1. During the Full Assessment, it became obvious that the adaptive Rotational Management System was effectively ensuring continuance of the resource under the fishing pressures allowed.	0.25	80
80	Stock assessments using robust models are used to routinely assess the health of the fishery. The models are partly generic but they consider all major impacts of fishing on the target stock(s), including all-likely sources of fishing mortality. The assessments are appropriate in frequency and design to provide a high degree of confidence that the stocks are not overfished.	A general model for yield-per-recruit analysis of rotational (periodic) fisheries has been developed and applied to the sea scallop (<i>Placopecten magellanicus</i>) fishery of the northwest Atlantic (Hart, 2003). Area closures and rotational fishing can cause difficulties with the use of standard spatially averaged fishing mortality metrics and reference points. The concept of temporally averaged fishing mortality has been introduced as one that is more appropriate for sedentary resources when fishing mortality varies in time and space. The stock is evaluated annually using direct and rigorous methodologies to establish the biomass (See Lasta et al., 2001e) and generate a high degree of confidence that the resource is not overfished. The catch activity has no drastic effects on the stock reflected in the maintenance of a relatively stable state in biomass over the last 6 years (Figure 10).		
100	Annual assessments of the fishery are performed, using rigorous methods and a fully-dynamic model specifically designed for			

SCORING INDICATORS	Comments	Weight	Score
<p>the fishery. All significant impacts of fishing are incorporated in the model. Natural mortality is treated as time and age specific, with explicit consideration of trends in predation. The model captures all major features of the biology of the species, the fishery and the management system. The assessment makes full use of all available data and information on the fishery. Fishing mortality rates and the biomass of the stock(s) are estimated with a very high degree of confidence and assurance that the stocks are healthy.</p>			

SCORING INDICATORS		Comments	Weight	Score
1.1.5.2		The assessment is spatially structured.		
60	The assessment considers each principal management unit separately.	<p>Assessment models are not necessary nor appropriate for this fishery because of the spatial and temporal variation in fishing mortality and recruitment (Hart, 2003). The spatial structure of the exploited population is assessed annually on a very fine scale by grid pattern dredge surveys. These cover the exigencies of spatially and temporarily variable fishing mortality and recruitment and provide information that allows bed by bed management of the fishery (See Lasta <i>et al.</i>, 2001e). There is a high degree of certainty in biomass estimates.</p> <p>The areas of strong recruitment have been identified (M. Lasta, pers. comm.) and the dynamics of larval supply and linkages between beds are being investigated.</p> <p>A general model for yield-per-recruit analysis of rotational (periodic) fisheries has been developed and applied to the sea scallop (<i>Placopecten magellanicus</i>) fishery of the northwest Atlantic (Hart, 2003). Area closures and rotational fishing can cause difficulties with the use of standard spatially averaged fishing mortality metrics and reference points. The concept of temporally averaged fishing mortality has been introduced as one that is more appropriate for sedentary resources when fishing mortality varies in time and space.</p>	0.25	80
80	The assessment models broadly reflect the spatial structure of the exploited components of the target stock(s) using appropriate area-specific values.			
100	The assessment models are fully spatially-structured representations of the target stock(s), including recruitment source/sink linkages, movement patterns of post-settlement animals and distributions of fishing effort.			

SCORING INDICATORS		Comments	Weight	Score
1.1.5.3		The assessment, including any assumptions, has been appropriately tested by simulation or other methods and considers uncertainties which are reflected in management advice.		
60	The assessment methodology takes only limited account of assessment uncertainties, including assumptions but associated results are considered by managers.	There is a high degree of confidence in the biomass estimates obtained by annual surveys (See Lasta <i>et al.</i> , 2001e). The estimates are robust and are considered as such in decision-making by the managers. Simulation modelling of the effectiveness of rotational harvesting with a TAC for the whole area, could be tested by simulation in a similar manner to the scallop fishery in Central New Zealand (Challenger Scallop Enhancement Company Limited, 2005).	0.25	60
80	The assessment methodology uses statistically-appropriate parameter estimation procedures that take account of uncertainty in the input data. There is an evaluation of the sensitivities of key assessment outputs (e.g. resource biomass) to errors in assumptions. Major uncertainties in the assessment outputs are recognized, the most important ones have been evaluated, and all are both reported in the management advice and taken into account in the harvest strategy.			
100	The assessment methodology has been comprehensively tested by simulation and the results show that major assessment outputs of			

SCORING INDICATORS	Comments	Weight	Score
<p>management interest achieve robust levels of precision and bias. The assessment methodology comprehensively addresses all significant uncertainties. There is a comprehensive evaluation of sensitivities of key outputs to errors in assumptions, parameter values and/or data. The harvest strategy takes full account of sensitivities, uncertainties and of any inaccuracies of the assessment methodology.</p>			

SCORING INDICATORS	Comments	Weight	Score	
1.1.5.4		The assessment evaluates the consequences of harvest strategies and evaluates the status of the fishery relevant to reference levels.		
60	The assessment attempts to evaluate the fishery and the target stock(s) relative to the reference levels, including separate evaluations for each principal management unit. The assessment includes an initial, spatially-structured approximation of the future consequences of the current harvest strategy.	The assessment of biomass is spatially structured (INIDEP Technical Reports) and used to estimate the TAC of 0.4 of the total commercial biomass (Resolution FFC N° 4/2005). Annual assessment can be used to evaluate the effectiveness to this strategy in attaining sustainability. Biomass and spatial structure have not changed significantly over the last 6 years of the fishery (Figure 10; INIDEP Technical Reports), indicating that the rotational harvest strategy within the TAC set has achieved this objective and the fishery is sustainable. The current harvest strategy will assure the maintenance of the resource at current levels and retain a similar spatial structure. The evaluations have considered the beds within each of the two Management Zones (North and South). The rotational harvest strategy and annual scientific sampling over each zone is allowing INIDEP to develop spatially structured predictive models. It is not logical to develop predictive models with the type of data available in this fishery for a sedentary stock with high spatial and temporal variation in recruitment and mortality (Hart, 2003).	0.25	70
80	The assessment evaluates the fishery and the target stock(s) relative to the reference levels, including separate evaluations for each management unit. The future consequences of the harvest strategy in each management unit have been evaluated, using the assessment model or by other means.			
100	The assessment makes a reliable, probabilistic evaluation of the fishery and the target stock(s) relative to the reference levels, including separate evaluations for each management unit. The future consequences of the harvest strategy have been			

SCORING INDICATORS		Comments	Weight	Score
	fully evaluated, with attention to the spatial structure of the stock(s) and the uncertainties in the models used.			
1.1.6	The stock(s) is/are at appropriate reference level(s).		0.30	
1.1.6.1		The overall population is at appropriate reference levels.		
60	There is a reasonable level of confidence that the total exploitable biomass of the target stock(s) is above the limit reference level (or its operational equivalent), and estimated to be in the vicinity of the target reference level and approximately stable. If the target stock(s) is below the limit reference level(s), (or their operational equivalents) then Criterion 1.2 will be evaluated for appropriate performance of recovery or rebuilding actions.	<p>The surveys provide direct estimates of biomass with high confidence. Because the management strategy has retained the biomass in an apparent steady state during the last 6 years (Figure 10), it provides strong evidence that the resource is maintained well above the lower threshold level. The TAC is used to maintain a high level of reproductive adults (60% of the recruited biomass) within the population (See Resolution FFC N° 4/2005).</p> <p>The age and size composition of the stock is sufficiently consistent with expectations for equilibrium under sustained fishing at the target mortality rate (<40% of the commercial sized scallops). It was noted by the Assessment Team that scallops have dense and low populated areas and that these are not in fixed areas, within each bed. Variability over time is a natural event for scallops and probably relates to 1) larval settlement decided by localized currents and 2) food availability. Therefore, area means are a more appropriate expression of population and its characteristics.</p> <p>The variability of the stocks makes the establishment of reference points difficult for biomass or fishing mortality. The reproductive characteristics of the resource and the process related to the recruitment success are unpredictable and their intensity is not related to the size of the spawning stock.</p> <p>Within the concept of Rotational Harvest the upper and lower thresholds, related to biomass (= number and/or proportion of commercial sized adults to juveniles and first year reproductive adults) are in effect reference points for sedentary invertebrates. In the case of the Patagonian scallop fishery these are expressed as,</p>	0.67	70
80	There is a high degree of confidence that the total exploitable biomass of the target stock(s) is above the limit reference level, and biomass is estimated to be in the vicinity of the target reference level and stable, while the age and/or size	<p>1) Upper threshold for fishing activity: Cessation of fishing when 40% of commercial sized adults allowed by law are captured.</p> <p>2) Lower threshold for fishing activity: Is when more than 50% of the juvenile scallops established by previous surveys make up the population. Fishing is prohibited. Obviously the fishing mortality added to the natural mortality does not exceed the total mortality rate for the bivalvular stages of the scallops as there has been no need to close the fishery. The fishery resource under current adaptive management over 10 years has allowed for closure and recovery of beds and is therefore sustainable.</p> <p>The commercially available biomass (the biological reference point) is used to drive the rotational harvest strategy.</p>		

SCORING INDICATORS	Comments	Weight	Score
<p>composition of the stock(s) appears consistent with expectations for equilibrium under sustained fishing at the target mortality rate. If the target stock(s) are below the limit reference levels, (or their operational equivalents), then Criterion 1.2 will be evaluated for performance of recovery or rebuilding actions.</p>			
<p>100</p> <p>There is a very high degree of confidence that the total exploitable biomass of the target stock(s) is above the limit reference point and remains generally stable in the vicinity of its target reference level, while the age and/or size composition of the stock(s) is consistent with expectations for equilibrium under sustained fishing at the target mortality rate. If the target stock(s) are below the limit reference level(s), (or their operational equivalents), then Criterion 1.2 will be evaluated for appropriate performance of recovery or rebuilding actions.</p>			

SCORING INDICATORS		Comments	Weight	Score
1.1.6.2		The local areas of the resource are neither depleted nor overfished; or the depleted local areas are in a recovery process.		
60	There is a reasonable level of confidence that neither local depletion nor local overfishing are occurring, beyond the expected temporary effects of concentrations of fishing effort moving within the fishing grounds; or the depleted local areas are in a recovery process.	In sedentary fisheries local depletion is a natural consequence of fishermen concentrating effort in the areas of higher density. The history of this fishery indicates that such areas recover or the scallops establish high densities elsewhere within the bed (INIDEP Technical Reports). This is the basis for the success of rotational fishery strategies adopted by this fishery. The very precise spatial detail of catch data shows no signs of significant depletion of beds over the history of the fishery, and this is corroborated by the similarly precise spatial data of biomass surveys. Total biomass has remained steady over the last 6 years of the fishery (Figure 10). Fishing mortality on individual beds is estimated from catch information calibrated by observer data. The fishery is not overfished, apart from temporary depletion of the localized highly population areas, within the defined Management Zones, which represent less than 1% of the Total Argentine Continental Shelf. The 8 fishing grounds (beds) are well defined within each of the 2 Management Zones. The distribution of fishing mortality approximately (40% catch of commercial size scallop within the beds fished each year) can be calculated by analysis of catch data collected by the On Board Observers. Fishery mortality over the past 6 years has been consistent with the intent of the adaptive management system implemented to establish this new fishery.	0.33	90
80	There is a high degree of confidence that neither local depletion nor local overfishing are occurring, beyond the expected temporary effects of concentrations of fishing effort moving within the fishing grounds. Fishing mortality and the biomass of the target stock(s) within each management area are estimated (with a high degree of confidence) to be consistent with the requirements of long-term sustainable management of the fishery.			
100	There is a very high degree of confidence that neither local depletion nor local			

SCORING INDICATORS	Comments	Weight	Score
<p>overfishing are occurring, beyond the expected temporary effects of concentrations of fishing effort moving within the fishing grounds.</p> <p>The distribution of fishing mortality across the target stock(s) and local biomass densities in each part of the spatial structure of those stocks are known (with a very high degree of confidence) to be fully consistent with the intent and requirements of the management system (including plans for rebuilding from depletion, if any).</p>			

SCORING INDICATORS	Comments	Weight	Score	
1.2	<p>Where the exploited populations are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level consistent with the precautionary approach and the ability of the populations to produce long-term potential yields within a specified time frame. (NOTE, this is not to be scored unless there is a current depletion with the target stock).</p>	0.20		
1.2.1	When the biomass is locally depleted significantly below the target level, rebuilding measures are implemented.			
60	Significant local depletion (beyond the expected temporary effects of concentrations of fishing effort moving within the fishing grounds) leads to implementation of specific and appropriate rebuilding measures. Their implementation can be demonstrated either through past experience or through a formal plan for such measures. These rebuilding measures have not been tested but there is a basis to expect their effectiveness.	<p>SCORE: THIS CRITERION IS NOT APPLICABLE BECAUSE EVIDENCE OF DEPLETION BEYOND THE EXPECTED TEMPORARY EFFECTS BY CONCENTRATION OF FISHING EFFORT WITHIN THE FISHING GROUNDS HAS NOT BEEN DETECTED.</p>	1.00	
80	The fisheries management includes provisions for the prompt implementation of appropriate rebuilding measures when significant local depletion (beyond the expected temporary effects of concentrations of fishing effort moving within the fishing grounds) occurs. Rebuilding measures are			

SCORING INDICATORS	Comments	Weight	Score
<p>tested and effective in allowing the biomass to recover within a reasonable time.</p>			
<p>100</p> <p>The management includes provisions for the prompt implementation of appropriate rebuilding measures when significant local depletion (beyond the expected temporary effects of concentrations of fishing effort moving within the fishing grounds) occurs. Practical experience has demonstrated that the rebuilding measures are effective in allowing the biomass to recover quickly. There is evidence that the management system responds adaptively to past local depletions, adopting additional management measures to prevent the repetition of the same problems.</p>			

SCORING INDICATORS		Comments	Weight	Score
1.3	Fishing is conducted in a manner that does not significantly alter the age or genetic structure or sex composition to a degree that impairs reproductive capacity.		0.30	
1.3.1		There is adequate information on the population structure and reproductive capacity of the resource.		
60	Basic information is available on the average age or size at reproductive maturity and on variations in relative fecundity with size or age, but only through assuming that fecundity is proportional to body weight. Initial estimates of growth and natural mortality rates are available, such that the reproductive capacity of the stock(s) in the absence of fishing can be estimated. The age or size and sex compositions of the stock(s), under exploitation by the fishery, have been estimated.	<p>The average size and age at reproductive maturity is known (Waloszek and Waloszek, 1986). Growth and natural mortality rate have been estimated (Valero, 2002). Age and size compositions of individual beds are analysed annually (INIDEP annual Technical Reports); differences in size and age frequency and growth rate among the management areas have been documented. The sex ratio is 1:1 (Campodónico <i>et al.</i>, 2001b). These are known with a high degree of confidence.</p> <p>It is known that fecundity is high in pectinids. In New Zealand <i>Zygochlamys delicatula</i>, which occurs along the Otago shelf in the same depth range as <i>Z. patagonica</i>, has a fecundity of up to 11 million eggs per individual (Michael and Cranfield, 2001). The relationship between numbers of larvae spawned and recruitment is highly variable (Orensanz <i>et al.</i>, 2005). The study of variation in fecundity with age and area in the fishery is commencing.</p> <p>The use of empirical relationships between recruitment, fecundity, number of parents and environmental parameters will be used to develop abundance and recruitment (number of recruits x spawning biomass) indices.</p>	0.15	70
80	The age and size at reproductive maturity are known with a high degree of confidence. Maturity ogives have been estimated. The variations in relative fecundity (determined independently of body weight but perhaps by assuming that fecundity is proportional to gonad weight) with size and age			

SCORING INDICATORS	Comments	Weight	Score
<p>are known with a high degree of confidence. Estimates of growth and natural mortality rates are available, such that the reproductive capacity (per recruit) of the stock(s) in the absence of fishing has been estimated with a high degree of confidence. The age, size and sex compositions of the stock(s), under exploitation by the fishery, and hence their reproductive capacity (per recruit) have been estimated with a high degree of confidence. Differences among management areas in the above variables (if any) have been documented. The importance to successful reproduction of the density of spawners is recognized and its implications have been explained in management advice.</p>			
<p>100</p> <p>The age and size at reproductive maturity are known and maturity ogives have been determined with a very high degree of confidence. The variations in effective fecundity</p>			

SCORING INDICATORS	Comments	Weight	Score
<p>(determined by direct counting of eggs, with due allowance for egg quality and other factors affecting viability of spawned eggs) with size and age are known with a very high degree of confidence. Estimates are available of the minimum density of spawners needed for effective fertilization. Estimates of recruitment, growth and natural mortality rates are available, such that the reproductive capacity of the stock(s) in the absence of fishing can be estimated with a very high degree of confidence. The age, size and sex compositions of the stock(s), under exploitation by the fishery, the density of the animals and hence their reproductive capacity have been estimated with a very high degree of confidence. The reduction in reproductive capacity that has resulted from fishing activity is documented. Studies of spatial and temporal genetic diversity of the target stock(s) have</p>			

SCORING INDICATORS		Comments	Weight	Score
	<p>been undertaken. Differences in the above variables among the units of the spatial structure of the stock(s) have been comprehensively documented. The recruitment source/sink linkages within the spatial structure of the stock(s) are understood.</p>			
1.3.2		The age/sex/genetic structure of the resource is monitored to detect significant impairment of reproductive capacity.		
60	<p>There is ample evidence that correlates size as the key indicator of reproductive capacity. The size composition of the target stock(s) in each of the principal management areas is effectively monitored to detect significant impairment of reproductive capacity.</p>	<p>Reproductive capacity is high in pectinids although settlement habitat is key to successful settlement of scallops (Orensanz <i>et al.</i>, 1991a,b). Fecundity increases with size and age in scallops (Orensanz <i>et al.</i>, 1991a; 2005; Michael and Cranfield, 2001), so these parameters are a key indicator of reproductive capacity. The study of variation in fecundity with age and area in the fishery is commencing. Scallop size frequency is routinely monitored in biomass surveys. Size frequency has varied between beds before the fishery began (Lasta and Bremec, 1998; M. Lasta, pers. comm.). These differences show that recruitment has varied on different beds before reproductive capacity could have been affected by fishing. Size composition of the target stock is measured in each management area and effectively monitors reproductive capacity (INIDEP Technical Reports). The genetic studies in process are investigating linkages between beds with the aim to identify origin of recruits. This is a long term study (M. Lasta, pers. comm.).</p>	0.15	
80	<p>There is strong evidence that correlates size, age and sex as the key indicators of reproductive capacity. Size, age and sex compositions of the target stock(s) in each management area are effectively monitored to detect significant impairment of reproductive</p>			

SCORING INDICATORS	Comments	Weight	Score
100	<p>capacity.</p> <p>There is strong evidence that correlates size and age as key indicators of reproductive capacity. The size, age and sex compositions of, and recruitments to, the target stock(s) in each unit of their spatial structure are routinely and effectively monitored to detect any impairment of reproductive capacity. There is some monitoring of relevant genetic indicators.</p>		

SCORING INDICATORS	Comments	Weight	Score	
1.3.3	The stock assessment adequately indicates the level of impairment of reproductive capacity.			
60	The stock assessment doesn't fully explain the effects of fishing mortality and other impacts of the fishery on reproductive capacity. Monitoring for reproductive impairment is appropriate.	Stock assessment in this fishery relies on annual biomass surveys. Scallop biomass has remained relatively constant over the last 6 years of fishing (See Figure 10), providing strong evidence that reproductive capacity and recruitment of the whole fishery area has not been affected by fishing. The size structure of scallops measured on these surveys on individual beds, shows that juvenile populations are strongly represented on most beds (annual INIDEP Technical Reports). In those beds with few juveniles the low recruitment was not related to fishing (M. Lasta, pers. comm.), further indicating that fishing has not impaired settlement and reproductive capacity locally either.	0.15	80
80	The stock assessment provides confidence that the fishing mortality and other impacts of the fishery cannot impair reproductive capacity, such that monitoring for reproductive impairment is not required.			
100	The stock assessment provides a high degree of confidence that the fishing mortality and other impacts of the fishery cannot impair reproductive capacity, such that monitoring for reproductive impairment is unnecessary.			

SCORING INDICATORS		Comments	Weight	Score
1.3.4		There is a well defined and effective harvest strategy to manage the fishery in a manner that does not impair the reproductive capacity.		
60	Mechanisms are in place to reduce or modify fishing effort when impairment of reproductive capacity is detected or projected to occur. Decision-making is logical and appropriate, although not fully documented. Decision rules have not been tested.	The minimum legal size of 55 mm (Resolution SAGPyA N° 150/96 and Resolution FFC N° 4/2005) maintains reproductive capacity by allowing one year of spawning (45 mm size at first maturity, Waloszek and Waloszek, 1986) before capture. Size limit is monitored by the on board observers (G. Blanco, pers. comm.). The TAC ensures a target biomass of 60% commercial sized scallops is maintained to ensure a high reproductive capacity. The establishment of large no-take zones (8 of them ranging in size from 13 nm ² to 104 nm ²), within each bed in 1996 (Resolution SAGPyA N°150/96) and reaffirmed in 2005 (Resolution FFC N° 4/2005), protects reproductive stocks locally that can be a source of propagules to repopulate any depleted area around them (See Bohnsack <i>et al.</i> , 2004). SAGPyA and the Coastguard monitor, in real time, vessel position to ensure compliance, so these zones are not fished. The loose rotational fishing pattern developed in this fishery itself plays an important role in protecting reproductive capacity of the fishery and avoidance of recruitment overfishing (See Hart, 2003).	0.25	90
80	Mechanisms are in place to reduce or modify fishing effort as and when impairment of reproductive capacity is detected or projected to occur. There is a high degree of confidence in the effectiveness of those mechanisms. Clear decision rules exist and are fully documented but have not been fully tested.	Fishers themselves have established decision rules that regulate fishing effort to avoid local impairment of reproductive capacity. When the production of callus drops below 5 tonnes per day they move to a new more productive fishing area (E. González Lemmi, pers. comm.). This strategy maintains the concentration of breeding resource. This rule was established by vessel owners who monitor catch rates and ensure compliance with it. There are clear decision rules to ensure the TAC is not exceeded and reproductive capacity impaired. When 90% of the TAC is reached, the National Direction of Fishery Coordination informs INIDEP and each fishing company in writing (Resolution FFC N° 4/2005), after which the FFC recommends SAGPyA to close the area. This has been achieved within 1-3 days. The fishing companies monitor catch continuously and stop fishing as soon as the TAC is reached and inform FFC. There is a high level of interaction between fishing companies, INIDEP, SAGPyA and the FFC which ensures rapid and effective response to cease fishing before the quota is exceeded and reproductive capacity impaired.		
100	Mechanisms are in place to reduce or modify fishing effort as and when impairment of reproductive capacity is detected or projected to occur. Clear, documented and tested decision rules are fully implemented and are fully consistent with data and assessment limitations. The			

SCORING INDICATORS	Comments	Weight	Score
	decision rules are evaluated periodically.		

SCORING INDICATORS		Comments	Weight	Score
1.3.5		Reproductive capacity is not impaired.		
60	Reproductive capacity has been temporarily reduced by fishing but recruitment has not failed and measures have been implemented to restore that capacity.	Scallop biomass has remained relatively constant over the last 6 years of fishing (See Figure 10), giving a high degree of confidence that recruitment into the fishery area overall has not been negatively affected by fishing and that the stock remains at robust levels. The size structure of scallops measured on these surveys on individual beds, shows that juvenile populations are represented on most beds (annual INIDEP technical reports). In those beds with few juveniles the low recruitment was not related to fishing (M. Lasta, pers. comm.), further indicating that fishing has not negatively affected recruitment locally either.	0.30	90
80	It is estimated that recruitment to the target stock(s), overall or locally, has not been negatively affected by the fishery beyond the changes expected when fishing a virgin stock.			
100	There is a high degree of confidence that recruitment to the target stock(s), overall or locally, has not been negatively affected by the fishery beyond fishing a virgin stock and is trending toward robust levels.			

SCORING INDICATORS		Comments	Weight	Score
PRINCIPLE 2	Fishing operations should allow for the maintenance of the structure, productivity, function and diversity of the ecosystem (including habitat and associated dependent and ecologically related species) on which the fishery depends.			
2.1	The fishery is conducted in a way that maintains natural functional relationships among species and should not lead to trophic cascades or ecosystem state changes.		0.40	
2.1.1	There is adequate understanding of the ecosystem and its value.		0.15	
2.1.1.1		The nature and distribution of habitats relevant to the fishing operations are known.		
60	Some information exists on the habitats on the fishing grounds but it is neither detailed nor comprehensive. The general distribution of the benthic habitat that supports the targeted stock is known.	The biomass surveys carried out by dredging on a grid pattern over the area of the fishery has permitted the generation of very detailed maps of spatial distribution of scallop density and has identified the nature and shape of beds along the Argentine Shelf using kriging (Lasta <i>et al.</i> , 2001e,f). The fishery data is recorded in tow by tow detail by observers who provide ground truth and regular records of by-catch. The associated benthic organisms of these beds which are dominated by <i>Zygochlamys patagonica</i> are well described (Bremec and Lasta, 2002; Bremec <i>et al.</i> , 2003). The nature and distribution of benthic habitats has been identified with the same high spatial precision as the distribution of scallops, from analysis of by-catch of the fishery, sampled by on board observers. The organisms in these samples have been identified to species level using an illustrated taxonomic guide (Bremec <i>et al.</i> , 2003). Likewise, the nature and distribution of benthic habitats are known with the same high spatial precision as the distribution of scallops is known from biomass surveys, in which the organisms in a sample of the dredge catch have been identified to species level, and biomass and size range of species been estimated by INIDEP research staff (Bremec and Lasta, 2002).	0.10	95
80	The nature and distribution of habitat types on the fishing grounds are known in moderate detail. The distribution of the benthic habitat critical to the targeted species is known and monitored.	The physical nature of the seafloor on which scallops occur has been mapped with a high spatial precision by multibeam sonar analysis (Madirolas <i>et al.</i> , 2005).		
100	The nature and distribution of habitat types on the fishing grounds has been mapped in detail. The distribution of benthic habitat critical to the targeted species fishing operations is monitored with high spatial precision.			

SCORING INDICATORS		Comments	Weight	Score
2.1.1.2		The habitat requirements of the target species, in particular the settlement habitat of juveniles, are known.		
60	Basic information is available on the types of habitat in which various life stages of the target species live.	The adult habitat on muddy sand substrates is well known. The area of highest adult density coincides with frontal systems with elevated phytoplankton production (Bogazzi <i>et al.</i> , 2005). Almost all (99%) juveniles 3 to 13 mm are bysally attached to adult shells (Bogazzi and Lasta, 2000; Ciocco <i>et al.</i> , 2005). The larvae and juveniles of most scallops are more intolerant of fine sediments in suspension than adults are (Stevens, 1987). Scallop larvae first settle on a variety of organisms (especially filamentous forms such as bushy bryozoa) offering a clean silt-free surface raised above the seabed (Brand <i>et al.</i> , 1980). They may remain bysally attached until they are physiologically able to survive on the sea floor, or they may detach from the original settlement surface and secondarily reattach to other more stable substrates such as live scallops (secondary settlement). Studies of primary settlement of larvae have been initiated in this fishery.	0.20	80
80	Considerable information is available on the habitat requirements of the bivalvular life stages of the target species. Studies of the preferences and habitat requirements of settling larvae have been initiated.			
100	Extensive information is available on the habitat requirements of all life stages of the target species. The preferences and requirements of settling larvae are thoroughly known.			

SCORING INDICATORS	Comments	Weight	Score	
2.1.1.3		Information is available on the position and importance of the target species within the food web.		
60	Key prey, predators and competitors of the target species are known.	<p><i>Zygochlamys patagonica</i> is the dominant suspension feeder of the community of the seafloor ecosystem. It contributes from 21-58% of the total biomass and 31-62% of the benthic community production (Bremec <i>et al.</i>, 2000). Adults ingest mainly diatoms and some dinoflagellates (Schejter <i>et al.</i>, 2002). Juvenile and adult scallops are probably the main prey of starfish, gastropods, and crabs that form part of benthic community (Bremec and Lasta, 2002). Shells of living scallops play an important role in recruitment of the benthos providing surfaces for the settlement and survival of their larvae (including juvenile scallops). Epibionts on the shell of scallops make up to 7% of scallop weight (Bremec and Lasta, 1998; 2002; Bremec <i>et al.</i>, 2003).</p>	0.15	80
80	Qualitative and some quantitative information is available on the trophic position and general importance of some life stages of the target species in their ecosystems.			
100	Extensive quantitative information is available on the trophic position and importance of all life stages of the target species in their ecosystems.			

SCORING INDICATORS		Comments	Weight	Score
2.1.1.4		Information is available on the ecosystem roles of the non-target species impacted by the fishery.		
60	The principal non-target species affected by the fishery have been identified.	82 non-target species captured by the fishery have been identified and categorised by feeding niche (Bremec and Lasta, 2002). Echinoderms, including predatory asteroids, and the herbivorous echinoids and detritivore ophiuroids, were the most important group. Size range of individual by-catch species are recorded in research dredge catches during research surveys and by on board observers from commercial trawl catches. These data are entered into a developing database useful in analysing species life histories (C. Bremec, pers. comm.).	0.15	90
80	The non-target species commonly affected by the fishery have been identified, and research to obtain information, including distribution and basic ecology, on the main non-target species has commenced.			
100	The non-target species affected by the fishery have been identified. The life history and ecosystem requirements of the main species are fully understood.			

SCORING INDICATORS		Comments	Weight	Score
2.1.1.5		There is information available on the recovery rate of the ecosystem from fishery related impacts.		
60	Approximate recovery rates can be inferred from known generation times and/or life expectancies of species in other regions which are ecologically similar, and taxonomically related, to the principal species affected by the fishery.	The fishery causes no long-term depletion of macrofauna by-catch species. Each tow results in a temporary depletion of non target species along the tow path. It is assumed that the rapid return of the living by-catch to the seafloor ensures that this depletion is of short duration. This is confirmed in by-catch data where abundance and species composition is mostly unaffected by the fishery (Bremec and Lasta, 1999; 2001; 2002; Bremec <i>et al.</i> , 2003) although sessile taxa (Porifera and Cnidaria) have shown long-term reductions in fished areas (Bremec and Lasta, 2001). The widespread collection of quantitative by-catch information from each bed in 1995, before the fishery commenced, has provide a data baseline that permits future evaluation of structural changes due to fishing of these beds as well as recovery times of benthic habitat (Bremec and Lasta, 2002). Furthermore, the designation of areas closed to fishing within each bed (Resolutions SAGPyA N°150/96 and FFC N°4/05) will allow evaluation of the immediate short-term effects of fishing on the community. Recovery rates of benthic habitats will be measured directly in those closed areas that were formerly fished. The loose rotational fishing patterns developed in this fishery, not only reduce the chance of overfishing the target stock but also benefits the non target species by reducing fishing pressure on the seafloor (Hart, 2003). Studies of longevity and generation times of by-catch species are in progress (Bremec and Echeverría, 2005) and will be used in investigations of recovery rates of benthic habitats.	0.20	85
80	Approximate recovery rates are inferred from known generation times and/or life expectancies of species in other regions which are ecologically similar, and taxonomically related, to a selection of the species affected by the fishery. Research to determine life expectancies of the species actually affected and/or to directly measure recovery rates is in progress.			
100	Ecosystem recovery rates have been estimated (where appropriate, for each habitat type affected by the fishery) with a high degree of confidence, using a combination of ecological modelling and direct experimentation.			

SCORING INDICATORS		Comments	Weight	Score
2.1.1.6		There is information available on the functioning of the ecosystem relevant to the fishery.		
60	Some elements of the functioning of the ecosystem, relevant to the fishery, have been identified.	There is a strongly developed benthic-pelagic coupling in the ecosystem. The dominant factor structuring the ecosystem is oceanographic fronts that result in localised high algal production and may favour retention and concentration of larvae of scallops and the other benthos within eddies (Bogazzi <i>et al.</i> , 2005). The distribution of sediments and the canyons along the shelf break are presently being investigated (Madirolas <i>et al.</i> , 2005). The canyons and sediments may also structure the ecosystem. The species diversity of the ecosystem and its variation over the spatial scale of the fishery is well documented (Bremec <i>et al.</i> , 1998; Bremec and Lasta, 2001, 2002). Scallops which dominate the energy flow of the benthic ecosystem of the beds (Bremec <i>et al.</i> , 2000), are prey for a diverse range of predators and probably structure the ecosystem by enhancing recruitment of most benthic species (Bremec and Lasta, 1998; 2002; Bremec <i>et al.</i> , 2003).	0.20	90
80	The main elements of the functioning of the ecosystem, relevant to the fishery, have been documented and are partially understood.			
100	Detailed information is available on the ecosystem, including species diversity, trophic and other functional relationships, the dominant factors structuring the system, ecosystem dynamics and the extent and nature of spatial and temporal variations.			

SCORING INDICATORS		Comments	Weight	Score
2.1.2	There is adequate knowledge of the effects of gear-use on the receiving ecosystem and extent and type of gear losses.		0.10	
2.1.2.1		There is adequate knowledge of the physical impacts on the habitat due to use of gear.		
60	The intensity and location of gear use is known in general terms. The main impacts on habitat types present in this fishery are known.	The type of gear used in the fishery is comprehensively known and documented. All 4 vessels in the fishery use the same trawl gear, towing method (See Lasta and Iribarne, 1997; Ciocco <i>et al.</i> , 2005) and follow similar fishing strategies (See Performance Indicator 1.1.2.5). The system is standardized. A video record of the trawl on the seafloor obtained by the “Remotely Operated Towed Vehicle” (ROTV) (M. Lasta, pers. comm.) shows no significant impact other than the capture of scallops and other benthic organisms. All fishing activity is routinely recorded with a very high spatial precision (± 40 m see PI 1.1.2.3.), and the impact on habitat is monitored (indirectly) on this same scale of precision by routinely taking (once a day from randomly selected tows) and analysing samples of bycatch.	0.90	95
80	The intensity and location of gear use are known with high precision. The impacts on habitat types have been identified, and studies specific to the assessed fishery have commenced.			
100	The types of gears and the fishing techniques employed are comprehensively documented. All fishing activity impact on habitat types is routinely monitored with very high spatial precision.			

SCORING INDICATORS		Comments	Weight	Score
2.1.2.2		There is adequate knowledge of gear losses and their impacts on the ecosystem.		
60	Some recording of gear losses takes place.	The fishery is pursued on a flat muddy sand seafloor so trawls cannot become fouled and lost on reefs or pinnacles. The very high precision of navigation and the log records of all vessels have allowed the immediate recovery of gear which has occasionally broken (E. González Lemmi, pers. comm.). Vessel logbooks are mandatory (Resolution SAGPyA N° 150/96) and observers record and verify all such events and allow cross referencing (G. Blanco, pers. comm.).	0.10	100
80	There is some knowledge of the type, quantity and location of gear lost during fishing operations and its destiny in the receiving ecosystem.			
100	There is fully sufficient knowledge of the type, quantity and location of gear lost during fishing operations and its destiny in the receiving ecosystem, to characterize any resulting impacts.			

SCORING INDICATORS		Comments	Weight	Score
2.1.3		Risks to the ecosystem are adequately determined.	0.15	
2.1.3.1		Information is available on the nature and extent of the non target species caught, or otherwise killed, by the fishery. This includes all non target species – invertebrates, fish, mammals, reptiles, birds etc.		
60	The principal non-target species caught by the assessed fishery have been identified. Types of non-capture mortality have been identified.	The full extent of the non-target species caught in the fishery is documented (Bremec <i>et al.</i> , 1998; Bremec and Lasta, 2001; 2002). Quantitative information on bycatch species is available from the on-board observer programme (required by law to cover 100% of vessels fishing; See Resolution FFC N° 4/2005, Section 9) and more detailed information is available from the quantitative analysis, by species, of sub-samples of bycatch regularly taken as part of the observer scheme. Observers sub-sample the catch of randomly selected tows daily and identify, count, weigh, and measure the maximum and minimum sizes of by-catch species. They use the sub-sample proportion to estimate the by-catch taken in that trawl. The entire catch of research dredge in biomass surveys is treated in the same way (Lasta <i>et al.</i> , 1998c; Bremec and Lasta, 1999; Bremec <i>et al.</i> , 2001; Bremec <i>et al.</i> , 2003; Ciocco <i>et al.</i> , 2005). Initial estimates of non-capture mortality have been made. For most bycatch species it is estimated to be less than 10%. Bycatch organisms processed through the sorting system are all alive and active after passing through the capture and sorting processes so non capture mortality is minimal. The continuing stability of species composition and abundances of bycatch through the history of the fishery (apart from the attached Cnidaria and Sponges which do not appear to re-attach on return to the sea), indicates the bycatch also survives the discard process with negligible mortality.	0.40	90
80	Quantitative information from on-board observers is available on the principle non-target species caught by the assessed fishery. Initial estimates of non-capture mortality have been made but monitoring of it is limited. Basic biological information, including distribution and abundance, is available for a selection of the main species affected.	Basic biological information including distribution and abundance is available for the main bycatch species. Sufficient information is available for the most abundant bycatch species to assess that, other than the attached Cnidaria and sponges, they are not declining and indicates that the scallop fishery is not causing a significant portion of the total mortality of bycatch species.		
100	Quantitative estimates, providing a high degree of confidence, of the nature and extent of non-target catches and incidental mortalities by the fishery are available. They are based on a comprehensive observer program. Monitoring of non-capture mortality is on-going. Sufficient information is	No reptiles, birds, or mammals have been caught and very few fish have been captured (G. Blanco, pers. comm.).		

SCORING INDICATORS		Comments	Weight	Score
	available, for a selection of those species, to judge whether they are declining or depressed and whether the assessed fishery is causing a significant portion of their total mortality.			
2.1.3.2		Information is available on the extent and survivability of the discarded by-catch.		
60	Some information is available on the extent of discard of by-catch, including a list of the principal species discarded. However, no information is available on discard survival.	The 100% observer coverage ensures that there is an accurate estimate of all discards. Quantitative estimates of by-catch by taxonomic group are available from observer records of regular sub-samples of the commercial trawl catch. Observers sub-sample the catch of 1 randomly selected tow daily, identify and count, weigh and measure maximum and minimum sizes of by-catch species and multiply the proportion of the sample to entire catch (On Board Observers Manual, in preparation; G. Blanco, pers. comm.) By-catch and non-commercial size scallops are separated from the commercial size scallop catch in a large-diameter, rotary sieve that revolves slowly, with the by-catch cushioned in flowing water. The by-catch suffers no visible damage and is returned to the seafloor within 10-20 minutes of capture (C. Bremec, pers. comm.). Little by-catch is killed. Discard mortality for most bycatch species is estimated to be less than 10% apart from the attached Cnidaria and sponges that appear to fail to reattach on discard. Bycatch species survive the catching and sorting processes (This is especially clear in the most fragile group, the echinoids). The continuing stability of species composition and abundances of bycatch through the history of the fishery (apart from the attached Cnidaria and Sponges which do not appear to re-attach on return to the sea), indicates the bycatch also survives the discard process with negligible mortality.	0.60	90
80	Information is available to allow reliable estimation of discarding of the principal by-catch species. Initial estimates of discard mortality are available for some species.	The estimates of abundance of by-catch species in fished and un-fished areas are very similar suggesting that discard mortality is low (C. Bremec, pers. comm.). An index for discard mortality is necessary to evaluate changes.		
100	Information from onboard observers provides for an accurate estimate of the extent of all discards of by-catch species. Estimates of discard mortality are available for the principal non-target species affected.			

SCORING INDICATORS	Comments	Weight	Score	
2.1.4	Strategies have been developed and implemented within the fisheries management system to address and restrain any significant negative impacts of the fishery on the ecosystem.			
2.1.4	Strategies have been developed and implemented within the fisheries management system to address and restrain any significant negative impacts of the fishery on the ecosystem.			
60	While ecosystem effects are not taken into account in the reference levels for the target species there is no evidence of trophic cascades or ecosystem state changes.	Management advice includes a thorough presentation of available advice on ecosystems and the impacts of the fishery which are published (See Lasta <i>et al.</i> , 1998a,c; Bremec and Lasta, 1999; 2001; 2002; Bremec <i>et al.</i> , 2001; Bremec <i>et al.</i> , 2003). Management takes account of this advice. The FFC pursues a strategy that maintains a low fishing effort by licensing only 4 fishing vessels. The FFC uses a very conservative estimate of sustainable yield at 0.4 of commercial biomass which reduces the frequency that the seafloor is swept by trawls. Vessel managers have developed a strategy of rotational fishing that maintains reproductive potential, guards against growth and recruitment overfishing, and allows faster recovery of benthic habitat (See Hart, 2003). The FFC have sequestered significant areas of the seafloor of each bed from fishing (Resolution FFC N° 4/2005, Annex III b) to protect the ecosystem and provide sources of larvae of both scallops and by-catch species for re-colonization of fished areas should they become depleted (Roberts <i>et al.</i> , 2005; Bohnsack <i>et al.</i> , 2004). The species composition, diversity and relative volumes of by-catch have not changed appreciably on any of beds over the 10 years of the fishery (M. Lasta, pers. comm.; Bremec and Lasta, 1999; Bremec <i>et al.</i> , 2001; Bremec <i>et al.</i> , 2003). The baseline study of distribution and abundance of bycatch species (Bremec and Lasta, 2002) showed that the biomass of bycatch species as well as scallops varied throughout the fishery area at the commencement of the fishery. The study comparing bycatch samples between 1995 (pristine state of the fishery) and 1998 (after 3 years of fishing), suggested that main effects of trawling on the fauna were damage of non-target invertebrates (short-term response), an increase in numbers of scallop shells (produced by the onboard factory) and a long-term response of decreased biomass of sessile taxa (Porifera and Cnidaria) (Bremec and Lasta, 2001). The effects of fishing on the ecosystem are well founded, acceptable and without any signs of trophic cascade.	0.25	80
80	Available information on ecosystems and the impacts of the fishery are included in the scientific advice to fishery managers. Some allowance for ecosystem effects is taken into account in setting the reference levels for the target species. There is clear evidence that no trophic cascade or ecosystem state change is occurring.			
100	The management advice includes a thorough presentation of available information on ecosystems, the impacts of the fishery and their implications. Management of the fishery takes full account of these implications. The reference levels take quantitative and			

SCORING INDICATORS		Comments	Weight	Score
	explicit account of ecosystem effects. Levels of acceptable impacts for key aspects of the ecosystem, based on well-founded knowledge have been established and are subject to frequent review.			
2.1.5	Assessments of impacts associated with the fishery are undertaken, including the significance and risk of each impact on the ecosystem structure and/or function, on habitats or on the populations of associated species.		0.15	
2.1.5.1		An assessment of the ecosystem effects of the fishery has been conducted, including consideration of significance and risk. Monitoring of any significant effect is ongoing.		
60	The principal impacts of the fishery (including but not limited to those on the ecosystem addressed under other performance indicators) have been identified. On-going monitoring is not-well developed.	The potential risks of the fishery on the ecosystem were evaluated by Bremec and Lasta (2002) in their analysis of the epibenthic assemblage associated with scallop beds on the Argentinian Shelf. There is a comprehensive regular sampling programme by the observers monitoring actual temporal changes in the ecosystem as reflected in by-catch of the fishery. These changes are also regularly checked independently of the fishery in annual research surveys (INIDEP Technical Reports). These records of by-catch show no appreciable change in the ecosystem or in diversity of species (although the density of some species may have changed, C. Bremec, pers. comm.). With this system of continuous monitoring there is no risk of ecosystem modification by fishing going undetected. After 10 years of fishing there is no sign of appreciable ecosystem modification.	0.40	90
80	An evaluation of the effects and potential risks of the fishery on the ecosystem has been initiated. A monitoring programme is being developed.	Even though there is no comprehensive quantitative risk-assessment of the effects of fishing on the ecosystem, appropriate comparative and experimental studies of fished and unfished areas are underway and are capable of identifying any fishery-induced changes in community structure or population dynamics of key species. These studies are quantitative and allow quantitative assessment of risk.		
100	A comprehensive, quantitative risk assessment of the effects of the fishery on the ecosystem has been undertaken and is updated			

SCORING INDICATORS	Comments	Weight	Score
<p>regularly. The assessment is founded on appropriate comparative and/or experimental studies, including where possible comparisons between fished and unfished areas. There is an on-going monitoring program capable of identifying any fishery-induced changes to community structure or the population dynamics of key species.</p>			

SCORING INDICATORS		Comments	Weight	Score
2.1.5.2		The impacts on ecosystem structure and function from removal of target stock(s) are known.		
60	Removals from target stock(s) are not expected to have unacceptable impacts on ecosystem structure and function.	Scallops dominate the benthos physically and energetically (Bremec <i>et al.</i> , 2000; Bremec and Lasta, 2002). The potential risks of the fishery removal of scallops on the ecosystem were also evaluated by Bremec and Lasta (2002) in their analysis of the epibenthic assemblage associated with scallop beds on the Argentinian Shelf. Trophic relationships of the epibenthos were also well established in this work. The reduction in number of adult scallops with fishing will have little effect on increasing algae available to competitive suspension feeders. It will reduce availability of faeces and pseudofaeces to detritivors, and will also reduce prey available to starfish, gastropods and crabs. Studies have commenced on stable isotope signatures to investigate the origin and transformation of organic matter and trophic links within the benthic community (M. Lasta, pers. comm.) and should lead to the sort of quantitative relationships already established in the benthos of shallow water sandy seafloor in Argentina (Penchaszadeh et al., 2006). Removal of adult scallops may well result in reducing recruitment of benthic organisms dependent on scallop shells for settlement. Analysis of the on board observer monitoring programme will detect any long-term change.	0.20	85
80	Qualitative information on the ecosystem consequences of current levels of removals from the target stock(s) is available.			
100	The ecological consequences of current levels of removals from the target stock(s) have been quantified to a sufficient extent that reasonable predictions can be made about the effects on ecosystem structure and function.			

SCORING INDICATORS		Comments	Weight	Score
2.1.5.3		The impacts on ecosystem structure and function from removal of non-target stocks are known.		
60	Studies of the impacts on ecosystem structure and function of removals from key non-target stocks have been initiated.	As captured non-target species are immediately returned to the sea and not removed, fishing has little impact on the benthic ecosystem. Data available confirms there is no appreciable change in by-catch over 10 years of fishing (Bremec and Lasta, 1999; Ciocco <i>et al.</i> , 2005) hence fishing has had little or no effect on ecosystem structure and function. It is reasonable to predict that fishing will continue to have little effect on the ecosystem. The on board observer programme with its continuous monitoring of by-catch will verify the validity of this prediction.	0.20	95
80	Some information on the ecosystem consequences of current levels of removals from non-target stocks is available.			
100	The ecological consequences of current levels of removals from non-target stocks have been quantified to a sufficient extent that reasonable predictions can be made about the effects on ecosystem structure and function.			

SCORING INDICATORS		Comments	Weight	Score
2.1.5.4		Fishery impacts on habitat structure are known.		
60	Expected impacts of the fishery on habitat structure within the principal fishing areas have been identified, although the issue has not been directly studied.	Video records obtained by the “Remotely Operated Towed Vehicle” (ROTV) (M. Lasta, pers. comm.) show little or no biogenic benthic structure on the seafloor hence the passage of the trawl can have little impact. Studies of seafloor structure using multibeam sonar surveying have commenced and initial studies (Madirolas <i>et al.</i> , 2005) confirm the visual evidence that the seafloor of scallop beds has little structure that can be affected by fishing.	0.20	80
80	Impacts of the fishery on habitat structure within the principal fishing areas are being studied.			
100	The level of impacts on habitat structure have been documented and are within acceptable, tested and justified limits.			

SCORING INDICATORS		Comments	Weight	Score
2.1.6		There are no unacceptable impacts on the ecosystem.		
2.1.6		There are no unacceptable impacts on the ecosystem.		
60	There is a rudimentary understanding of the impacts of the assessed fishery on the ecosystem. There is some confidence that there are no unacceptable impacts on the ecosystem.	Analysis of the fishing catches over the years, provided by logbooks and a comprehensive observer coverage (1995: 100%; 1996: 42%; 1997: 21%; 1998: 29%; 1999: 17%; 2000: 36%; 2001: 42%; 2002: 63%; 2003: 60%; 2004: 70%; 2005: 100%) (M. Lasta, pers. comm.), and the data gathered in annual research survey catches over the same period shows that the fishery has had no appreciable impact on the ecosystem (Bremec and Lasta, 1999; Ciocco <i>et al.</i> , 2005).	0.20	95
80	There is a reasonable understanding of the impacts of the assessed fishery on the ecosystem. There is enough information to generate confidence that there are no unacceptable impacts on the ecosystem.			
100	Through comprehensive reviews and analysis there is clear understanding of the impacts of the assessed fishery on the ecosystem. There is a high degree of confidence that there are no unacceptable impacts on the ecosystem.			

SCORING INDICATORS		Comments	Weight	Score
2.2		The fishery is conducted in a manner that does not threaten biological diversity (at the genetic, species or population levels) and avoids or minimises mortality of, or injuries to, endangered, threatened or protected species.	0.40	
2.2.1		Fishing is conducted in a manner that does not have unacceptable impacts on recognised protected, endangered or threatened species.	0.50	
2.2.1.1		There is information on the presence and populations of protected, threatened and endangered species.		
60	There is a program in place to identify protected, threatened and/or endangered species potentially affected by the assessed fishery.	No populations of protected, threatened and endangered species occur in the area fished so such species are not affected (M. Lasta, pers. comm.; G. Blanco, pers. comm.). Should changing climate affect the distribution of protected, threatened and endangered species, the nature of the gear (very low headline height and narrow mouth opening), offers considerable protection against their incidental capture. The on board observer would detect any capture of such species immediately (G. Blanco, pers. comm.) allowing for the development of avoidance practices.	0.25	95
80	Key protected, threatened and/or endangered species directly affected by the assessed fishery, if any, have been identified. Their spatio-temporal distributions within the area of the fishery are known.			
100	There is knowledge of all protected, threatened and/or endangered species directly or indirectly affected by the fishery, if any, including their spatio-temporal distributions within the area of the fishery, trends in their abundances, and the types and distributions of their critical habitats.			

SCORING INDICATORS		Comments	Weight	Score
2.2.1.2		The interactions of the fishery with protected, threatened and endangered species are known.		
60	The direct interactions between the assessed fishery and any protected, threatened and/or endangered species (if any have been identified) are known.	As no populations of protected, threatened and endangered species have been detected within the habitat of the Patagonian scallop (<i>G. Blanco</i> , pers. comm.), these species cannot be affected by the fishery.	0.25	95
80	There is a reasonable level of confidence that there are no significant interactions between the assessed fishery and any protected, threatened, and/or endangered species. No information is available on indirect impacts.			
100	There is a high degree of confidence that there are no significant interactions between the assessed fishery and any protected, threatened and/or endangered species.			

SCORING INDICATORS	Comments	Weight	Score	
2.2.1.3		Strategies have been developed and implemented to address and restrain any unacceptable risks, posed by the fishery to protected, threatened or endangered species.		
60	Some interactions may occur. Only limited strategies exist to address risks to protected, threatened, and/or endangered species. These strategies take a precautionary approach. Management actions are mainly reactive rather than proactive.	There are no populations of protected, threatened and endangered species in the habitat of the Patagonian scallop (G. Blanco, pers. comm.), therefore these cannot be affected by the fishery. The footrope and head rope of the trawl are attached directly to the doors and without sweeps the gear does not herd fish well and combined with the low headline height does not catch demersal fish. With the slow towing speed (3,8 knots), and narrow mouth opening (1-1.20 m high; E. González Lemmi, pers. comm. and 11.5-12.6 m wide; Lasta and Iribarne, 1997), the trawl will not readily catch any birds or mammals that might stray into the fishery area.	0.50	95
80	Significant interactions are unlikely but nevertheless limited strategies exist to address risks. These strategies take a precautionary approach. The management system has adequate arrangements to adjust fishery operations if unacceptable risks are detected.			
100	There is a high degree of confidence that there are no significant interactions between the assessed fishery and any protected, threatened, and/or endangered Nevertheless limited strategies exist to address risks. These strategies are precautionary in approach. The management system has			

SCORING INDICATORS		Comments	Weight	Score
	adequate arrangements to adjust fishery operations if unacceptable risks are detected.			
2.2.2	The fishery is conducted in a manner that does not threaten biological diversity (at the genetic, species or population levels).		0.50	
2.2.2.1		The effects of the fishery on associated biological diversity and productivity are documented.		
60	The impacts of the assessed fishery on biological diversity and productivity have been considered but not directly studied.	The scallop fishery has had no effect on biological diversity and the comprehensive sampling leading to this conclusion has been well documented (Bremec and Lasta, 2002). Biological diversity is regularly and comprehensively sampled and reviewed as part of the management process (Regulation FFC N° 4/05, Annex II). Production in the fishery is dominated by scallops; energy flow through the scallop community has been documented (Bremec <i>et al.</i> , 2000); and with biomass remaining constant over the history of the fishery, fishing will not have altered its productivity.	0.40	95
80	The impacts of the assessed fishery on biological diversity and productivity have been studied directly but those studies are not comprehensive.			
100	The principal effects of the assessed fishery on biological diversity and productivity have been comprehensively documented.			

SCORING INDICATORS		Comments	Weight	Score
2.2.2.2		The fishery does not threaten biological diversity or productivity.		
60	No unacceptable impacts of the assessed fishery on biological diversity and productivity have been identified.	Biomass of scallops in the fishery area has remained stable over the last 6 years (See Figure 10) during the period of fishing, so production has not been affected by the fishery. Likewise, species richness has not changed over this period (C. Bremec, pers. comm.), so biological diversity is likewise unaffected.	0.60	95
80	The impacts of the assessed fishery on biological diversity and productivity are estimated to be within acceptable limits.			
100	There is a high degree of confidence that the effects of the assessed fishery on biological diversity and productivity are within tested acceptable limits.			

SCORING INDICATORS	Comments	Weight	Score	
2.3	<p>Where exploited populations (of non-target species) are depleted, the fishery will be executed such that recovery and rebuilding is allowed to occur to a specified level within specified time frames, consistent with the precautionary approach and considering the ability of the population to produce long-term potential yields.</p> <p><i>(NOTE: These indicators only to be scored if the team finds a circumstance of current depletion)</i></p>	0.20		
2.3.1	<p>There is sufficient information on fishery interaction with the depleted species to determine appropriate management measures which will allow recovery of depleted non-target populations.</p>			
2.3.1		<p>There is sufficient information on fishery interaction with the depleted species to determine appropriate management measures which will allow recovery of depleted non-target populations.</p>		
60	<p>There is some information on fishery interactions with the depleted species, sufficient to identify precautionary measures for depleted stocks to rebuild.</p>	<p>NON APPLICABLE</p>	0.50	
80	<p>There is adequate information on fishery interaction with the depleted species to identify reasonable management measures for depleted stocks to rebuild.</p>			
100	<p>There is a thorough understanding of fishery interactions, sufficient to identify and test specific management measures for depleted stocks rebuilding.</p>			

SCORING INDICATORS	Comments	Weight	Score	
2.3.2	Appropriate recovery/rebuilding measures have been implemented in response to identification of unacceptable impacts.			
2.3.2		Appropriate recovery/rebuilding measures have been implemented in response to identification of unacceptable impacts.		
60	Appropriate rebuilding measures for depleted non-target stocks exist and are implemented. They have been judged to be reasonably effective but have not been evaluated.	NON APPLICABLE	0.50	
80	Appropriate rebuilding measures exist and are fully effective. A mechanism exists for the rapid introduction of new measures for management of the assessed fishery, if its catches of non-target species are identified as impeding rebuilding of depleted stocks.			
100	Appropriate precautionary, rebuilding measures, based on a sound understanding of functional relationships, are fully implemented. They have been tested and shown to be effective. If the assessed fishery was the cause of the depletion (in whole or in part) additional measures are being implemented to prevent a recurrence.			

SCORING INDICATORS		Comments	Weight	Score
PRINCIPLE 3	The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable.			
3.1 Structure and Strategies	A management system containing an institutional and operational framework exists with clear lines of responsibility.		0.25	
3.1.1 (3A. 3)	The management system is appropriate to the cultural context, scale and intensity of the fishery.			
3.1.1		The management system is appropriate to the cultural context, scale and intensity of the fishery.		
60	The management system has some inconsistencies with key elements of the cultural context, scale and intensity of the fishery but a process to resolve them is in progress.	The management system is composed by the FFC, INIDEP and the Sub-Secretariat of Fisheries and Aquaculture (SSPyA), dependant of the Secretariat of Agriculture, Livestock, Fisheries and Food (SAGPyA). The responsibilities of each institution are clear within the institutional framework (See Federal Fishing Law 24922), which is common to all fisheries in the Argentine Continental Shelf. The FFC establishes the national fishery policy and approve the management recommendations promoted by INIDEP, by consensus with the representatives of the provincial governments (members of FFC). SAGPyA applies the decisions. Due to the FFC composition, all major concerns on the cultural context of the fishery are considered and are fully addressed and consistent with the scale and intensity of the fishery. The fishing companies, the Coastguard and other official entities also conduct their operations at high levels of responsibility and therefore contribute effectively to the overall management of the fishery.	0.10	100
80	The management system is consistent with key elements of the cultural context, scale and intensity of the fishery.			
100	The management system is entirely consistent with the cultural context, scale and intensity of the fishery.			

SCORING INDICATORS		Comments	Weight	Score
3.1.2 (3A. 2)		The management system has clear long-term goals, specific objectives, incorporating operational criteria, consistent with MSC Principles and Criteria.	0.15	
3.1.2.1		There are long-term goals and objectives.		
60	There is a general consensus among management decision-makers about the goals and objectives of their management of the assessed fishery but no comprehensive documentation exists.	Broad goals and objectives for the management of the fishery exist. These are established in the Resolutions of the FFC (Resolution FFC N° 4 and 5/2005) for a five year period and adopted by the legally-mandated management authority. Additionally the Federal Fishing Law and its complementary Decree and Resolution SAGPyA N° 150/96 include other items related with long-term management of the fishery and its associated technical research. More specific documentation of the management measures into a more detailed/explicit Fishery Management Plan in the future is desirable. The management measures spelled out in Resolution N° 4/2005 of the FFC could be easily improved as a formal plan by further development of objectives.	0.60	90
80	A general statement of broad goals and objectives for the management of the assessed fishery exists and is used as guidance by management decision-makers.			
100	There is a complete and explicit statement of long-term goals and objectives for management of the assessed fishery, which statement has been formally adopted by the legally-mandated management authority.			

SCORING INDICATORS	Comments	Weight	Score
3.1.2.2	There are operational objectives and criteria.		
60	Operational criteria are limited to the reference levels for the target stock(s).	0.40	95
80	Short- term objectives for management of the assessed fishery have been developed and are used as guidance by management decision-makers. Operational criteria beyond reference points have been adopted by the management authority.		
100	Long term objectives for management of the assessed fishery have been developed and are used regularly in management decisions. Operational criteria beyond reference points and for other issues of concern have been adopted.		

SCORING INDICATORS		Comments	Weight	Score
3.1.3 (3A. 1)		The management system has a clear legal basis.	0.15	
3.1.3.1		The fishery management system has a clear legal foundation.		
60	The legal foundations of some minor facets of the management system are disputed. The disputed points do not impede effective implementation of the management system.	The institutional and legal framework is established in the Federal Fishing Law (N° 24.922) with specific statements on local, national and international legislation. From all existing operative regulations focused on this specific fishery or other Argentine fisheries, the main legal documents are: <ul style="list-style-type: none"> • Federal Fishing Law (N° 24.922), • Its Complementary Decree (N° 748/1999), • Resolutions N° 4 and 5/2005 of the Federal Fishery Council, and • Resolution SAGPyA N° 150/1996 	0.30	100
80	All facets of the management system have clear foundations in local and national law. Any points of dispute are procedural in nature and do not impede the effectiveness of the management system.			
100	All facets of the management system have clear foundations in local, national and international law.			

SCORING INDICATORS	Comments	Weight	Score
3.1.3.2		The fishery is not conducted under a controversial unilateral exemption to an international agreement.	
60	The fishery is conducted under one or more unilateral exemptions to international agreement(s) but those exemptions are not controversial in nature and participants are engaged in a process to overcome this exemption.	All international agreements (which are all encompassed in the Federal Fishing Law N° 24.922 and its Complementary Decree N° 748/99) have been adhered to since the beginning of the fishery. The North Management Unit is located within the Argentine-Uruguayan Fishing Common Zone (ZCPAU), but approximately 95% of Patagonian scallop commercial size biomass is distributed on the Argentine territory within the ZCPAU. Because the Patagonian scallop is a sedentary resource, Argentina is able to restrict Uruguayan vessels fishing the resource within the Argentine part of the ZCPAU (See CONVEMAR, Art.77).	0.15
80	The fishery is not conducted under any controversial unilateral exemptions to international agreements.		
100	The fishery is not conducted under any controversial unilateral exemptions to international agreements. It is managed and conducted in a manner that fully respects the spirit of international conventions and agreements.		

SCORING INDICATORS		Comments	Weight	Score
3.1.3.3		The fishery is consistent with international conventions and agreements.		
60	The fishery appears to only have minor deviations from the terms of relevant international conventions and agreements and efforts are ongoing to address these deviations in a timely manner.	The fishery is conducted in accordance with articles 37 and 38 of Federal Fishing Law (N° 24.922) on international agreements. The North Management Unit is located within the Argentine-Uruguayan Fishing Common Zone, but approximately 95% of Patagonian scallop commercial size biomass is distributed within the Argentine area of the ZCPAU. Because the Patagonian scallop is a sedentary resource, Argentina is able to prohibit Uruguayan vessels fishing within its waters of the ZCPAU (See CONVEMAR, Art.77). All other international agreements are being met by Argentina.	0.15	100
80	The fishery is broadly consistent with the terms of all relevant international conventions and agreements.			
100	The fishery is fully consistent with the terms of all relevant international conventions and agreements.			

SCORING INDICATORS	Comments	Weight	Score	
3.1.3.4	The fishery and management system are consistent with local legislation and official regulations, in the appropriate jurisdictions.			
60	The fishery and its management system are generally consistent with the requirements of relevant Argentine legislation and official regulations (occasional at-sea violations of regulations excepted). No known violations of legislation or regulations jeopardize the management of the fishery.	The fishery, as defined for the certification purposes, is entirely within the Argentine Economic Exclusive Zone and under Federal Government jurisdiction (Section 4 of the Federal Fishing Law). It is consistent with both the letter and intent of relevant Argentine legislation.	0.40	95
80	The fishery and its management system is fully consistent with all requirements of relevant Argentine legislation and official regulations (occasional at-sea violations of regulations excepted).			
100	The fishery and its management system are fully consistent with both the letter and the intent of relevant Argentine legislation and official regulations.			

SCORING INDICATORS	Comments	Weight	Score
3.1.4 (3A. 4)	The management system observes the legal and customary rights and long-term interests of people dependent on fishing.		
3.1.4		The management system observes the legal and customary rights and long-term interests of people dependent on fishing.	
60	The fishery and its management do not violate the legal or customary rights of any directly-affected stakeholder group and considers the interest of people dependent on the fishery.	The management system observes all legal regulations and interests of any group or individual related to the fishery. The fishing policy and regulations sanctioned by the FFC and applied by SAGPyA take in account long-term interests of people dependent on fishing. The complaint resolution mechanisms are clearly established in the Federal Fishing Law N° 24922 and are respected. Article 1 of the Federal Fishing Law establishes the intent of creating the maximum employment of Argentine labor in any national fishery. The FFC has balanced increasing fishing effort by adding to the fleet and thus increasing employment opportunities with the requirement of sustainability of the fishery. They have since maintained the fishery with a fleet of four vessels.	0.15
80	The fishery and its management fully recognizes and does not violate the legal or customary rights of any stakeholder group. The fishery management system takes into account the long-term interests, including socio-economic interests, of people dependent on fishing for food and livelihood.	More added value opportunity possibly exists within Argentina. During the interview process CAIPA (Fishing Industry Chamber) complained that the fishery is a monopoly with only two companies and does not comply with Federal Fishing Law 24.922. The FFC stated that because they failed to submit a complaint following the correct legal channels, within the period prescribed by law, that the submission of CAIPA to OIA has no legal validity (See Section 5).	95
100	The management system explicitly abides by and recognizes legal and customary rights of any stakeholder group. The fishery management system gives full consideration to the long-term interests, including socio-economic interests,		

SCORING INDICATORS	Comments	Weight	Score
of people dependent on fishing for food and livelihood. The system includes efforts to understand the social and economic consequences of management decisions.			

SCORING INDICATORS		Comments	Weight	Score
3.1.5 (3A. 2; 3A. 5)		The management system contains a transparent consultative process and incorporates a dispute resolution mechanism.	0.15	
3.1.5.1		The management system involves all interested and affected parties through a regular, integral, open and transparent consultative process.		
60	The management system allows for affected parties to voice their concerns in a manner timely to management decisions.	The FFC by Resolution N° 4/2005 created a Commission for the Analysis and Monitoring of the Patagonian Scallop Fishery constituted by one representative of INIDEP, one representative of SAGyPA, and one representative of each fishing Company. The function of the Commission is to formalize the consultative process with participation of interested parties. The process does not seek participation from NGOs and others but all data relating to the fishery management provided by them are considered by the FFC.	0.50	90
80	The management system incorporates regular, effective and meaningful consultation with directly-affected parties. There is no distinct evidence of a pattern of discrimination against any significant stakeholder interests.			
100	The management system incorporates a formal and effective consultative process, open to all interested parties, with consultations ahead of all major management decisions. There is no distinct evidence or perception of discrimination against significant stakeholder interests.			

SCORING INDICATORS	Comments	Weight	Score
3.1.5.2		The management system provides, in an open and transparent manner, for timely and fair resolution of disputes arising within the system.	
60	Disputes not resolved informally are addressed through the processes of the management authority and/or the national judicial and governance structures. The application of those processes may vary.	The dispute resolution system is well defined in the Federal Fishing Law N° 24.922. Usually, the FFC receives and discusses in their public minutes any comment which emerges from any stakeholder group. There is a formal dispute-resolution mechanism but it is not independent of the Management Authority. The FFC makes decisions quickly and openly so no party is disadvantaged by delays. When the resolution of the dispute is not accepted, affected parties have recourse to the legal system. The court system is independent of the FFC, is transparent, open to the public and conducted by legally appointed judges.	0.50 90
80	The management system incorporates provisions for open and transparent resolution of significant disputes. Disputes are resolved in a timely and fair manner.		
100	The management system incorporates a formal and effective dispute-resolution mechanism, independent of both the management authority and the national governance structure. That mechanism is open, transparent and accessible to all stakeholder groups.		

SCORING INDICATORS	Comments	Weight	Score	
3.1.6	The management system recognizes the responsibilities and authorities of relevant official institutions and coordinates their implementation. Conflicts with or between the authorities of institutions are addressed.			
3.1.6		The management system recognizes the responsibilities and authorities of relevant official institutions and coordinates their implementation. Conflicts with or between the authorities of institutions are addressed.		
60	Areas of responsibility and authority of each relevant institution is known. However there is no coordination and interaction. While some disagreements exist there are no serious conflicts which undermine the management system.	The responsibility and authority of each relevant institution (FFC, SAGyPA, INIDEP) in regard to the fishery are explicitly acknowledged and established by the Federal Fishing Law, its Complementary Decree and the Internal Rules of FFC. There are agreements between these institutions and others that participate in the implementation of policy measures: Armada Argentina (Navy), Prefectura Naval Argentina (Argentine Coastguard).	0.15	95
80	The areas of responsibility and authority of each relevant institution with respect to the fishery are known. Their major interactions have been defined. Informal arrangements among relevant institutions are effective in preventing conflicts.			
100	The areas of responsibility and authority of each relevant institution with respect of the fishery are explicitly acknowledged. There is a high degree of coordination and cooperation of all institutions. Formal agreements among			

SCORING INDICATORS		Comments	Weight	Score
	relevant institutions ensure that no conflicts can arise.			
3.1.7	The management system provides for adequate financial support for necessary activities and functions of management and research.		0.15	
3.1.7.1		Adequate funding is provided for management.		
60	Sufficient funding is available for only the most basic of management.	All Institutions with responsibilities within the management system have their own budget. The FFC takes decisions about allocation of funding according to its availability in the Federal Fishing Fund and decisions on immediate research needs. Funding decisions are recorded in special minutes of the FFC which require a 2/3 affirmative vote to be approved and are published in its web page. The national budget provides partial funding to SAGPyA for salaries and operational costs. The main funding for INIDEP is from the National Budget, Federal Fishing Fund and the private companies. Other institutions involved in the Patagonian Scallop research have their own source of funding.	0.30	90
80	The management system is funded adequately in order to fulfill all of its major responsibilities.			
100	The management system is funded adequately for fulfilling all management responsibilities effectively and efficiently.			

SCORING INDICATORS		Comments	Weight	Score
3.1.7.2		Adequate funding is provided for research.		
60	Research funding is minimal, sufficient only for basic data collection.	INIDEP scientific staff develop a research plan which includes a proposed budget which is presented to the National Research Direction. This is sufficient to support on-going short-term work. The private-sector supports research through funding surveys (compulsory, Resolution FFC N° 4/2005), payment of technician salaries through agreements with INIDEP, and other complementary actions mentioned above (studies on ageing, use of Multibeam technology and study of the effects of the fishery on non-target species) which allow long term studies. INIDEP's budget is approved by the National Congress on an annual basis and the Federal Fishing Fund provides additional funding each year (section 45 of the Federal Fishing Law). One of the two private companies involved in the Patagonian Scallop Fishery lent the multibeam sonar equipment to INIDEP for 3 years. The cost of Multibeam equipment is approximately US\$ 900.000. Funding is adequate for the scale of the fishery and research being undertaken at present. The recommendations of this report will require increased funding for research.	0.30	80
80	Research funding is sufficient to support a on-going short-term work but inadequate for in-depth, long-term research.			
100	Research funding is ample to support the immediate research needs of the fishery and a long-term research plan.			

SCORING INDICATORS		Comments	Weight	Score
3.1.7.3		The funding provided is secure in the long-term.		
60	Funding is only provided annually, without providing confidence that budgets will be maintained in the future.	The management system is funded annually according to the national budget established by the National Congress. Funding arrangements provide a high degree of continuity of the present level of management. As in all countries governmental allocation can vary between years but in Argentina there has not been a decrease in trend over the last 5 years. It is therefore considered as predictable.	0.20	85
80	Funding is provided annually but is predictable over long-enough time scales to allow continuity of the present level of management.			
100	Funding arrangements provide a very high degree of confidence that at least the present level of budgets will be maintained in the long term.			

SCORING INDICATORS	Comments	Weight	Score
3.1.7.4		Providers of funding for management and research have appropriate security for their interests in the fishery.	
60	Private-sector funding support for management and/or research does not provide any security for the funder's interests in the fishery.	Only four factory vessels are authorized to operate in this fishery. This number of vessels was recommended by INIDEP as the maximum number that will maintain the sustainability of the resource. The long-term sustainability of the fishery is linked to the cap on fishing effort, and the management plan incorporating this capped effort provides the security for the two fishing companies to make long-term financial plans. Thus the companies are in a position to support research when they see that it will help develop sustainability and profitability of the resource. In this fishery, the private-sector gives high support for research in order to develop studies which will reduce the uncertainty in knowledge of the resource and ensure its sustainability. These studies minimize error in biomass estimations and the TACs suggested. These aspects increase the security of the funder's interests in the fishery.	0.20
80	It is understood that private-sector funding support for management and/or research increases the security of the funder's interests in the fishery.		
100	Private-sector funding support for management and/or research is encouraged by a clear commitment that such investment will secure the funder's interests in the fishery, in so far as those are consistent with the MSC Principles and Criteria.		

SCORING INDICATORS		Comments	Weight	Score
3.2 (3A. 10)	The management system specifies measures and strategies that demonstrably control the degree of exploitation of the resource.		0.25	
3.2.1 (3A. 10 a)	The management system sets catch levels that will maintain the target population , and account for the non-target species (or size, age, sex) captured and landed in association with, or as a consequence of, fishing for the target species.		0.15	
3.2.1.1		Catch levels are set for each local area in the fishery, either as allowable catches, levels of fishing effort expected to take those catches, or both.		
60	A fishery-wide TAC and/or allowable effort limit is specified.	Management addresses spatial structure of the stock. Annual catch levels are specified for each bed within both Northern and Southern Management Units, as TACs, based on survey information. Fishing effort is regulated by restricting the number of vessels to four from the beginning of the fishery in 1996 (Resolution SAGPyA N° 150/96 and Resolution FFC N° 5/2005). The fishing beds are closed when the catches reach the established TAC, when the total commercial scallops catch reach 40 % of the total adult biomass in a given bed, and additionally they are not reopened until the relation between number of commercial/non commercial scallops reaches at least 50% of commercial scallops (See Resolution FFC N° 4/2005).	0.40	95
80	A TAC and/or allowable effort limit is specified for each principal management area.			
100	A TAC and/or allowable effort limit is specified for each management area which addresses the spatial structure of the stock.			

SCORING INDICATORS		Comments	Weight	Score
3.2.1.2		Catch levels are set to maintain the productivity, biomass and age structure of the target population at optimum levels.		
60	The catch and/or effort limits are set such that it is estimated that productivity, biomass and age structure of the target stock(s) will be maintained at adequate levels.	The management measures provide a high degree of confidence that productivity, biomass and age structure of the scallop stock is being maintained at an optimum level. Total allowable catch is established from the commercial fraction of the population (more than 55 mm shell height) and the fishing area is opened if the commercial scallops are dominant in number (> 50 %) over those of non commercial size (regionalized index $Z \geq n_{\text{commercial}} / n_{\text{total}}$) (Resolution FFC N° 4/2005). Closures are established to protect non commercial scallops, but there is no established biomass threshold. Analysis of the annual biomass surveys show that the biomass and age structure of the scallop stock remains similar from year to year (INIDEP Technical Reports).	0.40	95
80	The catch and/or effort limits are set such that there is a high degree of confidence that productivity, biomass and age structure of the target stock(s) will be maintained at adequate levels.			
100	The catch and/or effort limits are set such that there is a very high degree of confidence that productivity, biomass and age structure of the target stock(s) will be maintained at optimum levels.			

SCORING INDICATORS		Comments	Weight	Score
3.2.1.3		Catch levels are set to prevent significant capture of non-target species.		
60	The catch and/or effort limits are set such that it is estimated that catches of non-target species, sizes, ages or sexes will not be excessive.	Catch levels are set for scallops alone. The nature of the fishery results in the by-catch being mainly invertebrates, which are closely associated with scallops (Bremec and Lasta, 2002). No account has been taken of the by-catch in setting TAC. In this fishery the design of the gear aims to minimize this by-catch (See Performance Indicator 3.2.2.1) and it is expected that most of the individuals return alive to the sea bottom (E. González Lemmi, pers. comm.; G. Blanco, pers. comm.). Survival of the different components is unknown. Nevertheless, more studies on the survival of main components of epifaunal community taken as by catch are needed. No changes in biodiversity have been observed, even though changes in abundance of each benthic species have been registered in fished areas (C. Bremec, pers. comm.). The reproductive and experimental no-take zones also act as preservation zones for non target species. The loose rotational fishing pattern developed by fishers ensures that the same area of seafloor is not fished so frequently thus minimizing the take of by-catch from it. Over the range of the resource there are large areas that are not fished and ensure the maintenance of widespread unmodified benthic habitats (M. Lasta, pers. comm.). In addition no-take zones within beds further ensure the maintenance of local unmodified benthic habitat.	0.20	85
80	The catch and/or effort limits are set such that there is a high degree of confidence that catches of non-target species, sizes, ages or sexes will not be excessive.			
100	The catch and/or effort limits are set such that there is a very high degree of confidence that catches of non-target species, sizes, ages or sexes will not be excessive.			

SCORING INDICATORS		Comments	Weight	Score
3.2.2 (3A. 10 b) (3B. 13; 3B. 14)	<p>The management system identifies and requires the use of appropriate gear, practices and fishing methods to minimize adverse impacts on habitat (especially in critical or sensitive zones such as spawning and nursery areas) and to avoid the capture of non-target species (and non-target size, age, and/or sex of the target species).</p> <p>Destructive fishing practices such as fishing with poisons or explosives are not be used.</p>		0.15	
3.2.2.1		The fishing gears, methods and practices suitable for harvest of the target species have been examined with regard to their adverse impacts on habitat (especially in critical or sensitive zones), their rates of capture of non-target animals and incidental impacts on target animals. The gears with least impacts and non-target catches are used and/or prevented by other management measures.		
60	<p>The potential for adverse impacts on habitat (especially in critical or sensitive zones), capture of non-target animals and/or incidental impacts on target animals by the fishing gears, methods and practices used in the fishery has been considered and any significant adverse effects have appropriately considered in defining operational criteria for the fishery.</p> <p>The selection of fishing gears is appropriate to the fishery being assessed, the environment in which it is conducted and the need to minimize adverse impacts.</p>	<p>Although dredges are generally used to harvest scallops, on many grounds they become saturated rapidly, the dredge filling with benthos. Modified trawl gear with tickler chains that cause scallops to swim off the seafloor capture scallops readily and minimize the capture of the immobile benthic invertebrates have proved more effective in reducing by-catch and efficient in capturing scallops (Michael and Cranfield, 2001). The trawl gear used in this fishery is much more appropriate and results in much lower levels of by-catch. By-catch has been further reduced by modification of trawl construction (See Performance Indicator 1.1.2.5 for description of the net). The effect of trawls on the seafloor has largely been inferred from by-catch but M. Lasta (pers. comm.) used video to record directly how the gear operated. The invertebrates encountered by the trawl were not damaged and mainly scallops were captured by the gear as contact with the tickler chain caused them to swim upwards. A lower proportion of the immobile invertebrates were captured by this trawl. The trawl had no observable effect on the seafloor. Both the companies and scientists have indicated continual review of the otter net and its efficiency. For example Glaciar Pesquera S.A. mentioned its intention to evaluate square mesh nets in order to reduce the catch of non-commercial species and other non-living material which negatively affects the productivity of the on-board factories (E. González Lemmi, pers. comm.).</p> <p>Critical and sensitive zones are identified. Non-fishable reserve areas have been established as reproductive and experimental reserves.</p> <p>Because of the sedentary nature of scallops, reproduction is much higher within the fished areas. Therefore management to maintain the resource (population) is by application of a loose rotational harvest system, which allows zones and specific beds to be closed and/or the order of rotation altered in order to allow recovery. With this strategy, overfishing has not been a significant problem.</p>	0.70	90
80	<p>The selection of fishing gears is appropriate to the fishery being assessed, the environment in which it is conducted and the</p>			

SCORING INDICATORS	Comments	Weight	Score
	requirement to use gears with the least impact on habitat and non-target catches. Critical and sensitive zones within the fishery have been identified and efforts are underway to avoid or minimize interaction with these zones.		
100	The selection of fishing gears is appropriate to the fishery being assessed, the environment in which it is conducted and the requirements to use gears with the least impact on habitat and non-target catches. Critical and sensitive zones within the fishery have been identified and are either avoided or interactions have been significantly reduced. To further reduce bycatch or interaction with sensitive area, further gear modification research is ongoing.		

SCORING INDICATORS	Comments	Weight	Score
3.2.2.2		The fishery does not use poisons, explosives or similarly destructive fishing practices.	
60	The fishery does not involve the use of poisons or explosives.	Destructive fishing practices are not used in this fishery. This is specifically forbidden by legislation (Federal Fishing Law N° 24.922, section 21, item a-c) and there have been no incidents in the fishery's history as expressed by all stakeholders.	0.30
80	The fishery does not involve the use of poisons, explosives or destructive fishing practices.		
100	The fishery does not involve the use of poisons, explosives or destructive fishing practices. There is effective legislation to safeguard against such activities.		

SCORING INDICATORS		Comments	Weight	Score
3.2.3 (3A. 10 c)		The management system provides for the recovery and rebuilding of depleted fish populations to specified levels within specified time frames.	0.10	
3.2.3.1		The management system includes specified requirements for rebuilding the target stock(s), to specified levels within specified time frames, if they become depleted.		
60	No formal requirement for specified rebuilding measures exists in the management system but there is both an understanding that such measures would be required in the event of excessive depletion of the target stock(s) and procedures that would recognize such depletion if it occurred. In addition the management system has a capacity to respond appropriately and with reasonably expected effectiveness.	The management system has developed effective strategies for rebuilding depleted populations and is responsive and timely. Closing local areas to fishing because of high level of juveniles has been done rapidly in the past. Closing beds to fishing before the local TAC is reached, is also a timely mechanism that has worked well. The same mechanisms can be used to close any beds that become depleted locally. Present management has ensured sustainability of the fishery (See Figure 10), so such closures are unlikely. Fishers themselves achieve a similar result by moving on from areas on which catch rate has become lower than 5 tonnes of callus per day (a production that they consider uneconomic), thus giving rise to a rotational fishing pattern (M. Lasta, pers. comm.). No depletion events have been detected at a level to require rebuilding measures. However, closures are foreseen if depletion takes place.	0.80	95
80	Even though the target stock(s) have never yet been depleted the management system is capable of rapidly and effectively developing appropriate rebuilding requirements if and when required.			
100	Even though the target stocks have yet to be depleted, the management system includes specified			

SCORING INDICATORS		Comments	Weight	Score
	requirements for rebuilding the target stock(s), to specified levels within specified time frames, if they become depleted.			
3.2.3.2		The management system includes specified requirements for rebuilding any non-target fish populations, if they are frequently caught by the fishery and if they become depleted.		
60	No formal requirement for specified rebuilding measures exists in the management system but there is an understanding that such measures would be required in the event of excessive depletion of any non-target fish stocks frequently taken by the assessed fishery. In addition the management system has a capacity to respond appropriately and with reasonably expected effectiveness	Federal Fishing Law includes all relevant international laws which encompass the needs of at-risk and endangered species and allows the rebuilding of depleted populations. No at-risk and endangered species occur in the by-catch. The by-catch from this fishery is well described and abundance and species composition has been mostly unaffected over the history of the fishery (Bremec and Lasta, 1999; 2001; 2002; Bremec <i>et al.</i> , 2003) (the data from the On Board Observer Programme exactly compliment the by-catch data from research surveys). This is partly due to the immediate return of by-catch species to the sea (mandated by Resolution FFC N° 4/2005), which is monitored by 100% coverage of trips by on board observers. Even though there is no sign that populations of by-catch species need to rebuild the fishery has in place a mechanism for ensuring recovery of depleted areas, should this occur. Resolution FFC N° 4/2005, established no fishing areas within each scallop bed. These are sufficiently large that the populations of by-catch species will be a source of propagules that can recolonize any depleted areas.	0.20	95
80	Even though no non-target fish stocks frequently taken by the assessed fishery have yet been depleted the management system is capable of rapidly and effectively developing appropriate rebuilding requirements if and when required.			
100	Even though depletion on non-target stocks has not			

SCORING INDICATORS	Comments	Weight	Score
<p>occurred, the management system includes specified requirements for rebuilding any non-target fish stocks frequently taken by the assessed fishery, to specified levels within specified time frames, if they become depleted.</p>			

SCORING INDICATORS	Comments	Weight	Score
3.2.4 (3A. 10 d)	The management system has mechanisms in place to limit or close fisheries when designated catch limits are reached.		
3.2.4		The management system has mechanisms in place to limit or close fisheries when designated catch limits are reached.	
60	Management actions to be taken when catches reach the set limits are only considered when that situation arises. Catches are generally constrained within set limits but non-significant over-runs occur from time to time.	The management system has mechanisms which lead to fishery closures when catch limits are reached. This mechanism has been working since the beginning of the fishery, so that the total catches have not exceeded allowable levels. When 90% of the TAC is reached (Resolution FFC N° 4/2005), the National Direction of Fishery Coordination informs INIDEP as well as each fishing company in writing. The FFC then recommends SAGPyA to close the area. During the last two years, both Companies have voluntarily stopped fishing when the TAC is reached. They did this themselves, using their own catch records. The companies immediately informed the FFC of their decision to cease fishing.	0.15
80	The management system triggers fishery closures or other restrictions when catches approach set limits. There is a demonstrated, consistent ability to prevent catch over-runs.		
100	The management system has pre-set mechanisms which directly lead to fishery closures or other restrictions when set catch limits are reached, such that total catches do not exceed allowable levels.		

SCORING INDICATORS		Comments	Weight	Score
3.2.5 (3A. 10 e)		The management system has considered no-take zones as a means to control exploitation.		
3.2.5		The management system has considered no-take zones as a means to control exploitation.		
60	The potential use of no-take zones in the assessed fishery has been considered by management decision-makers. A more definitive analysis of the value of no-take zones is being planned.	In 1995 a very important recruitment of new scallops within the “Reclutas” bed was observed. A no-take zone was established within it (Resolution SAGPyA N° 150/1996) expressly to study biological and ecological aspects under non-fished condition. Further no-take zones have been formally established as reproductive and experimental reserves within each fishing bed since 1996 following technical recommendation from INIDEP (Resolution SAGPyA N° 150/1996 and Resolution FFC N° 4/2005). Such zones maintain the status of reserves but their usefulness at present or the need to delimitate new zones must be evaluated.	0.10	90
80	The potential use of no-take zones in the assessed fishery has been reviewed by management decision-makers and management has acted on the results.			
100	There has been a formal analysis of the value of establishing no-take zones in the assessed fishery and management has acted upon the findings and recommendations.			

SCORING INDICATORS	Comments	Weight	Score	
3.2.6	The management system specifies such other measures and strategies which demonstrably achieve the goals and objectives of the fishery.			
3.2.6		The management system specifies such other measures and strategies which demonstrably achieve the goals and objectives of the fishery.		
60	The management system includes a range of measures and strategies to control the level of fishing activity but it is unclear whether, taken as a whole, they are sufficient to achieve the goals and objectives of the fishery.	The management measures and strategies applied in the fishery give confidence that the fishing effort is restrained to a level that ensures sustainability. Several measures and strategies achieve this: the size limit is set at a level that ensures that a significant portion of the population cannot be fished; the TAC further limits the fishing effort; the restriction of vessels allowed to operate in the fishery further limits fishing effort; and the regulations that allow closure of areas in which more than 50% (in numbers) of the population are juveniles can be used to further limit fishing activity; as well as populations in which adults have been depleted, can be used to further limit fishing effort. The overall goal of restricting fishery effort is to ensure sustainability. Figure 10 shows this objective has been achieved.	0.10	90
80	The management measures and strategies applied in the fishery, when taken as a whole, are thought to limit fishing activity to the level which best achieves the goals and objectives of the fishery.			
100	There is a high degree of confidence that the management measures and strategies applied in the fishery, when taken as a whole, limit fishing activity to the level which best achieves the goals and objectives of the fishery.			

SCORING INDICATORS		Comments	Weight	Score
3.2.7 (3B. 12; 3B. 15)		Fishing operations minimize mortality of non-target catch, reduce discards of what cannot be released alive, and minimize operational waste such as lost fishing gear, oil spills, on board spoilage of catch, etc.	0.10	
3.2.7.1		The operations of the fishery are conducted so as to minimize (to the degree practical) the capture of non-target animals, particularly those which cannot be released alive.		
60	The operations of the fishery include some reasonable measures to reduce the capture of non-target animals, particularly those which cannot be released alive. Their effectiveness has not been fully evaluated.	The operations of the fishery are conducted so as to minimize the catch of non-target species through increase of mesh size and reduction of towing time (average tow time is approximately 15 minutes). Mortality of by-catch is reduced during sorting by the washing system that keeps them cushioned in flowing water (C. Bremec, pers. comm.). The sorted by-catch is returned to the sea within 10-20 minutes (G. Blanco, pers. comm.). This is mandated by Resolution FFC N° 4/2005, which specifies that by-catch must be immediately returned to the sea. The headline height of the net (1-1.2 m) and the slow towing speed (3-4 knots), minimize the capture of demersal fish. Birds and mammals have never been captured in this fishery.	0.20	90
80	The operations of the fishery include a range of reasonable measures, including both formal management requirements and informal industry practices, to minimize the capture of non-target animals, particularly those which cannot be released alive. Their performance is appropriately evaluated.			
100	The operations of the fishery are demonstrably conducted so as to minimize (to the degree practical) the capture of non-target animals, particularly those which cannot be released alive, and the mortality of those which are discarded.			

SCORING INDICATORS	Comments	Weight	Score
Fishermen and others in the industry take reasonable measures, beyond the formal management requirements, to minimize such capture and mortality.			

SCORING INDICATORS	Comments	Weight	Score	
3.2.7.2		The operations of the fishery are conducted so as to minimize (to the degree practical) the mortality of discarded non-target catch. Fishermen and others in the industry take reasonable measures, beyond the formal management requirements, to minimize such mortality.		
60	The operations of the fishery include some reasonable measures to reduce the mortality of discarded non-target catch.	The operations of the fishery are conducted so as to minimize the mortality of non-target species by devolution to the sea immediately after they have been caught, following the Resolution FFC N° 4/2005. Mortality of by-catch in the net is reduced by keeping tow time short (15 minutes), so even the most fragile species such as the echinoids are landed without damage. Mortality of by-catch is reduced during sorting by the washing system that keeps them cushioned in flowing water (C. Bremec, pers. comm.). The sorted by-catch shows no sign of damage (even the most fragile species such as the echinoids) and the by-catch is returned to the sea within 10-20 minutes (G. Blanco, pers. comm.). Both the companies and scientists have indicated that operation of the otter net and its efficiency is continually under review. For example Glaciar Pesquera S.A. mentioned its intention to evaluate square mesh nets in order to reduce the catch of non-commercial species and other non-living material which negatively affects the productivity of the on-board factories (E. González Lemmi, pers. comm.).	0.20	95
80	The operations of the fishery include a range of reasonable measures, including both formal management requirements and informal industry practices, to minimize the mortality of discarded non-target catch.			
100	The operations of the fishery are demonstrably conducted so as to minimize (to the degree practical) the mortality of discarded non-target catch. Fishermen and others in the industry take reasonable measures, beyond the formal management requirements, to minimize such capture.			

SCORING INDICATORS		Comments	Weight	Score
3.2.7.3		Fishermen and others in the industry take all reasonable steps to minimize the loss of fishing gear.		
60	Fishermen and others in the industry have adopted procedures to retain fishing gear.	Fishermen and others in the industry demonstrably take all reasonable steps to minimize the loss of fishing gear (E. González Lemmi, pers. comm.; G. Blanco, pers. comm.). Fishing gear is promptly recovered because of the precision of navigation and the skill of the crews even if they are damaged and remain temporarily on the seafloor. All gear breakages are recorded in the ships logs and by the on board observers. No gear breakage has resulted in the gear being lost.	0.20	100
80	Fishermen and others in the industry take steps to minimize the loss of fishing gear.			
100	Fishermen and others in the industry demonstrably take all reasonable steps to minimize the loss of fishing gear, and to recover lost fishing gear.			

SCORING INDICATORS		Comments	Weight	Score
3.2.7.4		Fishermen and others in the industry take all reasonable measures, whether or not required by law or regulation, to minimize discharge into the ocean of anything except water, organic shipboard wastes and materials caught during fishing operations.		
60	Fishermen and others in the industry do not wantonly discharge substances into the ocean but there are no specific programs or controls. While there are no significant discharges except for water, organic shipboard wastes and materials caught during fishing operations.	Fishermen and others in the industry demonstrably take all reasonable measures to minimize discharge, wastes or substances into the ocean that may produce damage to floral and faunal components. These are explicitly forbidden by Federal Fishing Law N° 24.922, Art. 21 item's e) and m). Argentine navigation legislation requires the companies to carry wastes back to port. Liquid wastes must be transported to land for processing and recycling by a specialized company which certifies this mandatory requirement of the company by the Government (E. González Lemmi, pers. comm.). Argentina has adopted all international regulations and recommendations proposed by United Nations in regard to waste processing and these are incorporated in the Federal Fishing Law.	0.20	95
80	Fishermen and others in the industry take reasonable measures to minimize discharges into the ocean, in accordance with either regulations or an industry code of practice.			
100	Fishermen and others in the industry demonstrably take all reasonable measures to minimize discharge into the ocean of anything except water, organic shipboard wastes and materials caught during fishing operations, in accordance with either regulations or an industry code of practice. Such discharges are minimal.			

SCORING INDICATORS	Comments	Weight	Score
	Performance monitoring occurs. Fishermen and others in the industry strongly support minimization of waste discharges.		
3.2.7.5		Fishing and on-board processing operations are conducted so as to minimize spoilage or other wastage of the marketable portion of the target catch.	
60	Spoilage or other wastage of the marketable portion of the target catch is not excessive.	Fishing is conducted so as to minimize, as well as possible, spoilage of the marketable portion of the target catch. The on-board processing operations are accepted by the FFC and approved by SENASA who control quality and food safety. The on board quality control process includes specific measures to minimize wastage. Quality and sanitary control is high (J. Shepherd, pers. comm.). After steaming to recover the cooked animal, the gonad, digestive gland and gill are removed by a precise controlled riddling process. The muscles are graded to size and these are individually frozen before package into 15 Kg. boxes which are held in cool storage on board until the vessels dock. The grading of product on board adds value to it. Throughout the extraction process the plant is continually cleaned by washing and hygienic handling practices (E. González Lemmi, pers. comm.). The other company operates a similar system that was not viewed by the Assessment Team.	0.20
80	Fishing and on-board processing operations are conducted so as to minimize spoilage or other wastage of the marketable portion of the target catch.		90
100	Fishing and on-board processing operations are conducted such that spoilage or other wastage of the marketable portion of the target catch does not occur except as a result of unforeseen emergencies or accidents at-sea.		

SCORING INDICATORS		Comments	Weight	Score
3.2.8 (3A. 6)		The management system provides economic and social incentives that contribute to sustainable fishing and does not operate with subsidies that contribute to unsustainable fishing.	0.15	
3.2.8.1		The fishery has no subsidies that contribute to unsustainable fishing.		
60	The fishery management system is not financially dependent on subsidies that contribute or lead to overfishing. However, some subsidies do occur and could be construed as contributing to overcapacity in the fishery. These subsidies are minor and do not impinge on management's ability to manage biological resources on a sustainable basis.	This Argentine fishery has no subsidies that contribute to unsustainable fishing or overcapacity. Even when the tax return system was suspended recently, mechanisms were in place to return internal taxes like IVA (Added Value Tax) to the Companies that export any product (Argentine industrial policy for all exports). This mechanism is accepted by the World Trade Organization and is not considered as a subsidy. Companies pay a specific tax (10%) to export fish which could act as a disincentive.	0.50	100
80	The fishery management system is not financially dependent on subsidies that contribute or lead to overfishing. Subsidies that could be contributing to overfishing are now being addressed and a program is in place to eliminate them.			
100	The fishery has no subsidies that contribute to unsustainable fishing or overcapacity.			

SCORING INDICATORS		Comments	Weight	Score
3.2.8.2		The management system includes economic/social incentives that contribute to sustainable fishing.		
60	Other than the economic benefit of achieving a sustainable fishery, the management system provides little additional incentives for sustainable fishing.	Glaciar Pesquera S.A. have a strict code of conduct of behaviour of crew on board, and reward staff to a much higher level than equivalent land workers, thus ensuring a responsible attitude to the conduct of all on board and fishing operations (E. González Lemmi, pers. comm.). All the vessels fulfill the requirements of the law and the incentives provided to the crews ensure responsible application and discharge of duties to guarantee the sustainability of the fishery. The various government organizations involved in management of the fishery are all making or instituting decisions (economic and social) which directly contribute to improved sustainability of this fishery. The FFC, the Management Authority has demonstrated clearly its continuing desire to develop the Patagonian scallop fishery as a well managed and sustainable one (e.g. Resolutions FFC N° 4 and 5/2005, See Appendix II).	0.50	85
80	The management system includes some economic and/or social incentives for sustainable fishing. A programme is being developed to promote sustainable fishing practices beyond harvest and gear controls.			
100	The management system includes specific economic and/or social incentives that demonstrably contribute to sustainable fishing. A programme to actively promote sustainable fishing practices has been implemented.			

SCORING INDICATORS	Comments	Weight	Score
3.3	The management system is implemented in an effective manner to meet MSC Principles and Criteria.	0.25	
3.3.1 (3B. 16)	The fishery operation (which includes all management authorities) is conducted in compliance with the management system and is effective, responsible and timely.		
3.3.1	The fishery operation (which includes all management authorities) is conducted in compliance with the management system and is effective, responsible and timely.		
60	The effectiveness, responsibility and timeliness of the management system and operation of the fishery are marginally sufficient for the management of the assessed fishery.	0.25	95
80	The administration of the management system and operation of the fishery is adequately effective, responsible and timely.		
100	The administration of the management system and operation of the fishery is highly effective, responsible and timely.		

SCORING INDICATORS		Comments	Weight	Score
3.3.2 (3A. 7)		The management system uses adaptive and precautionary approaches, particularly when dealing with scientific uncertainty.		
3.3.2		The management system uses adaptive and precautionary approaches, particularly when dealing with scientific uncertainty.		
60	While there is policy in place to ensure use of the precautionary approach, management decisions appear to be precautionary when dealing with scientific uncertainty. Scientific uncertainty is met by treating best available estimates as though they were accurate.	Management decisions implement appropriate precaution when dealing with scientific uncertainty. The estimates of recruitment and mortality are uncertain, as the estimates of fecundity and reproductive capacity. The management of the fishery is highly effective because of the creation of the Commission for the Analysis and Monitoring of the Patagonian Scallop Fishery which ensures appropriate and timely decision making. The success of this is reflected in the lack of disciplinary actions (J.C. Salvarezza, pers. comm.) applied within the fishery and the precautionary strategy of the companies to ensure that recruitment and growth overfishing do not occur. The development of the loose rotational fishing pattern by fishing companies is a further major precautionary measure ensuring that recruitment and growth overfishing do not occur (See Hart, 2003).	0.25	90
80	Management decisions implement appropriate precaution when dealing with scientific uncertainty. Efforts to define and implement an explicit precautionary strategy are underway.			
100	Management decisions are made using an explicit precautionary strategy in light of scientific uncertainty. This strategy is formally adopted as policy or regulation. The use of this strategy is documented.			

SCORING INDICATORS		Comments	Weight	Score
3.3.3 (3A. 8)	The management system incorporates a research plan – appropriate to the scale and intensity of the fishery – that addresses the information needs of management and provides for the dissemination of research results to all interested parties in a timely fashion.		0.25	
3.3.3.1		There is a comprehensive, long-term research programme that provides for both short- and long-term information needs for management of the fishery and protection of the ecosystem.		
60	Major areas requiring further research have been identified and some research projects addressing key issues are undertaken by one or more institutions. These areas of research are relevant to information needs of the management system. However there is no organized, comprehensive research programme.	There is a comprehensive research program that provides for both short- and long-term information needs for management of the fishery and protection of the ecosystem through multiple ongoing research projects. The main body of research is conducted by INIDEP, as a part of a research program formulated 4 years ago, and adjusted annually according to need (See www.inidep.edu.ar). Other institutions participating in the research program include the National University of Mar del Plata, CONICET, CITEP and SENASA (M. Lasta, pers. comm.). All are partially coordinated by INIDEP, who generally provides the samples. The two fishing companies also participate with economic support and provision of a compulsory 20 days survey once a year for each fishing vessel (Resolution FFC N° 4/2005).	0.60	90
80	Major areas requiring further research have been prioritized. These areas of research are relevant to information needs of the management system and are beginning to address ecosystem productivity. The research priorities are appropriate to the scale and intensity of the fishery. There is limited coordination between institutions engaged in research related to the fishery.			
100	There is a comprehensive			

SCORING INDICATORS	Comments	Weight	Score
<p>research programme that provides for both short- and long-term information needs for management of the fishery and protection of the ecosystem through multiple ongoing research projects.</p> <p>There is coordination among the institutions participating in the research program.</p> <p>The fishing industry and other stakeholders participate in the direction of the research programme, along with scientists and fishery managers.</p>			

SCORING INDICATORS	Comments	Weight	Score
3.3.3.2		The management system provides for dissemination of research results to all interested parties in a timely and understandable fashion.	
60	Dissemination of research results is left to the scientists involved in the research. Technology transfer is informal and involves the operators in the industry.	The management system includes routine measures for dissemination of research results. Once the FFC approves the INIDEP technical report with research results, it is available to all interested parties as requested. Minutes of the weekly meetings of the FFC are published in their web page (www.cfp.gov.ar) and contain a list of the new technical reports approved. Information transfer to the fishers would be improved if the science was presented in a practical form which allows efficient application of the new information resulting from the research.	0.40
80	The management system has organized measures for the dissemination of research results to interested parties.		
100	The management system includes a very effective programme for the timely dissemination of research results to all interested parties.		

SCORING INDICATORS	Comments	Weight	Score	
3.3.4 (3A. 2)	The management system considers all relevant information, including local knowledge, and bases decisions on the best available information.	0.25		
3.3.4.1		The management system solicits and takes into account relevant information, including information on conservation of the resource, protection of the ecosystem, efficiency of harvesting of the target species, and other issues while also using relevant information in fair and equitable ways.		
60	The management system considers information and advice but does not solicit it. Relevant information is used when making decisions.	INIDEP is the most proactive part of the management system that solicits and processes information of harvesting and impact on the target species and ecosystem, from fleet logbooks and the on board observer program. All information contributes to planning the management. The FFC does not discriminate in the use of information. INIDEP is the main source of such information and other institutions are occasionally consulted by the FFC. The FFC receives, in a formal way, any concerns from any party or Institution which they respond to. The outcome is recorded in its minutes (See www.cfp.gov.ar).	0.60	90
80	The management system actively solicits and seriously considers all relevant information when making management decisions. There is some evidence that the management system gives fair and appropriate consideration to all information received. There is evidence that the system responds to the information.			
100	The management system demonstrably solicits, encourages and takes into account all relevant information from all interested and affected stakeholders. The system is responsible and contributes to planning. There is clear evidence that the			

SCORING INDICATORS		Comments	Weight	Score
	management system does not discriminate in the solicitation and use of information received.			
3.3.4.2		The management system presents information, including scientific advice, to interested parties in a clear, useful, transparent way.		
60	Relevant information is made available to interested parties on request.	The management system provides for public presentation of relevant information to interested parties through publication of lists of the new technical reports approved and included in the minutes posted in its web page (www.cfp.gov.ar) and provides such information on request. However, it is not a proactive system, since whole reports are not published. Most relevant research produced by INIDEP is published as scientific papers, in refereed international journals (M. Lasta, pers. comm.). In order to extend this to the fishing community INIDEP draws the attention of the FFC through SAGPyA. The FFC in consultation with SAGPyA use the scientific and fisheries management information for the preparation and dissemination of recommendations. Information transfer to the fishers would be improved if the science was presented in a practical form which allows efficient application of the new information resulting from the research.	0.20	85
80	The management system routinely provides for public presentation of relevant information to interested parties.			
100	The management system includes an effective public programme for presentation of relevant information to interested parties in a clear, useful, and transparent way. This program also active public education/outreach to improve the quality and quantity of incoming information.			
		All scientific and management information is submitted to the Commission for the Analysis and Monitoring of the Patagonian Scallop Fishery (created by Resolution FFC N° 4/2005).		

SCORING INDICATORS		Comments	Weight	Score
3.3.4.3		Management decisions are based on the best information available.		
60	It appears that management decisions are based on the best available information.	All management decisions are based on the best information available and consider all information sources. There are no internal audit mechanisms formally established but any citizen can follow the FFC activities and decisions on their web page. Additionally shorthand versions of their deliberations are kept for further consultation. Every report produced by a research group is approved by National Director of Research and reviewed by the FFC. INIDEP submits their reports to the SSPyA Technical Department (Fisheries Advisory Department) and to the FFC, which has a Technical Secretariat that analyzes the reports and gives advice to the FFC members.	0.20	95
80	There is evidence that management decisions are based on the best information in a timely way.			
100	There is a clear record that management decisions are based on the best information available. There are internal audits procedures in place to ensure this record continues.			

SCORING INDICATORS	Comments	Weight	Score	
3.4	The management system contains a process for monitoring and evaluating performance and acting on findings.	0.25		
3.4.1. (3A. 11)	The management system contains appropriate procedures for effective compliance, monitoring, control, surveillance and enforcement which ensure that established limits to exploitation are not exceeded and specifies corrective actions to be taken in the event that they are exceeded.	0.50		
3.4.1.1	The management system includes appropriate procedures for monitoring fishing effort allocation in the fishery.			
60	The management system includes a basic procedures for monitoring fishing effort allocation in the fishery but this monitoring program lacks evaluation. Data are collected with a temporal resolution of years and a spatial resolution of management units only.	The management system includes a suite of appropriate procedures for comprehensive monitoring of fishing effort allocation within the fishery, such as on-line satellite monitoring for positioning, speed and track. This process is in the control of the Coastguard but SAGPyA, INIDEP and the two fishing companies have direct on line access to the data and use it for the respective purposes. This ensures a high level of transparency in the whole fishing operation. These data are collected with a high spatial and temporal resolution. Data are complemented with the track of every haul registered and plotted by a navigation software installed on the vessels. INIDEP has access to this information (J.C. Salvarezza, pers. comm.; E. González Lemmi, pers. comm.; M. Lasta, pers. comm.; M. Santos, pers. comm.)	0.20	95
80	The management system includes a full range of appropriate, proven procedures for monitoring fishing effort allocation in the fishery at logical temporal and spatial resolutions.			
100	The management system includes a suite of appropriate procedures for comprehensive monitoring fishing effort allocation in the fishery. Data are collected with high temporal and spatial resolutions. This program			

SCORING INDICATORS		Comments	Weight	Score
	is fully evaluated to ensure its effectiveness.			
3.4.1.2		The management system includes appropriate procedures for monitoring of catches, including species, sizes, ages and other data.		
60	The management system provides for basic monitoring of catches, including species, sizes, ages and other data, encompassing catches of both target and non-target species. However, this monitoring program lacks evaluation, its effectiveness is uncertain. Data are collected with a temporal resolution of years and a spatial resolution of management units only.	The management system includes appropriate procedures for monitoring of catches, including species, size and other data, encompassing catches of both target and non-target species by sub-samples taken by the On Board Observer Program (with 100% compulsory coverage; G. Blanco, pers. comm.). Data are collected by means of logbooks, with high temporal and spatial resolution, particularly those on target species. The following information is required and reported: i) Catch information of every haul must be recorded in the logbook (Resolution SAGPyA N° 150/96), and reported by fax, every 72 hours; ii) total catch and production from the trip must be reported before landing of it starts (Resolution SAGPyA N° 150/1996). Landings are controlled by the Fishing Control Department of SAGPyA and Argentine Customs. Additionally the information is cross-checked with the Sanitary Control body (SENASA) who are responsible for the quality and safety of the products produced (J. Shepherd, pers. comm.). The on board observers sampling and reporting program is continuously producing the above information for use by the fishery (On Board Observer Reports).	0.15	
80	The management system includes appropriate procedures for monitoring of catches, including species, sizes, ages and other data, encompassing catches of both target and non-target species. The fates of various portions of the catch (e.g. retained, discarded) are monitored. Data on the target species are collected with medium temporal and spatial resolutions.			

SCORING INDICATORS	Comments	Weight	Score
<p>100</p> <p>The management system includes a suite of evaluated procedures for comprehensive monitoring of catches, including species, sizes, ages and other data, encompassing catches of both target and non-target species. The fates of various portions of the catch (e.g. retained, discarded) are monitored. Data are collected with high temporal and spatial resolutions, particularly those on the target species. This program has a demonstrated ability to monitor all relevant aspects of the fishery.</p>			

SCORING INDICATORS	Comments	Weight	Score	
3.4.1.3		The fishing industry assists and cooperates with the management authorities in the collection of catch, discard and other information.		
60	The fishing industry cooperates in the collection of catch, discard and other information to the extent required by law and regulation. Deliberate misreporting is not so common as to compromise management of the fishery.	The fishing industry intensively assists and cooperates with the management authorities in the collection of catch, discard and other information data. All information collected by the companies is supplied to INIDEP, besides information recorded in the logbooks as required by standard regulations. The salaries and costs of the observers on board are the responsibility of the fishing companies (See Convenio N° 86 “Acciones mancomunadas para el desarrollo del Proyecto Vieira Patagónica”). The fishing companies operate at a high level of integrity and efficiency. Deliberate or accidental misreporting do not occur.	0.10	100
80	The fishing industry provides significant assistance to the management authorities in the collection of catch, discard and other information, beyond minimum requirements. Deliberate misreporting is minimal.			
100	The fishing industry extensively assists and cooperates with the management authorities in the collection of catch, discard and other information. Deliberate misreporting is non-existent.			

SCORING INDICATORS		Comments	Weight	Score
3.4.1.4		The management system provides for necessary control of fishing activity.		
60	The management system includes provisions for the control of fishing activity but they are not fully effective.	The management system includes provisions which effectively control fishing activities as necessary to achieve the management objectives. All vessels working in the Argentine Sea are on line monitored by the Argentine Coastguard, SAGPyA, Navy and the five maritime provinces by means of satellital equipment that records position, speed, and track information on map every hour (J.C. Salvarezza, pers. comm.). Fishery documentation is controlled in the port at the beginning and end of every trip. SAGPyA has a Control Department for fishing activities, supported by the Argentine Prefecture, which controls the fishing operations by means of on board and/or on-land inspectors. Because the Patagonian scallop fishery is considered a non conflictive fishery in regard to the incidental capture of finfish species, mainly the Common hake (<i>Merluccius hubbsi</i>), by the Department of Control of SSPyA, it was decided that it is not obligatory to have inspectors on board (A. Moscato, pers. comm.).	0.15	100
80	The management system includes provisions which adequately control fishing activity, such that the objectives of management are generally achieved.			
100	The management system includes provisions which effectively control fishing activity as necessary for the achievement of the objectives of management.			

SCORING INDICATORS		Comments	Weight	Score
3.4.1.5		The management system includes appropriate surveillance, enforcement and justice systems.		
60	The management system includes surveillance, enforcement and justice systems of limited effectiveness, such that there is some minor risk of inadequate compliance. However there are no major risk to management's ability to achieve conservation objectives.	The surveillance system is supported by Argentine Coastguard (on-line satellite monitoring of all vessels) in agreement with SAGPyA and by the SAGPyA Fishing Control Department (J.C. Salvarezza, pers. comm.). Procedures for surveillance, enforcement and justice are common for all fisheries. There are many instances of negotiation to resolve understanding of the rights of the fishers (M. Santos, pers. comm.). If legal recourse is required there is some doubt about the timeliness of the justice system. The management system includes appropriate and effective surveillance, enforcement and justice systems, sufficient to ensure a high degree of compliance with management measures. The fishers responsibly adhere to the requirements of the management system and only a few minor transgressions have been recorded by the surveillance system.	0.10	95
80	The management system includes appropriate surveillance, enforcement and justice systems, and compliance is generally achieved.			
100	The management system includes appropriate and effective surveillance, enforcement and justice systems, sufficient to ensure a high degree of compliance with management measures.			

SCORING INDICATORS	Comments	Weight	Score	
3.4.1.6	The fishing industry complies with the fishery management system and all legal and administrative requirements and intentions.			
60	The fishing industry generally complies with the fishery management system and/or legal and administrative requirements.	The Evaluation Team did not find indications of non-compliance with the fishery management system and all legal and administrative requirements and intentions were met. The Argentine Prefecture has recorded three or four episodes of non compliance in four years (J.C. Salvarezza, pers. comm.). On the other hand, the Evaluation Team found that the industry has interest in complying with administrative requirements and takes actions in a proactive way to improve the management system.	0.15	100
80	The fishing industry generally complies with the fishery management system and all legal and administrative requirements, though the compliance is with the letter of the requirements and not with their intentions.			
100	There are no significant indications of non compliance with the fishery management system and all legal and administrative requirements and intentions.			

SCORING INDICATORS	Comments	Weight	Score
3.4.1.7			
60	Corrective actions are taken when established limits to exploitation are exceeded and are only considered when that situation arises. However, these actions are taken on a case by case basis.	0.15	100
80	Corrective actions are taken when the established limits to exploitation are exceeded and are considered on a case by case basis. There is evidence that demonstrates that the case by case actions are appropriated executed in a timely manner.		
100	The management system has pre-determined actions and timelines to be taken if established limits to exploitation are exceeded. There is record of proven results that demonstrate that these corrective actions are working and leading to fewer and fewer incidents of exceeding established limits.		
The management system includes specified corrective actions to be taken if established limits to exploitation are exceeded. The management system includes specified actions and timelines to be taken if established limits to exploitation are exceeded (M. Santos, pers. comm.). These actions are preventive, because closure of the fishery in any bed within the management units is determined when the catch reaches 90% of the TAC. Logbooks are provided by the fishing companies to SAGPyA every 72 hs. (E. González Lemmi, pers. comm.). The fishing zones remain closed until the conditions to re-start fishing are checked. This mechanism has proved effective and there is a record of proven results that demonstrate that these corrective actions are working and leading to fewer and fewer incidents of exceeding established limits (M. Lasta, pers. comm.).			

SCORING INDICATORS	Comments	Weight	Score	
3.4.2 (3A. 9)	The management system requires that assessments of the biological status of the resource and impacts of the fishery have been and are periodically conducted.	0.50		
3.4.2.1	There are annual assessments of the fishery and its target stock(s).			
60	Assessments of the fishery and its target stock(s) are performed at appropriate intervals. The results are evaluated relative to the reference levels.	The assessment of the fishery and target stock is performed annually in each bed within both management units. Traditional predictive stock assessment is replaced by complete fishery-dependent and fishery independent information following a spatially explicit protocol (M. Lasta, pers. comm.; INIDEP Technical Reports). The results of the fishery and stock assessments are evaluated by SAGPyA and the FFC.	0.25	80
80	A full assessment of the fishery and its target stock(s) has been conducted and update assessments are performed at intervals. The results are evaluated relative to the reference levels.			
100	Full assessments of the fishery and its target stock(s) are conducted at intervals, the timing of which has been determined to be consistent with the inherent variability of production parameters and the uncertainty of assessments. The results are evaluated relative to the reference levels.			

SCORING INDICATORS		Comments	Weight	Score
3.4.2.2		The impacts of the fishery on the ecosystem and on endangered, threatened or protected species are assessed routinely.		
60	An assessment of the impacts of the fishery on the ecosystem and on endangered, threatened or protected species (if any have been identified) is being developed.	Data collection of non-target species is taken continuously by on board observers in real time. No endangered or threatened species have been recorded in the catch over the 10 years of the fishery (G. Blanco, pers. comm.; M. Lasta, pers. comm.). Because of the structure of the management system there is automatic assessment of the impact of the fishery on the ecosystem and endangered, threatened or protected species. Analysis of the fishery by-catch data and the by-catch of biomass surveys give a high degree of confidence that the ecosystem has not been modified by the fishery.	0.25	90
80	The impacts of the fishery on the ecosystem and on endangered, threatened or protected species have been assessed.			
100	The impacts of the fishery on the ecosystem and on endangered, threatened or protected species are assessed routinely every few years.			

SCORING INDICATORS		Comments	Weight	Score
3.4.2.3		The management system includes provisions for regular internal reviews.		
60	The management system incorporates an internal review process that meets minimum performance requirements.	The management system incorporates an internal review process of management measures, management plans, and research. Every regulation is reviewed. INIDEP has an internal revision process for technical reports: Coordinator, National Director of Research and Director of Institute. Also SAGPyA and FFC technical advisory departments analyze the technical reports. The fishing companies regularly review their management systems.	0.15	85
80	The management system undertakes internal reviews of its functioning at intervals. Performance is evaluated relative to the objectives set by the management system.	The Research Programme of this fishery is reviewed annually internally.		
100	The management system incorporates explicit provisions for on-going internal reviews of its performance. Performance is evaluated relative to the objectives set by the management system.			

SCORING INDICATORS		Comments	Weight	Score
3.4.2.4		The management system is subject to periodic external reviews.		
60	The management system is not subjected to independent external reviews but considers external critiques that may occur.	The external reviews of the management system are carried out by the Legislative Power (Senate and Legislative Chambers), which have created specific Commissions to control the management activities and policies of the National Executive Power. Both Chambers mentioned, regularly or continually sanction Declaration Projects which specify different topics of interest of the Congress to the Executive Power, in addition to Information Requesting Projects which seek explanation actions or policies of the Executive Power. Argentina is a Republic and, as such, the Legislative Power acts independently of the Executive Power. The latter establishes fishing policies and operative matters of the Patagonian Scallop Fishery. The responsibilities of the Commission of Maritime, Fluvial, Fishery and Port Interests belong to the National Legislative Chamber and can be found in its web site: www.diputados.gov.ar , whereas the ones of the Commission of Agriculture, Livestock and Food which belong to the National Senate can be found in www.senado.gov.ar .	0.10	80
80	The management system is subjected to independent external review at intervals, results of which are explicitly considered by managers.	Other external reviews of the FFC, SAGPyA and INIDEP are carried out by the financial control organizations belonging to the National Executive Power and Legislative Power. Should this fishery receive MSC Certification regular external reviews will be obligatory.		
100	The management system incorporates explicit provisions for independent, expert external review, including considering and implementing appropriate advice.			

SCORING INDICATORS		Comments	Weight	Score
3.4.2.5		The management system responds to the results of assessments and reviews.		
60	There are indications that the management system responds to some results of assessments and reviews.	The FFC, SAGPyA and INIDEP give response in a timely manner to all the questions asked by the National Legislative Power. The Chief Ministry (Jefatura de Gabinete de Ministros) which coordinates, ensures that all questions are replied to, even though this does not always happen in a timely manner. The present management system has developed in response to the information submitted by SAGPyA, INIDEP and fishers to the FFC and to the National Legislative Power.	0.25	80
80	The management system shows evidence of improved performance built on the results of internal and external reviews.			
100	The management system has demonstrated a consistent pattern of incorporating, in a timely manner, significant recommendations for improvement developed through internal or external performance reviews.			

6.3 TRACKING AND TRACING OF THE PATAGONIAN SCALLOP PRODUCT

- The vessels are continually tracked and activity plotted by satellite technology by the coastguard.
- There is no at sea transfer of products between vessels.
- The product is unloaded and immediately packed in containers for export, which are supervised and sealed by Argentine Customs. There are 3 seals (Customs, Glaciar Pesquera S.A. and Maersk Shipping who take responsibility for shipment of product for the customers of Glaciar Pesquera S.A).
- Tracking of production from on-board processing, to unloading and shipping is traceable.
- Glaciar Pesquera SA does not process product, or repack on shore. It is a producer only on board the factory vessel.
- The processing facilities are hygienic and the fresh product is frozen within 30 minutes after the scallop arrive on board.

The Assessment Team is satisfied that the system of tracking and tracing in the fishery ensure that all of the product is derived from the fishery and no risk factors exist, prior to the point of unloading. The scallop products from this fishery may enter into further chains of custody and carry the MSC logo, subject to the fishery successfully completing the Chain of Custody Certification requirements.

The chain of the fishery certification ends when the vessel docks in port to unload the catch. At that point the Chain of Custody assessment and certification begin.

7 CONDITIONS AND RECOMMENDATIONS

The fishery has achieved more than 80% for each of the three principles and has satisfactorily passed the evaluation against the MSC Principles and Criteria. Nevertheless some Performance Indicators scored less than 80%, which therefore requires the Certifier to establish conditions in order to maintain the Certification.

These conditions will help the fishery to improve to a minimum (pass) level, within a period that may not exceed the period of five years for which the certification is valid. The fishery will be audited annually in order to verify that the improvements required in the conditions established are met.

7.1 CONDITIONS

The continuity of the certification of the Patagonian scallop fishery will depend on the following conditions being achieved within the times specified.

Condition 1

Performance Indicator 1.1.1.3

The population dynamics of the species (including age at maturity, natural mortality, growth, and fecundity) are understood.

Required Action: Within a maximum of 4 years, starting from the certification of the fishery it will be necessary to commence study of the variability of the natural mortality rate for each bed, within each management unit.

Comment: The estimation of natural mortality is the most difficult task in marine resources studies, and any approach is imbued with uncertainty. But this parameter defines population dynamics and the harvesting strategy. An estimate of mortality has been made of the Patagonian scallop derived from an integrated model for the Reclutas bed (Valero, 2002), in addition to a study done by Lasta *et al.* (2001). The Assessment Team recommends estimating mortality from size structure and age structure of populations within the protected areas of each bed so that by the end of the certification period there is a good understanding of the spatial variation of mortality. Improved estimates of these population parameters will provide more comprehensive data for simulation modelling of the fishery and its management.

Given the time span and the possibility of not having new cohorts to follow, it is important to realize that this comparison may not be fully possible or fully comparable within 4 years. Improved estimates of these population parameters will provide more comprehensive data for simulation modelling of the fishery and its management.

Condition 2

Performance Indicator 1.1.3

Appropriate reference levels have been developed for biomass and fishing mortality rate.

Performance Indicator 1.1.6.1

The overall population is at appropriate reference levels.

Required Action: In a maximum period of 1 year from the fishery certification, biological reference limits must be established based on the resource biology, regarding biomass and fishing mortality rate. Limit reference levels for each bed in each management unit (to be considered in management decisions) will need to be initiated within the current certification period.

Comment: The use of a rotational management strategy overcomes many of the difficulties associated with a traditional fishery. Rotational fishing strategies in scallop fisheries have been modelled (see Breen and Kendrick, 1997; Hart, 2003).

Condition 3

Performance Indicator 1.1.5.3

The assessment, including any assumptions, has been appropriately tested by simulation or other methods and considers uncertainties which are reflected in management advice.

Performance Indicator 1.1.5.4

The assessment evaluates the consequences of harvest strategies and evaluates the status of the fishery relevant to reference levels.

Performance Indicator 1.1.6.1

The overall population is at appropriate reference levels.

Required Action: Within a maximum period of 4 years from the fishery certification, the precision of the estimates in the stock evaluation must be improved, taking into account the uncertainty of the initial data and testing of the sensitivity of the results.

Development of the possible changes in exploitable biomass, relative to the catch strategy currently applied, under different fishing scenarios will be analyzed within the current certification period. For example; simulation modelling of rotational fishing with existing growth mortality and recruitment parameters (see Breen and Kendrick, 1997) and the long term sustainability of the fishery evaluated (see Hart, 2003).

Comment: Although biomass estimates are precise, the estimate of catch from landed meat weight by a single estimate of meat weight-green weight conversion coefficient, is very imprecise and has no estimate of variability. Precision of catch estimation should be investigated and improved methodology developed. The consequence of the present harvest strategy can be evaluated from only 6 years catch data, so simulation studies must be initiated to evaluate their effects over long periods with different scenarios to test sensitivity to assumptions made and imprecision of parameter estimates.

Condition 4**Performance Indicator 1.3.1**

There is adequate information on the population structure and reproductive capacity of the resource.

Performance Indicator 1.3.2

The age/sex/genetic structure of the resource is monitored to detect significant impairment of reproductive capacity.

Required Action: Within a maximum period of 1 year from the fishery certification, the relative fecundity per size or weight must be established for each bed, and within a maximum period of 2 years from the fishery certification, a study on the oceanographic variables involved in relation to recruitment must commence.

Additionally, within a maximum period of 3 years after the certification of the fishery correlation over time with the changes in size, age and sex structures of each bed, must commence in order to evaluate the impact of the fishery on the reproductive capacity of the stock.

Comment: No relationship has yet been established between local stocks and recruitment in populations of *Z. patagonica*, and little relationship has been found between parental stock and recruitment in scallops in general. Hence “conventional wisdom” tends to dismiss the importance of a stock-recruitment relationship in scallops with most variation in recruitment being attributed to effects of environmental variation on larval mortality and settlement. Nevertheless, McGarvey et al. (1993), found egg production was correlated with recruitment in two Georges Bank populations of *Placopecten magellanicus* and this correlation was stronger and held more widely among other populations when egg production of older (larger) scallops alone was considered. They concluded that the two scallop populations may be reproductively self

sustaining stocks. Furthermore, recent modelling of larval dispersal in the Caribbean concluded that marine populations must rely on mechanisms enhancing self-recruitment rather than depend on distant 'source' populations (Cowen et al. 2002). There is sufficient doubt about the relationship between stock and recruitment in scallops to make investigation of fecundity of *Z. patagonica* a sensible precautionary approach to management of this new fishery.

The fecundity data will provide input to simulation models of the fishery and its management.

7.2 RECOMMENDATIONS

The Assessment Team considers it necessary to make some recommendations that are not obligatory requirements but which could improve the performance of the fishery against the MSC Principles and Criteria. The ways to achieve these recommendations and the times required remain the judgement of Glaciar Pesquera S.A., and INIDEP the research organization involved in the development of this fishery.

Performance Indicator 1.1.1.2

The life history of the species is understood.

Performance Indicator 1.1.1.6

Information on the relationship of recruitment to parental stock is understood.

Recommendation

To continue with studies on the requirements for settlement and commence studies on morphology and larval development. To study the rate of settlement, for example by means of measurement of the prodisoconchas and the environmental factors that govern the recruitment of the species. These studies will contribute to knowledge on the factors affecting larval settlement and, therefore recruitment intensity, which is important for prediction of production from the different beds. It is difficult to firmly establish the stock-recruitment relationship for this species. There are a number of factors involved, but it is necessary to identify these. The uncertainty of reproductive success mediated by environmental variability may also make the relationship between fecundity and recruitment more difficult to unravel but other scientific investigations suggest it is likely to prove important (see notes on Appendix IV, Assessment Team rational for points raised by the Peer Reviewers, Performance Indicator 1.1.1.6).

These data will provide input in simulation modelling of the fishery and its management.

Performance Indicator 1.1.2.1

Fishery removals are recorded/estimated (including landings, discards and incidental mortality).

Recommendation

Carry out estimations and keep registers of incidental mortality during the different fishing activities as a consequence of recapture and discard of juveniles or the process of cooking juveniles fixed on the shells of commercial size scallops that are processed.

This will permit understanding of the fishing activities which cause significant mortality of juveniles that currently are not taken into account for evaluation of the impact of fishing on the stock at population level, nor for the estimation of allowable catches. These data will provide input in simulation modelling of the fishery and its management.

Performance Indicator 1.1.2.6

Selectivity is known for the fishery (including incidental catches).

Performance Indicator 3.2.2.1

The fishing gears, methods and practices suitable for harvest of the target species have been examined with regard to their adverse impacts on habitat (especially in critical or sensitive zones), their rates of capture of non-target animals and incidental impacts on target animals. The gears with least impacts and non-target catches are used and/or prevented by other management measures.

Performance Indicator 3.2.7.2

The operations of the fishery are conducted so as to minimize (to the degree practical) the mortality of discarded non-target catch. Fishermen and others in the industry take reasonable measures, beyond the formal management requirements, to minimize such mortality.

Recommendation

The selectivity of the fishing gear (otter net) could possibly be improved using large square mesh to evaluate whether the by-catch of other invertebrates, juvenile scallops and non living material could be reduced.

Performance Indicator 1.1.5.1

There is a scientifically-rigorous stock assessment methodology that is relevant to the biology of the target species and the nature of the fishery. The assessment uses all available relevant data.

Recommendation

Initiate studies on the application of analytical models and elaborate conceptual and quantitative models that permit demonstration that the management methods applied to the fishery are appropriate (without substantial changes in the biomass and capture), integrating survey evaluations with the commercial fleet data on an appropriate map. Periodically evaluate the F value stipulated. This recommendation aims to predict yields in different fishing scenarios in order to apply management actions which contribute to the sustainability of the fishery. The use of a rotational management strategy overcomes many of the difficulties associated with a traditional fishery. Rotational fishing strategies in scallop fisheries have been modelled (see Breen and Kendrick, 1997; Hart, 2003). Similarly, the use of predictive models for rotational fishing as it was applied to the *P. magellanicus* fishery (See Hart, 2003) should be investigated.

Performance Indicator 1.3.2

The age/sex/genetic structure of the resource is monitored to detect significant impairment of reproductive capacity.

Recommendation

Study the genetic structure for each bed with the objective to determine the source-sink relationship and its correlation with the fishing activity. This will allow application of protection measures or creation of no-take zones, with the aim to maintain the genetic diversity of the stock and improve the settlement of larvae in the different beds.

Performance Indicator 2.1.1.2

The habitat requirements of the target species, in particular the settlement habitat of juveniles, are known.

Recommendation

Initiate studies to establish if the primary settlement occurs on the shells of the adults or if the presence of juveniles is the result of secondary settlement from another substrate.

Although bushy bryozoa and hydroids have not been recorded in fishery-trawl or survey-dredge bycatch, many of the echinoid groups present in the bycatch feed on bryozoa in other areas hence bryozoa and hydroids may be more important in the benthos than their representation in the bycatch suggests. Fishing is likely to destroy emergent bushy bryozoa or hydroids more rapidly than other benthos (see Collie et al., 1997; 2000). If primary settlement of scallops is on such filamentous substrates in Argentina as it is elsewhere, then fishing by reducing this substrate will have an effect on recruitment. If primary settlement is on the shells of adult scallops alone, the removal of adult scallops by fishing will likewise affect recruitment and fishing mortality will operate equally on cohorts of small juveniles as well as adults.

If primary settlement is on filamentous substrates, fishing gear could be modified to reduce its impact on the seafloor and damage to filamentous benthos and help sustain recruitment. If primary settlement is on adult scallops recruitment will probably be best sustained by rotational fishing that maintains high adult populations locally.

Performance Indicator 2.1.1.3

Information is available on the position and importance of the target species within the food web.

Recommendation

Quantitatively study the ecological relations in the benthic community.

Scallops dominate biomass and production in the benthos. Gut contents show they ingest mainly diatoms and some dinoflagellates. Investigation of gut contents of other suspension feeders could identify whether they are competing for the same resource and investigation of the isotope signal of carbon in scallops (adults and juveniles) and the other suspension feeders could show the proportion of benthic and plankton algal production and plankton.

These data can be modelled to develop an understanding of how present fishing is likely to indirectly alter benthic energy flow and dynamics and how management can minimise the effects on the food web and productivity.

Performance Indicator 2.1.1.5

There is information available on the recovery rate of the ecosystem from fishery related impacts.

Recommendation

Annually tabulate the quantitative data from the by-catch collected for each bed, by the On Board Observer Programme and the research surveys, comparing these with the 1995 data base. Compare the quantitative by-catch data obtained from the trawls in fished areas with those obtained from trawls in non-fished zones within the same bed, which are collected in the annual research surveys.

The testing of these data will show whether benthic habitat regenerates in the absence of disturbance by fishing. Regeneration of benthic habitat on fishing-disturbed-seafloor is linked to increasing productivity of fisheries on this habitat (Cranfield et al., 2001). Such habitat regeneration is likely to follow a succession that is partly determined by distance from sources of propagules and partly by period without disturbance hence habitat recovery can be facilitated by rotational fishing (Cranfield et al., 2004). If benthic habitat does recover here, analysis of the data will be useful in determining length of rotation cycle and sizes of areas and usefulness of MPA's in a rotational fishery management plan.

Performance Indicator 2.1.3.1

Information is available on the nature and extent of the non target species caught, or otherwise killed, by the fishery. This includes all non target species – invertebrates, fish, mammals, reptiles, birds etc.

Performance Indicator 2.1.3.2

Information is available on the extent and survivability of the discarded by-catch.

Performance Indicator 3.2.1.3

Catch levels are set to prevent significant capture of non-target species.

Performance Indicator 3.2.7.2

The operations of the fishery are conducted so as to minimize (to the degree practical) the mortality of discarded non-target catch. Fishermen and others in the industry take reasonable measures, beyond the formal management requirements, to minimize such mortality.

Recommendation

Estimate the biomass of the non-target species for each systematic group and for each bed, each year, and evaluate the annual changes. Experimentally estimate the discard mortality for the principle species in the by-catch and consider it in the management system.

One aim of the fishery should be to reduce mortality and bycatch of non-target species so benthic habitat is less modified, trophic webs preserved and the productivity of the fishery maintained (see Cranfield et al., 2001). Discarded bycatch is a major problem in

fisheries world-wide but this figure could be reduced by 25 to 64% by modifying fishing gear (Hall and Mainprize 2005; Harrington et al., 2005).

The components of bycatch, mechanisms of their capture and their subsequent mortality need to be measured so improvements can be measured in investigations of methods of reducing bycatch and bycatch mortality.

Performance Indicator 2.1.4

Strategies have been developed and implemented within the fisheries management system to address and restrain any significant negative impacts of the fishery on the ecosystem.

Recommendation

In addition to tabulation of the biomasses of by-catch for each group, each year (Performance Indicator 2.1.1.5, and 2.1.3.1), it is necessary to evaluate the usefulness of the fragile, long-lived species, which could suffer damage from the fishing gear and classification methods, as indicators of the impact of the fishery on the marine habitat. The echinoids are long-lived species (Bremec and Echeverria 2005) and are frequently found in the by-catch of the fishery (Bremec *et al.*, 2003). Because of their fragility they are very sensitive to all fishing activity around the world.

By focussing study of the effects of fishing on especially fragile benthic species, deleterious changes in the benthic habitat can be more rapidly identified and improvements can be more rapidly identified and enumerated in investigations of methods of mitigating these effects.

Performance Indicator 2.1.5.2

The impacts on ecosystem structure and function from removal of target stock(s) are known.

Recommendation

Study the consequence of removal of target species on ecosystem structure by modelling the energy flow.

This recommendation is linked to recommendation 11.

Performance Indicator 2.1.5.3

The impacts on ecosystem structure and function from removal of non-target stocks are known.

Recommendation

Compare the benthic by-catch from reserve areas within each bed with those from fished areas and analyze systematic changes; and in particular, study how the recruitment of the species dependent on scallop shells for settlement have been affected. Modelling energy flow through the benthic ecosystem will indicate the relative importance of each species and how the trophic web is likely to be affected by fishery removals of different species. These studies should be used in mitigation studies of the effects of gear modification and use of rotational fishing to let benthic habitat recover and maintain productivity of the fishery.

Performance Indicator 2.1.5.4

Fishery impacts on habitat structure are known.

Recommendation

Consider a more extensive use of video cameras to investigate the role of the scallops within the structure of the benthic habitat.

Remote underwater video allows direct observations of the effect of fishing on the benthic habitat in addition to the indirect studies analysing changes in bycatch. Observations of trawls in operation have shown that visibility on the seafloor allows capture of good images and use of a high resolution camera should enable specific identification of benthos. More extensive use of this system could allow direct comparison of fished seafloor, seafloor in reserve areas that has been fished and unfished reserve areas so giving direct evidence of fishery impacts on habitat structure.

These observations can be applied in modifying fishing gear to reduce its impact on the seafloor as well as directly testing the effect of rotational fishing on seafloor habitat.

Performance Indicator 3.1.7.1

Adequate funding is provided for management.

Performance Indicator 3.1.7.2

Adequate funding is provided for research.

Recommendation

Study the need for increased budgets for management, control (authorities) and scientific research for regular presentation to the relevant authorities.

Communication of results in this fishery is good but one of the issues identified by the team was the lack of opportunity and lack of budget for scientists to brief management, control authorities and fishers in plain language the results and implications of their research. Facilitation of this communication will result in more cohesive management and greater understanding of its importance.

Performance Indicator 3.2.5

The management system has considered no-take zones as a means to control exploitation.

Recommendation

Analyze the usefulness of the current reproductive and experimental reserve areas, the necessity for relocation and/or establishment of new ones.

No-take zones already exist in this fishery. Their effectiveness in excluding fishing, providing unmodified areas of seafloor for benthic comparisons with fished areas, and effectiveness in providing local sources of scallop larvae and propagules of other benthos, and the optimum size should be evaluated. These data can then be utilised in establishing new closed areas within the rotational fishing management regime to optimise production of the fishery.

Performance Indicator 3.2.7.1

The operations of the fishery are conducted so as to minimize (to the degree practical) the capture of non-target animals, particularly those which cannot be released alive.

Recommendation

The fishery undertake systematic trials measuring the effects of fishing operations on catch of scallops, size range of scallops and quantities and composition of bycatch and use this information to agree on long term gear modifications.

Performance Indicator 3.4.2.4

The management system is subject to periodic external reviews.

Performance Indicator 3.4.2.5

The management system responds to the results of assessments and reviews.

Recommendation

Study the feasibility for and adoption of better external reviews of the management system and the incorporation of the results obtained in decision making.

External reviews of the management system are important because they provide for regular objective overviews of how the system is performing and can more readily identify areas in which performance can be improved. In one sense the MSC certification process has provided a major external review and the next review 4 years out will do the same again.

8 PERSONAL COMMUNICATIONS

1. CPN Eduardo González Lemmi, President of Glaciar Pesquera S.A.
2. Mark Pittman, Director, Clearwater Seafood Inc., Nova Scotia, Canada
3. Lic. Mario Lasta, Scientist INIDEP, Chief Patagonian Scallop Project.
4. Dr. Claudia Bremec, Scientist INIDEP - CONICET, Patagonian Scallop Project.
5. Lic. Gabriel Blanco, On Board Observer Programme Chief.
6. Dr. Oscar Iribarne, Scientist, National University of Mar del Plata and CONICET.
7. Eng. Marcelo Santos, President of Federal Fishery Council.
8. Prefecto Principal Juan Carlos Salvarezza, Argentine Coastguard.
9. Mr. Alejandro Moscato, Inspectors Chief, SAGPyA.
10. CPN Jorge Shepherd, Custom's Agent - "Shepherd y Asociados".

9 STATEMENT FROM THE OIA CERTIFICATION COMMITTEE

The Certification Committee of the Organización Internacional Agropecuaria (OIA) has formally met to consider the report, conditions established and recommendations proposed by the scientific, Assessment Team convened to evaluate the fishery.

The Assessment Team has followed the steps required by the MSC, through all stages, and has reconsidered all points made by the various organizations and stakeholders with a valid interest in the fishery and revised the report accordingly.

These revisions have included:

- 1- Formulation of the Assessment Tree to decide the indicators and scoring guides for these, which accurately reflect the intent of the MSC principles and criteria for them.
- 2- Considerations by the client Glaciar Pesquera S.A.
- 3- Considerations of points raised by the MSC, stakeholders and two senior, scientific peer reviewers.

The Committee note that no comment has been received on any issue from the public anywhere in the world.

The Final Report arising from these considerations clearly passes the standards for each Principle and Criteria established by the MSC and for each Indicator established by the OIA Assessment Team.

As required by the MSC four conditions relating to eight indicators have been established by the Assessment Team and these have been upheld by the Committee. It is required that the client attend to these within the time scales specified for each, and that the client prepare an Action Plan, which will be included in the Final Report to the MSC. These conditions are obligatory, if the client wishes to be recertified in 5 years time. OIA will review progress on the Action Plan at least once per year, following the requirements of the MSC in this regard.

In addition the Assessment Team have correctly made 16 other recommendations to the client, to consider and action to ensure re-certification in the future, for various indicators which attained a score above 80, but merit consideration of the client.

The Determination of the Certification Committee of the Organización Internacional Agropecuaria is that the fishery be certified as a “well managed and sustainable fishery”.

The main reasons for awarding the Certification,

- 1- The Assessment achieved a score of more than 80 in all 3 principles and scores of 60 or more were obtained for all indicators.
- 2- The Fishery through an adaptive management approach has achieved a sustainable fishery over the past 10 years that has not been subject to closures.

- 3- The fishery has a positive program that does not have an adverse impact on the benthic community. Over 94% of the by-catch invertebrates survive capture and are returned to the sea alive.
- 4- The management of the fishery has achieved a high level of excellence.
- 5- Industry and the Federal organizations strongly support the research programme which supports development of the fishery.
- 6- 100% coverage of all fishing by On Board Observers who take scientific samples on which to base decisions in regards to the fishery.
- 7- No recorded adverse events to "at risk" and "endangered" species have occurred.
- 8- The continuous satellite monitoring of all vessel activity provides excellent control of fishing pressure.

The OIA Committee has taken into account, the report considered by the Assessment Team, the peer review reports, the comments made by stakeholders and the applicant for certification, and changes made to the report.

This assessment relates to the fishery up to the point of unloading.

ACTION PLAN PRESENTED

BY GLACIAR PESQUERA S.A.

TO COMPLY WITH OIA-MSC CERTIFICATION SYSTEM CONDITIONS AND RECOMMENDATIONS

DATE: 29 September 2006

GLACIAR PESQUERA S.A.: CONTADOR EDUARDO GONZALEZ LEMMI

CONDITION 1:

Required Action: Research is in progress to estimate the variability of natural mortality rate for each bed. Both fishing (F) and natural (M) mortality for most beds on the Shelf Break Front (SBF). Research has commenced to estimate direct mortality (M) in areas where fishing effort (F) is negligible and Total Mortality (Z) and natural mortality from beds which have good records of fishing mortality (F). Natural mortality (M) estimates are anticipated for presentation within 4 years. At the same time there is ongoing effort in evaluating sex ratio in relation to fishing activity, growth to establish age-size relationships based on external and internal shell growth rings and fecundity studies in the main beds located in the SBF.

CONDITION 2:

The key biological reference limits are 1) size/age at first maturity and 2) age. Within a period of 1 to 2 years it will be possible to calculate variation of these parameters for the San Blas, Reclutas, MDQ, SWSAO, Valdes, Tango B, SW Tango B beds.

Research resources are being concentrated on the main Shelf break beds.

Within 2 years, preliminary results are anticipated for development of a model addressed to develop a Rotational Fishing Strategy (RFS). This will be an on-going, long term exercise and will require incorporation of new expertise.

CONDITION 3:

A more in-depth study will be developed based on geo-statistical techniques. This is a powerful model-based technique which will improve the precision of estimates in the stock evaluation. Results are anticipated within a period of 2 years.

The simulation developed in Condition 2 (preliminary results of RFS) will be used to analyze how changes may occur in the exploitable biomass under different fishing scenarios. This will be done within 4 years. This research is on-going and continuing.

CONDITION 4:

This Condition is closely related to Condition 1, but is more specific.

The Research Team is beginning to develop an Oceanographic model with the purpose of investigating: (a) the potential of larval drift, and (b) the potential of genetic mixing/isolation between beds. Preliminary results will be available in one year, but it will continue over the next 5 years. The study will attempt to determine what forces drive the movement of larvae between beds. Oceanographic models are basically based on topography, and will be applied in the Shelf Break Front within the influence of the Malvinas Current. The oceanographic modelling is a long-term study.

Research is already under way in relation to genetic aspects of the between beds variation. Preliminary results suggest that there is no difference between beds from South to North, and thus there may be a strong mix of the genetic pool. However, markers that have been used are very limited to be conclusive. Funds allowing, it is anticipated that a more comprehensive genetic study in co-operation with international groups will commence within a 4 year period. Within a rotational strategy to develop a fishing activity, the knowledge if beds are sink or source of larvae are of main consideration. Genetic studies may provide a strong clue for this information.

RECOMMENDATIONS

In relation to the Recommendations made in the Final Report

1. Work has commenced on a Food Web, at this point identifying the trophic position of the main community species. This is being analyzed by stable isotope within two beds (Reclutas and MDQ). Results will be obtained in the next 3 years.
2. Experiments on the efficiency and selectivity of the fishing gears used will commence this year to evaluate if there were changes in this parameter due to small changes in the regular net since the last estimation of this parameter (1995). The capacity and quality of the catch (make up of species) are key parameters being investigated, in order to minimize damage to the benthos and improve selectivity of the net. The work will continue for one to two years.
3. In regard to quantity and quality of the composition of the by-catch within beds, a register is being prepared and will continue year by year. The purpose of this information will be to explore possible community (species and trophic levels) changes associated to fishing effort. It is an on-going study which compliments the stable isotope study.
4. An analysis of mortality during the on-board steaming process on juvenile scallops will be undertaken. This is based on On Board Observer data.
5. Knowing that in this fishery, captures are strongly related to the recruitment of new cohort, the management system considers strategies to maximize fertilization. One of them is to protect high density areas populated by reproductively active organisms. Thus emphasis will be given over the next 4 years on means to maximize fertilization, by increasing the number and dimension of closed areas where chances of fertilization are higher. Based on results from the oceanographic models, an analysis of the best places for location of the fishing exclusion areas will be done.
6. Based on the previous information, and expected results, within the next 4-5 years there will be studies on how to approach to the 20:20 rule (To leave 20% of the benthos without fishing pressure by 2020). At present 3-4% is closed to the fishery. The study will identify areas with high density of reproductive organisms and propose a progressive plan to achieve the 20:20 goal.

APPENDIX I

A. The Marine Stewardship Council (MSC)

The Marine Stewardship Council is a non-profit organization which was established in 1996. The Council was established as a joint initiative between Unilever and the World Wildlife Fund (WWF) who realized the need for the amalgamation of environmental and production groups to establish long term sustainable fishery resources, ensure continuing biodiversity and survival of marine ecosystems at risk to irresponsible fishing pressures. The MSC is now a fully independent Organization, governed by an elected independent Board of Directors, advised by panels of scientific, environmental, economic and fishery experts.

The MSC Mission is:

“To work for sustainable marine fisheries by promoting responsible, environmentally appropriate, socially beneficial and economically viable fisheries practices, while maintaining the biodiversity, productivity and ecological processes of the marine environment.”

The MSC is dedicated to promotion of “well managed” and “sustainable fisheries”, identifying such fisheries through means of independent third-party assessments and certification.

When certified, fisheries are awarded the opportunity to utilize the MSC promoted “eco-label” to gain consumer acceptance for its environmentally responsible management and economic advantages in the marketplace.

The MSC system operates in a series of progressive steps.

- A. Initial contact: Client - Certification Body – MSC
- B. Pre-Assessment. The first formal stage of the MSC fishery assessment process, aimed to provide the client with an evaluation of the likelihood of the fishery passing a more detailed certification assessment.
- C. Full-Assessment. This is a formal public evaluation of the fishery, focused on information gathering, followed by scoring. These are robust, repeatable assessments designed to maintain the integrity of the MSC Certification Programme.
- D. Chain of Custody. This provides Certification of the traceability of product between vessels and customers ensuring the integrity that the products originate from an MSC Certified Sustainable fishery.

B. Organización Internacional Agropecuaria (OIA)

OIA commenced operation in 1991 as a certifier of organic vegetable, animal and processed products, from the initiation of organic production in Argentina to the present time.

Following the world trend in foodstuffs and consumer demand for safe, high quality foods, **OIA** has expanded its activities and is known as well for certification of conventionally produced products.

OIA is capacitated in certification and/or verification of:

- Organic Products
- Traceability
- Guaranteed Identity (OGM)
- Quality Attributes of Food Stuffs
- Sustainable Fishery Certification (MSC)
- EUREPGAP Certification

OIA is capacitated in verification and/or audit of:

- Good Agricultural Practices (GAP)
- Good Animal Production Practices (GAPP)
- Good Manufacturing Practices (GMP)
- Risk Analysis and HACCP
- SA 8000

Its mission, clearly defined in its objectives, is to offer services in qualified certification, reliable and transparent to the consumer, based on advanced scientific principles and, clear precise methodologies, to assure independence from commercial interests.

OIA has a relevant interdisciplinary team of professionals who work with production, education, scientific, and technological systems, with skills in productive and natural ecosystems, based on advanced principles demanded at international level. In addition, the members of OIAs independent Certification Committee represent different sectors including: scientific, technical, education, consumer, production and marketing.

In the case of sustainable fisheries certification, the Certification Teams are composed of scientists known nationally and/or internationally, that include fishery biologists with substantial experience in resource modeling, fisheries exploitation, ecology, sustainable production, management and administration, economics, environmental and resource management.

OIA Argentina

Av. Santa Fe 830 – (B1641ABN) Acassuso Buenos Aires – Argentina

Tel./Fax (54 11) 4793-4340 (54 11) 4798-9084

E-mail: ويا@ويا.كوم.ار

www.ويا.كوم.ار / www.certificacionويا.كوم

OIA Brasil

Rua Augusta 1939 Conj.61 – CEP 01412-000

Sao Paulo – Brasil

Tel./Fax. (55 11) 3068-9743 (55 11) 3083-4043

E-mail: ويابراسيل@ويابراسيل.كوم.بر

www.certificacionويا.كوم / www.ويابراسيل.كوم.بر

APPENDIX II**RESOLUTIONS 4 AND 5/2005
FEDERAL FISHERY COUNCIL****Resolution 4/2005 “Patagonian Scallop Management Measures”**

BUENOS AIRES

IN VIEW OF Provision No. 17 dated March 17th 1999 issued by the Registry of the UNDERSECRETARIAT OF FISHERIES, Resolution No. 829 dated December 7th 1999 issued by the Registry of the DEPARTMENT OF AGRICULTURE, LIVESTOCK, FISHERIES AND FOOD, Resolution No. 107 dated February 16th 2001 issued by the Registry of the DEPARTMENT OF AGRICULTURE, LIVESTOCK, FISHERIES Y AND FOOD, and

WHEREAS:

According to Provision No. 17 dated March 17th 1999 issued by the Registry of the UNDERSECRETARIAT OF FISHERIES and Resolution No. 829 dated December 7th 1999 issued by the Registry of the DEPARTMENT OF AGRICULTURE, LIVESTOCK, FISHERIES AND FOOD a Management Plan was established for the Patagonian Scallop (*Zygochlamis patagonica*), which was subsequently repealed under Resolution No. 107 dated February 16th 2001 issued by the Registry of the DEPARTMENT OF AGRICULTURE, LIVESTOCK, FISHERIES AND FOOD.

The FEDERAL FISHERY COUNCIL, through Minutes No.16 dated May 9th 2001 suggested the Enforcement Authority to repeal Resolution No. 107 dated February 16th 2001 issued by the Registry of the DEPARTMENT OF AGRICULTURE, LIVESTOCK, FISHERIES AND FOOD, to bring the status back to the time of enforcement of Resolution No. 829 dated December 7th 1999 issued by the Registry of the DEPARTMENT OF AGRICULTURE, LIVESTOCK, FISHERIES AND FOOD.

Since such recommendation was not fulfilled, various management measures were adopted by the FEDERAL FISHERY COUNCIL in order to secure the sustainability of the resource.

On April 21st 2005 INSTITUTO NACIONAL DE INVESTIGACIÓN Y DESARROLLO PESQUERO (INIDEP), according to the request timely made, filed with the FEDERAL FISHERY COUNCIL proposed management measures for the Patagonian Scallop (*Zygochlamis patagonica*), including new management measures for the fishery.

Therefore, it is necessary to establish new measures in accordance with the standing legal rules and with the data on resource availability and fishing fleet authorized to engage in the fishing of Patagonian Scallop (*Zygochlamis patagonica*).

During the term of enforcement of the management plans established under the above mentioned administrative acts, research and development efforts were carried out in conjunction with the companies that worked on the resource, which involved significant progress in the study of the species, at the same time enabling a biologically sustainable management.

It is convenient to continue with this intervention strategy, establishing an advisory Commission for the Analysis and Follow-Up of the Patagonian Scallop (*Zygochlamis patagonica*) Fishery.

The FEDERAL FISHERY COUNCIL is competent to issue these presents in accordance with the provisions of Law 24,922, section 9, subsections a) and f) and section 17.

NOW, THEREFORE,
THE FEDERAL FISHERY COUNCIL
RESOLVES:

SECTION 1. The following management measures that will be an integral part of the Management Plan for the Patagonian Scallop (*Zygochlamis patagonica*) are hereby established, which measures will be applicable as from the enactment of this resolution and for a four (4) year term, extendable for another year, in order to continue securing the resource sustainability through the measures being implemented.

SECTION 2. The catch of the Patagonian Scallop (*Zygochlamis patagonica*) will be carried out throughout the calendar year, and the FEDERAL FISHERY COUNCIL will be allowed to provide for closed seasons on fixed, changing, temporary or per zone basis, as advised by scientific reports.

SECTION 3. The Total Allowable Catch (TAC) for the species will be determined yearly by the FEDERAL FISHERY COUNCIL in accordance with the parameters suggested by INIDEP, broken down by management units, the geographical boundaries of which are defined in Annex I hereto.

The FEDERAL FISHERY COUNCIL will yearly, upon the proposal of INIDEP, propose the coordinates of the area that comprises each bed in order to reliably define the relevant beds and their respective Total Allowable Catches. The Total Allowable Catch per bed will be determined in tons of commercial whole scallop.

SECTION 4. In the event that a new bed is discovered, the discoverer will have to give notice thereof in the manner provided for in ANNEX II hereof. The new bed will be submitted to studies in order to determine the Total Allowable Catch. For this purpose, INIDEP will coordinate the relevant research.

SECTION 5. Vessels having national fishing license and Catch Authorization for Patagonian Scallop may operate both in beds with a certain Total Allowable Catch and in those where it has not been determined yet because of lack of sufficient scientific information. The catch obtained during a single fishing trip exclusively in beds where the TAC has not been determined, will not be allocated to any established TAC.

SECTION 6. A minimum FIFTY FIVE (55) millimeter high valve is fixed for admission into the productive process. Scallops smaller than the aforesaid size and the bycatch will be immediately returned to the sea.

SECTION 7. A Commission for the Analysis and Follow-Up of the Patagonian Scallop (*Zygochlamis patagonica*) Fishery is hereby created, formed by ONE (1) representative of INIDEP, ONE (1) representative of the Enforcement Authority, and ONE (1) representative of each of the companies authorized to catch the species. The Commission will be an advisory body and it will meet at least once every quarter; a report on the matters discussed at the meeting will be prepared and the conclusions will be submitted to the FEDERAL FISHERY COUNCIL for its consideration.

SECTION 8. Each vessel having a national fishing license and Catch Authorization for the species will devote TWENTY (20) days in the year to research works, which will be performed under the direction of, with personnel appointed and in the conditions determined by INIDEP. The cost of the research will be borne by the ship-owners. The companies may select to replace this obligation by funding an equal number of research days on board INIDEP's fishing vessels.

SECTION 9. Each vessel will have a scientific observer appointed by INIDEP on each fishing trip. The companies will provide such on board items as are necessary for the scientific observer to perform its job.

SECTION 10. ANNEX III, which is an integral part hereof, contains supplementary management measures which are herein provided for.

SECTION 11. Infringements of this Resolution will be penalized in accordance with the provisions of Law No. 24,922.

SECTION 12. Be this notified, published, given to the National Administration of the Official Registry and filed.

ANNEX I

NORTHERN MANAGEMENT UNIT (NMU)

Position (Latitude and Longitude) of the vertices of the polygons that comprise the beds. Areas of the polygons and beds in Square Nautical Miles (Mn²)

NORTH MANAGEMENT UNIT	Bed	South Latitude	West Longitude
		MdQ	36° 45' 00
		37° 00' 00	54° 20' 00
		37° 30' 00	55° 10' 00
		37° 30' 00	55° 30' 00
		38° 54' 00	55° 40' 00
		38° 54' 00	56° 20' 00
	Reclutas	38° 54' 00	55° 40' 00
		38° 54' 00	56° 20' 00
		39° 30' 00	56° 20' 00
		39° 30' 00	55° 40' 00

SOUTHERN MANAGEMENT UNIT (SMU)

Position (Latitude and Longitude) of the vertices of the polygons that comprise the beds. Areas of the polygons and beds in Square Nautical Miles (Mn²)

SOUTH MANAGEMENT UNIT	Bed	South Latitude	West Longitude
		San Blas	39° 30' 00
		39° 30' 00	55° 40' 00
		39° 48' 00	56° 10' 00
		39° 48' 00	57° 00' 00
	SAO	39° 48' 00	56° 10' 00
		39° 48' 00	57° 00' 00
		41° 30' 00	57° 48' 00
		41° 30' 00	58° 20' 00
	SW SAO	41° 30' 00	57° 48' 00
		41° 30' 00	58° 20' 00
		42° 06' 00	58° 09' 00
		42° 06' 00	58° 54' 00
	Valdés	42° 06' 00	58° 09' 00

			42° 06' 00	58° 54' 00
			42° 24' 00	58° 24' 00
			42° 24' 00	59° 18' 00
		Tango B	42° 24' 00	58° 24' 00
			42° 24' 00	59° 18' 00
			42° 54' 00	59° 12' 00
			42° 54' 00	59° 48' 00
		SW-Tango B	42° 54' 00	59° 12' 00
			42° 54' 00	59° 48' 00
			43° 30' 00	59° 36' 00
			43° 30' 00	60° 10' 00

OUTSIDE SOUTH MANAGEMENT UNIT (OSMU)

Position (Latitude and Longitude) of the vertices of the polygon that comprises the bed.
Area of the polygon in Square Nautical Miles (Mn²)

OUTSIDE SOUTH MANAGEMENT UNIT	South Latitude	West Longitude
	43° 30' 00	60° 10' 00
	43° 30' 00	59° 30' 00
	44° 00' 00	59° 40' 00
	44° 00' 00	60° 20' 00

ANNEX II

New Beds:

- Once a new fishing area has been discovered, written notice thereof will be given within FORTY EIGHT (48) hours to “NATIONAL DIRECTORATE OF FISHERIES COORDINATION” (DIRECCION NACIONAL DE COORDINACIÓN PESQUERA) and to INIDEP.
- Level of harvest or biomass to be removed in an area and timing. Removal of up to 40% the estimated absolute commercial biomass (or its lowest limit) in a year.
- Proportion of non commercial and commercial scallops concurring in the area. Exclusion of fishing activities in areas with predominant number of non commercial scallops. This aspect must be adaptable and it will be referred to the recruitment history in each area.
- Specific richness. To be understood as the presence of epibenthic invertebrate species associated with the Patagonian scallop community. The specific richness by bed will be compared yearly against that of non-fished sites (undisturbed condition).

ANNEX III

Supplementary management measures:

- a) Both dredges and otter trawls may be used to perform the catch, as established in the specific fishing licenses.

- b) Prohibition to carry out commercial catches in the areas established in Resolution No. 150 dated March 16th 1996 issued by the Registry of former DEPARTMENT OF AGRICULTURE, FISHERIES AND FOOD.
- c) In order to restrain the catch in new areas and until the new area is assessed in accordance with section 4, any of the authorized vessels may operate in this such area for a 60-day term commencing on the date of arrival of the vessel in the new area.
- d) Catch controls will be made per bed. Once the Total Allowable Catch has been attained, the bed will be closed to fishing that year.
- e) DIRECCION NACIONAL DE COORDINACION PESQUERA will carry out weekly controls of the catch on each bed for which a catch has been established. A written report in a recorded manner will be sent by it to each company and INIDEP when there is still to catch TEN PERCENT (10%) the TAC established for each of the beds.
- f) The activity of the vessels will be permanently tracked by a Satellite Monitoring System.

Resolution 5/2005 “Patagonian Scallop Fishing Authorizations”

BUENOS AIRES,

IN VIEW of Resolution No.4 issued by the FEDERAL FISHERY COUNCIL Registry, on the date hereof and

WHEREAS

Under the above mentioned Resolution Management Measures were provided for the Patagonian Scallop (*Zygochlamis patagonica*).

Said Management Measures are in accordance with the standing legal rules and they were prepared on the basis of available data on resource availability and fishing fleet authorized to engage in the fishing of this species.

It is necessary, in the framework of the above mentioned rules, to assign the Catch Authorizations provided for in Law No. 24,922, section 28.

It results from the implemented management measures and the scientific data obtained up to date, as assessed by NATIONAL INSTITUTE OF FISHERIES RESEARCH AND DEVELOPMENT (INSTITUTO NACIONAL DE INVESTIGACIÓN Y DESARROLLO PESQUERO (INIDEP), that the number and specific technical characteristics of the vessels that have been operating on this resource have not adversely affected either the sustainability of its exploitation or the biodiversity of the marine environment.

Therefore and in view of the principles of precaution and prevention, it is deemed convenient to authorize the above mentioned vessels, which are comprised in section 1 of Resolution No.150 dated March 16th 1996 issued by the Registry of former DEPARTMENT OF AGRICULTURE, FISHERIES AND FOOD, or their potential substitutes, to catch Patagonian Scallop (*Zygochlamis patagonica*).

The FEDERAL FISHERY COUNCIL is competent to issue these presents in accordance with the provisions of Law 24,922, sections 9 and 28.

NOW, THEREFORE,
THE FEDERAL FISHERY COUNCIL
RESOLVES:

SECTION 1. Each of the vessels that as of the date hereof are comprised in section 1 of Resolution No.150 dated March 16th 1996 issued by the Registry of former DEPARTMENT OF AGRICULTURE, FISHERIES AND FOOD, or their potential substitutes, are hereby granted Catch Authorization for Patagonian Scallop (*Zygochlamis patagonica*).

SECTION 2. The provisions of the foregoing section are so stated notwithstanding the fact that the mentioned species may be admitted in the future to the Management Regime by Individual Transferable Catch Quotas provided under Law No. 24,922, section 27, in accordance with the provisions of section 1 of Resolution No.2 dated March 14th 2001 issued by the FEDERAL FISHERY COUNCIL Registry.

SECTION 3. The Catch Authorizations issued in the terms of section 1 hereof will be subject to the Management Measures approved by Resolution No. 4, issued on the date hereof by the FEDERAL FISHERY COUNCIL, with all such restrictions as may be in force and any others that may be established for biological reasons.

SECTION 4. Be this notified, published, given to the National Administration of the Official Registry and filed.

APPENDIX III**FEDERAL FISHING LAW N° 24.922
AND ITS COMPLEMENTARY DECREE****FEDERAL FISHING LAW**

Sanctioned: 9 December 1.997

Partially Promulgated: 6 January 1.998

Official Bulletin: 12 January 1.998

CHAPTER I

General Prescriptions

ARTICLE 1: The Argentine Nation shall foster the practice of the maritime fishing in search of the maximum development compatible with the rational use of the maritime live resources. It shall promote the effective protection of the national interests concerning the fishing and shall also promote the viability of the fishing activity, fostering the long-term preservation of the resources, favoring the development of environmentally appropriate industrial processes that promote the obtaining of the maximum added value and the employment of Argentine labor.

ARTICLE 2: The fishing and the processing of the maritime live resources constitute an industrial activity and it shall be regulated with subjection to the Federal Regime of Maritime Fishing that is provided in the present Act.

CHAPTER II

Ownership and Jurisdiction

ARTICLE 3: The live resources that inhabit the domestic waters and the Argentine territorial sea adjacent to their coasts, up to twelve (12) nautical miles measured from the baselines that are recognized by the national appropriate legislation are of exclusive ownership of the provinces with maritime littoral and shall exercise this jurisdiction with the aims of exploration, exploitation, conservation and administration through the federal context that is hereby provided.

ARTICLE 4: The maritime live resources existing in waters of the economic exclusive zone of Argentina and in the Argentine Continental platform as from twelve (12) miles indicated in the previous section are of exclusive ownership and jurisdiction of the Nation.

The Argentine Republic in its condition of coastal state shall adopt conservation measures in the exclusive economic zone and in its adjacent area concerning the trans-zonal highly migratory resources, or that belong to a same population or populations of species associated to the ones of the Argentine exclusive economic zone.

CHAPTER III

Application

ARTICLE 5: The application of this Act includes the following:

The regulation of fishing in maritime spaces subject to the national jurisdiction.

The coordination of the protection and administration of maritime live resources that are located both in the national or provincial jurisdiction;

The faculty of the Undersecretariat of Fisheries to limit the access to fishing on the maritime spaces referred in section 3 when the existence of national interest committed in the conservation of one species or certain resource is declared, with foundation in scientific reasons that guarantee the imposition of such measure, which shall be put into consideration of the Federal Fishery Council (Consejo Federal Pesquero) within thirty days of being adopted for its confirmation.

The regulation of fishing in the zone adjacent to the Argentine exclusive economic zone with respect to the migratory resources or that belong to a same population or to populations associated to the Argentine exclusive economic zone.

The regulation of the fishing activities of processing and transformation, storing, transport and commercialization of fishing products.

CHAPTER IV

Undersecretariat of Fisheries

ARTICLE 6: (Article vetoed by art. 1° [Decree N° 6/98](#) B.O 12/1/98).

ARTICLE 7: The Undersecretariat of Fisheries shall:

Conduct and execute the national fishing policy, regulating the exploitation, control and research;

Conduct and execute the objectives respecting the technical and scientific investigation of the fishing resources;

Control the maximum licensed catching by species established by the Federal Fishery Council (Consejo Federal Pesquero) and issue the quotas of animal catching per vessels, per species, per fishing zones and per type of fleet, pursuant are granted by the Federal Fishery Council (Consejo Federal Pesquero);

Issue the licenses of fishing, prior authorization of the Federal Fishery Council (Consejo Federal Pesquero);

Calculate the available surplus and establish, prior approval of the Federal Fishery Council (Consejo Federal Pesquero), the restrictions with respect to areas or close seasons;

Establish, prior authorization of the Federal Fishery Council (Consejo Federal Pesquero), the requirements or conditions that vessels and fishing companies must fulfill to carry out the fishing activity;

Establish the methods and techniques of catching, as well as the equipment and nets, etc. of forbidden use with the advice of the National Institute of Fisheries Research and Development (Instituto Nacional de Investigación y Desarrollo Pesquero INIDEP) and according to the fishing policy established by the Federal Fishery Council (Consejo Federal Pesquero);

Impose sanctions, pursuant to the rules of infractions and create a record of transgressors to the prescriptions of the present Act, informing of the sanctions to the Federal Fishery Council (Consejo Federal Pesquero);
Work on and develop statistical systems of the fishing activity;
Intervene in bilateral or multilateral international negotiations related to the fishing activity pursuant to the national fishing policy;
Establish regulations of the fishing record created by this Act;
Collect the catching fees established by the Federal Fishery Council (Consejo Federal Pesquero);
Intervene in the granting of the benefits that come from promotion per sectors granted or to be granted to the fishing sector;
Intervene in the plans of investment that require or count on specific international financing entities and/or that have been granted or to be granted to the Argentine Republic, pursuant to the criteria that it should determine together with the Federal Fishery Council (Consejo Federal Pesquero).
Issue authorization for experimental fishing prior approval of the Fishing Federal Council;
Establish and implement the necessary and sufficient control systems to really determine the catching in the territorial sea and the exclusive economic zone and the catching unloaded in Argentine authorized ports and the fulfillment and truthfulness of the affidavits of catching;
Carry out national campaigns of promotion for the consumption of live resources of the sea and missions abroad to promote the commercialization of products of national fishing industry;
Exercise all the faculties and responsibilities that the Undersecretariat of Fisheries is hereby granted.

CHAPTER V

Federal Fishery Council (Consejo Federal Pesquero)

ARTICLE 8: The Federal Fishery Council (Consejo Federal Pesquero) is hereby created, and shall be composed by:

One representative by every province with maritime littoral;
The Secretary of Fisheries;
One representative for the Secretariat of Natural Resources and Sustainable Development (Secretaria de Recursos Naturales de Desarrollo Sustentable);
One representative of the Ministry of Foreign Affairs, International Trade and Culture) Ministerio de Relaciones Exteriores, Comercio Internacional y Culto;
Two representatives designated by the National Executive Power (Poder Ejecutivo Nacional);
The Secretary of Fisheries shall be the president. All the members of the Council shall have only one vote. A qualified majority shall adopt the resolutions.

ARTICLE 9: The Federal Fishery Council (Consejo Federal Pesquero) shall:

Establish the national fishing policy;
Establish the fishing research policy;

Establish the maximum licensed catching per species, bearing in mind the maximum sustainable production of each one of them according to data provided by the National Institute of Fisheries Research and Development (Instituto Nacional de Investigación y Desarrollo Pesquero INIDEP). Furthermore, establish the quotas of annual catching per vessel, per species, per fishing zones and per type of fleet;

Approve the licenses of commercial and experimental fishing;

Advise the Undersecretariat of Fisheries in international negotiations matters;

Plan the national fishing development;

Fix the guidelines of co-participation in the National Fishing Fund (Fondo Nacional Pesquero FO.NA.PE.);

Pronounce on experimental fishing;

Establish the catching fees and fix canons for the practice of fishing;

Modify the distribution percentages of the National Fishing Fund (Fondo Nacional Pesquero FO.NA.PE.) established in the sub section e) of section 45 of the present Act;

Rule the practice of artisanal fleet establishing a reserve of the fishing quota of the different species to be assigned to this sector;

Establish the items to be considered by the Federal Fishery Council (Consejo Federal Pesquero) that require qualified majority in the voting of its members;

Promulgate its own functioning regulations, and shall be approved with the affirmative vote of the two third parts of the total of its members.

ARTICLE 10: A honorary advisor commission formed by representatives of the different business Trade-union associations and associations of the fishing activity workers shall exist in the Federal Fishery Council (Consejo Federal Pesquero).

CHAPTER VI

Research

ARTICLE 11: The Federal Fishery Council (Consejo Federal Pesquero) shall establish the objectives, policies and requirements of the scientific and technical research referred to the maritime live resources. The INIDEP shall plan and fulfill its scientific and technical activities with the provinces and other entities, especially with respect to the evaluation and conservation of the maritime live resources. The National Institute of Fishery Research and Development (Instituto Nacional de Investigación y Desarrollo Pesquero INIDEP) shall cooperate with the national and provincial entities in the tasks of research that tend to prevent pollution.

ARTICLE 12: The National Institute of Fishery Research and Development (Instituto Nacional de Investigación y Desarrollo Pesquero INIDEP), shall manage and dispose of the fishing research vessels, possessed by the National State, pursuant to the requirements and policies that are timely established, and shall determine annually the sustainable maximum production of the species.

ARTICLE 13: The results of every research work about fishing resources shall be at the disposal of the Undersecretariat of Fisheries before any use or circulation of the same. The companies dedicated to the catching of maritime live resources are obliged to provide all the required information assigned to the research of the resource.

ARTICLE 14: The experimental fishing by natural or artificial persons, foreign persons or international entities with vessels of national or foreign flag, shall require authorization granted by the Undersecretariat of Fisheries, prior favorable decision of the Fishing Federal Council. The Undersecretariat of Fisheries shall have free access to all the information derived from scientific and technical research and shall have the faculty to appoint representatives of the National Institute of Fisheries Research and Development (Instituto Nacional de Investigación y Desarrollo Pesquero INIDEP) who in the capacity of observers witness the tasks and verify that they are adjusted to the fixed conditions and limits.

ARTICLE 15: The experimental fishing shall only have an aim of scientific or technical research and in no case shall be related to commercial operations. The ship owner shall be able to freely dispose of the catching, with the limitations imposed by the Undersecretariat of Fisheries. The Undersecretariat of Fisheries shall have to establish in each case terms and total allowed catch (TAC) according to the scientific or technical aim, prior decision of the National Institute of Fisheries Research and Development (Instituto Nacional de Investigación y Desarrollo Pesquero INIDEP).

ARTICLE 16: When this activity is developed by the INIDEP-Advisory Centre of Scientific and Technological Research (Consejo de Investigaciones Científicas y Técnicas, CONICET) and/or national or state provincial universities, the fishing products obtained during its development shall be disposed in the conditions established by the Undersecretariat of Fisheries.

CHAPTER VII

Conservation, Protection and Administration of the maritime live resources

ARTICLE 17: The fishing in all the sea spaces under Argentine jurisdiction, shall be subject to the restrictions established by the Federal Fishery Council (Consejo Federal Pesquero) with basis in the conservation of the resources, in order to avoid excesses of development and to prevent damaging effects on the environment and the unity of the ecological system.

ARTICLE 18: The Federal Fishery Council (Consejo Federal Pesquero) shall establish annually the total allowed catch (TAC) per specie, pursuant to section 9, sub section c).

ARTICLE 19: Pursuant to Section 7 sub section e) of this Act, the Undersecretariat of Fisheries shall establish close zones or seasons. The information related to the imposition of such restrictions, as well as its removal, shall be widely spread and communicated in advance to the fishing official agents and to the competent control authorities. In the same way it shall establish reserves and delimitation of fishing areas imposing to the official agents the obligation of providing under affidavit, statistical information of the obtained catching, fishing efforts, and position of its vessels.

ARTICLE 20: In order to contribute to the fulfillment of the national legislation about fishing, coordinated by the Undersecretariat of Fisheries, the competent entities shall ensure the appropriate vigilance and control in everything concerning to fishing vessels operative and the exploitation of maritime live resources in the maritime spaces under

Argentine jurisdiction. With this same aim, the Undersecretariat of Fisheries shall acquire and operate the necessary means.

ARTICLE 21: The Undersecretariat of Fisheries shall determine the forbidden fishing methods and techniques, equipment and nets etc. The following acts are completely forbidden in all the maritime spaces under Argentine jurisdiction:

The use of explosives of any kind;
The employment of acoustic equipment and harmful substances as catching methods;
Carry aboard and/or use forbidden nets etc.;
Transport explosives or toxic substances on the vessels;
Throw to the waters substances or debris that could harm the aquatic flora and fauna or impede the movement of fish in their natural migration;
Intercept fish in the water courses by means of installations, shortcuts or other procedures that attempt against the conservation of the aquatic flora and fauna;
Every practice or fishing action that cause destruction on fishing or predation of the live resources of the aquatic means;
The practice of fishing activities without license, assignation of the corresponding quota, as well as the activities against the current legal regulations;
The practice of fishing activities in close seasons or areas;
The introduction of exotic aquatic flora and fauna without prior authorization of the competent authority;
The introduction of live species that are declared harmful for the fishing resources;
The use of minimum meshes in the trawler nets that according to type of vessels, fishing operations and species, are not the established ones for the catching;
Throw discards and waste to the sea, against the responsible fishing practices;
Carry out catching of examples of species younger than the ones established by the legal regulations in force or declare amounts of catching different from the real ones, as well as fake the declaration of the species;
Surpass the allowed catching over the amount of quota of individual catching;
Carry out any practice that goes against the viability of the fishing resource and against the practices of responsible fishing, in agreement with what is determined by the Undersecretariat of Fisheries in consensus with the Federal Fishery Council (Consejo Federal Pesquero);

ARTICLE 22: In order to protect the preferential rights that correspond to the Nation in its condition of Coastal State, the Undersecretariat of Fisheries, together with the Ministry of Foreign Affairs, International Trade and Cult, (Ministerio de Relaciones Exteriores, Comercio Internacional y Culto) shall have to organize and sustain a fishing regulation system in the zone adjacent to the Argentine exclusive economic zone with respect to the migratory resources or that belong to a same population or populations of associated species to the ones of the exclusive Argentine economic zone.

With this aim the Argentine Republic shall agree with the States that want to fish these populations in the mentioned adjacent area on the necessary measures to rationalize the exploitation and ensure the conservation of the resources. When limitations are established with respect to the fishing or close seasons, these shall be extensive to the agreements made with third countries.

CHAPTER VIII

Fishing Regulations

ARTICLE 23: For the exercise of the fishing Activity, the Undersecretariat of Fisheries shall grant the authorization according to sections 7 and 9 of the present Act, through some of the following administrative acts:

Fishing license: it enables the practice of commercial fishing to national flag vessels to catch maritime live resources in the maritime spaces under Argentine jurisdiction;

Deep-sea fishing license: it enables national flag vessels for the practice of commercial fishing over the continental talus, out of the exclusive economic zone, deep waters or with license in waters of third countries;

Temporary fishing license: it shall be granted to hire naked hull vessels in conditions and terms established in the present Act. The same treatment shall be applied for foreign flag vessels that operate in conditions of exception established by this Act;

Fishing authorization: it enables for the catching of maritime live resources in a limited amount, with the purpose of scientific or technical research.

*(Note: By art. 2° of the [Law N° 25.109](#) B.O. 24/6/1999 the application of a) during the duration of fishing emergency for the *Common hake* (*Merluccius hubbsi*) is suspended.*

ARTICLE 24: The exploitation of maritime live resources in the maritime spaces under Argentine jurisdiction shall only be carried out by natural persons domiciled in the country, or artificial persons of private Act that are constituted and function according to the national Acts. The vessels employed in the fishing activity shall have to be enrolled in the national registration and raise the national flag.

ARTICLE 25: It shall be obligatory to land the production of the fishing vessels in Argentine wharves. In duly authorized force major cases or when the vessels are authorized to operate in international waters, the Undersecretariat of Fisheries shall authorize the unloading in foreign ports and the transshipment in Argentine ports or in the unloading zones in the roadsteads of the ports.

ARTICLE 26: The fishing licenses shall be granted according to Sections 7 and 9 of this Act, in the following conditions:

1) For a term of up to ten years (10) for a certain vessel. The Federal Fishery Council (Consejo Federal Pesquero) shall establish the conditions giving priority to:

The vessels that use Argentine labor in a greater percentage;

The vessels built in the country;

Minor length of service of the vessel.

2) For a term of up to (30) years for a certain vessel, belonging to a company with processing facilities established in national territory and that process and manufacture fishing products in a continuous way. The Federal Fishery Council (Consejo Federal Pesquero) shall establish the conditions giving priority to:

The use of Argentine labor in a greater percentage, on land and in vessels in a proportional way;

Giving more value to the final product;

The vessels built in the country;

Minor length of service of the vessel.

3) In order to grant the foreseen licenses in the sub sections 1 and 2 of the present section, the companies who own the vessels shall have to guarantee the fulfillment of the legal, previsional and tax obligations in force.

ARTICLE 27: As of the viability of this Act, a quota of catching shall be assigned to each fishing license, both to the pre-existent ones and to those granted in the future. The Federal Fishery Council (Consejo Federal Pesquero) is hereby empowered to rule and dictate all the necessary regulations to establish an administration regime of the fishing resources by means of the granting of catching quotas per species, per vessel, fishing zone and type of fleet. The catching quotas shall be temporal concessions that shall not surpass, per company or business group, the percentage that the Federal Fishery Council (Consejo Federal Pesquero) shall fix on the total allowed catch (TAC) per species to avoid unwanted monopolic concentrations. To establish the operation parameters of the fishing administration regime and the assignation of the catching quotas, the Federal Fishery Council (Consejo Federal Pesquero) shall give priority to the following items:

Amount of employed national labor;

Investments effectively made in the country;

The average of tons of legal catching of every species made during the last eight (8) years, measured up to December 31, 1996, per vessel or per group of vessels if these should belong to a same company or business group;

The average of tons of fishing products manufactured, on board or in land of every species in the last eight (8) years, measured up to December 31, 1996, per vessel or per group of vessels if these should belong to a same company or business group;

Lack of record of applied sanctions for infringement to the laws, decrees or regulatory resolutions of the fishing activity.

The catching quotas shall be totally or partially transferable in accordance with the conditions established by the Federal Fishery Council (Consejo Federal Pesquero) that shall establish a right of transfer in the transferee's part, in relation with the amount of catching and value of the species authorized by the quota. The transfer of catching quotas of wet fish trawlers to freezer trawlers or factories shall not be permitted. The Federal Fishery Council (Consejo Federal Pesquero) shall be able to reserve part of the total allowed catch (TAC) as a method of conservation and administration, prioritizing its assignation to sectors of maximum social interest.

*(Note: By art. 4° of the [Law N° 25.109](#) B.O. 24/6/1999 the allocation of the quotas resulting from the quotification process for the Common hake (*Merluccius hubbsi*) is suspended until 31 December 1999.)*

ARTICLE 28: The fishing licenses are authorizations granted only to have access to the fishing area. In order to exercise fishing, it is necessary to have an assigned catching quota or an authorization of catching in case the species is not quotified.

The fishing licenses or authorizations granted to vessels belonging to companies or business groups to whom bankruptcy is sentenced or that had remained without operating commercially during one hundred and eight (180) days running, without no justification according with to what is established by the Federal Fishery Council (Consejo Federal Pesquero) shall expire automatically.

The fishing licenses or authorizations assigned to vessels that could sink or are already sunk, or that have been affected by any other kind of disaster that meant a hindrance to develop its operation and that have not replaced the damaged vessel within the terms granted by the Undersecretariat of Fisheries shall expire automatically.

ARTICLE 29.- The fishing of the marine living resources, within Argentine jurisdiction, will be subject to the payment of a unique right to fish by species and fishing method, and it will be established by the Federal Fishery Council.

ARTICLE 30: The fishing license shall only be transferred to another unit or units of equivalent capacity that do not imply an increase of the fishing effort, when this unit or units replace the first because of disaster, force majeure reasons or when the vessel had arrived to the limit of its length of service, prior authorization of the Undersecretariat of Fisheries.

ARTICLE 31: In no case shall the fishing products be disposed of without previously submitting them to the sanitation control of the competent entities. It shall be exercised without hindering the fishing operation, in the conditions established by the regulations. The Undersecretariat of Fisheries shall rule the transport and the necessary documentation for the transit of fishing products.

ARTICLE 32: During the viability of the fishing license, the owners shall communicate in the character of affidavit the catching obtained in the way and opportunity that is established by the respective regulation. The falsehood of these affidavits shall be sanctioned according to the regulations established in Section 51 of this Act.

ARTICLE 33: The Undersecretariat of Fisheries shall decide the installation of devices in the vessels to carry out the satellite follow-up of the same in the way and opportunity that is established by the respective regulations. The falsehood of these affidavits shall be sanctioned according to the regulations established in the Section 51 of this Act.

ARTICLE 34: The approval of the projects that deal with the definitive incorporation of new vessels to the national fishing fleet by the Undersecretariat of Fisheries, shall have effectiveness to obtain the respective fishing license, provided that the acquisition, construction or importing be made within the granted term to that end and that should be unable to be extended. The construction or importing of vessels without prior approval of the project shall be at the shipyard, ship owner or importer's own risk.

CHAPTER IX

Exceptions to the Reserve of the National Flag.

ARTICLE 35: The commercial exploitation of the maritime live resources existing in the maritime spaces under Argentine jurisdiction shall only be carried out through the fishing made by vessels of Argentine flag, with the exception of those established by this section. The reserve of flag with the purpose of commercial fishing shall be essential within the national waters and the territorial sea.

ARTICLE 36: The national companies that usually develop fishing operations and had uninterrupted activity in the sector during the last five (5) years prior to the application, shall hire either individually or collectively, prior authorization of the Federal Fishery Council (Consejo Federal Pesquero), vessels of foreign registration with naked hull, whose service length does not surpass five (5) years and for a certain term, which shall not exceed 36 months, destined to the catching of surplus of unexploited species or underexploited, in such a way that it does not affect the established fishing reserves.

For the distribution of the quota the same criteria established in Section 27 shall be followed. The Argentine Coastguard (Prefectura Naval Argentina) shall be in charge of the inscription of the agreements and the respective seat shall be made in the special register, without detriment to the control and supervision in charge of the Undersecretariat of Fisheries. These vessels shall remain liable to the fulfillment of all the in force maritime and labor regulations related to navigation and employment aboard, established for national vessels.

International fishing treaties.

ARTICLE 37: The National State shall permit the access to fishing in maritime spaces under Argentine jurisdiction to foreign flag vessels, through international treaties approved by Act of the National Congress whose objective is the catching of non exploited or under exploited species and that take into consideration:

The opening of the market in the co-contracting country with import quotas of Argentine fishing products free of import tariffs for an economic value similar to the fishing quota granted in the maritime spaces under Argentine jurisdiction;

The conservation of the resources in the area adjacent to the Argentine exclusive economic zone;

The right of our fleet to fish in the domestic exclusive economic zone of the co-contracting country,

The determination of the fishing capability of the Argentine fleet in order to calculate the surplus, shall only be made taking into consideration biological, structural reasons and not cyclic decreases that are characteristic of the activity nor extraordinary facts of general extent that may have affected its functioning.

ARTICLE 38: The concession of fishing quotas to be caught by foreign flag vessels according to international treaties mentioned in the previous section shall not affect the fishing reserves imposed in favor of national vessels and shall remain subject in every case to the fulfillment of the following conditions:

It shall be granted for a certain time;

The foreign vessels activity shall be adjusted to the regulations of this Act and shall only be admitted when this is made jointly with one or more companies settled in the country, pursuant to the Act of partnerships;

It shall be authorized by areas of sea and by fisheries geographically delimited and with relation to species that are determined for each case;

The Undersecretariat of Fisheries shall regulate the fishing seasons and zones, type, size and amount of tackle, and the amount, size and type of fishing vessels that could be used;

The Undersecretariat of Fisheries shall fix the age and size of the maritime live resources to catch;

The vessels shall unload their catch in Argentine wharves, either to make transfers to other vessels or in transit for their re-embarkation;

These vessels shall remain subject to the fulfillment of all the maritime statutes and in force occupational regulations related to navigation established for national vessels when applicable;

The companies that are formed as a result of the application of sub section b) of this section, shall register in the record created to such effect, as well as the vessels, the effected crews and the particular agreements that are subscribed;

These vessels shall pay the canon for catching that the competent authority should determine for every case;

The ship owners of the foreign vessels shall provide aboard of every vessel the adequate facilities for the control and research personnel whose embarkation is determined by the Undersecretariat of Fisheries;

The production of these vessels shall be absorbed at international prices by the market corresponding to the country of origin of the authorized companies, with the commitment of non re-export, except when the penetration in new markets or in those that have restriction for the Argentine fishing export is offered.

At least a 50% of Argentine crewmembers shall embark in an effective way;

The Undersecretariat of Fisheries shall regulate the conditions that the associated Argentine companies shall meet;

The export of the fishing products obtained pursuant to the regime established in the present section shall not possess the benefits settled in the promotional regimes nor tax reimbursements of any kind.

CHAPTER X

Crews

ARTICLE 39: All the personnel aboard of the fishing vessels are obliged to have all the required documentation issued by the competent authorities in the conditions stipulated by national regulations.

ARTICLE 40: The crew of the fishing vessels shall be formed according to the following conditions:

a) The authorizations of captains and officers are reserved for native Argentine people by option or naturalized.

b) The 75% of shipyard workers, ship's crew and plant workers on board of the fishing vessels must be formed by Argentine or foreign people with more than ten (10) years of permanent residence effectively accredited in the country;

In case of requiring the embarkation of foreign personnel and when lacking personnel mentioned in the former sub section, the embarkation of the same shall be carried out in a provisional way complying with the prevailing legal regulations. Should there be Argentine crew members available, the crew must be completed with available Argentine members. The established reserves in sub section a) and b) shall not hinder in any case the normal operation of the fishing vessels, the Federal Fishery Council (Consejo Federal Pesquero) is hereby authorized to dedicate the necessary regulations to fulfill this disposition.

CHAPTER XI

Fishing Registry

ARTICLE 41: The Fishing Registry is hereby created and shall be under the responsibility of the Undersecretariat of Fisheries whereby all the natural or artificial persons who are devoted to the commercial exploitation of maritime live resources shall be registered under the conditions fixed by the rules.

ARTICLE 42: The lack, suspension or cancellation of the registration foreseen in this Act shall not impede the exercise of the obligations agreed with the Undersecretariat of Fisheries, neither shall it exempt the people submitted to its regime from the obligation and responsibilities that are established for those who are registered.

CHAPTER XII

National Fishing Fund (Fondo Nacional Pesquero FO.NA.PE.)

ARTICLE 43: The National Fishing Fund (Fondo Nacional Pesquero FO.NA.PE.) is hereby created as special account, that shall be constituted with the following resources:

- a) Annual tariffs with fishing licenses;
- b) Catching fees on the catching of the vessels with national registration, authorized for commercial fishing;
- c) Catching fees in national jurisdiction for vessels located with naked hull according to what is established by the Federal Fishery Council (Consejo Federal Pesquero).
- d) Canons perceived on the activity of vessels of foreign registration with temporary fishing license in national jurisdiction;

The penalties imposed by violations to this Act and its regulation;

The product of the sale of the extracted production, the nets etc. and vessels confiscated for infringements, according to section 53 of this Act and subsequent;

Donations and legacies;

Other earnings derived from agreements with institutions or national and international entities;

Contributions of the Treasury;

Rates by required services;

The interest and income of the mentioned earnings in the foregoing sub sections.

ARTICLE 44: The National Fishing Fund (Fondo Nacional Pesquero FO.NA.PE.) shall be administered by the Undersecretariat of Fisheries with intervention of the Federal Fishery Council (Consejo Federal Pesquero) and it shall participate jointly between the Nation and the provinces with maritime littoral, as fixed by the Federal Fishery Council.

ARTICLE 45: The Fishing National Fund (Fondo Nacional Pesquero FO.NA.PE.) shall:

Finance research tasks of the National Institute of Fisheries Research and Development (Instituto Nacional de Investigación y Desarrollo Pesquero INIDEP) with up to twenty five percent (25%) of the total of the fund;

Finance equipment and patrol tasks and police control of the fishing activity carried out by the competent authorities, with up to twenty percent (20%) of the fund;

Finance tasks of the Undersecretariat of Fisheries with up to one percent (1%) and of the Federal Fishery Council (Consejo Federal Pesquero) with up to two percent (2%) of the fund;

Finance the training and education of the fishing personnel through official institutions with up to two percent (2%) of the fund;

The Federal Fishery Council (Consejo Federal Pesquero) shall modify the percentages indicated in the previous sub sections, pursuant to the experience and the basic needs that are presented;

Transfer to the provinces that form the Federal Fishery Council (Consejo Federal Pesquero) and to the National State a minimum of fifty percent (50%) of the fund, as fishing joint participation, which shall be distributed according to what was established by the Federal Fishery Council.

CHAPTER XIII

Infringement and Sanctions Regime

ARTICLE 46: The natural or artificial persons and/or the entities resulting of its grouping that intervene in the exploration, catching, industrialization, commerce and/or transportation of the maritime live resources, their products or by-products, should be registered in the records under the responsibility of the Undersecretariat of Fisheries established by Section 6 of this Act in order to be authorized for the development of the described activities.

ARTICLE 47: The fishing product load that is found aboard a fishing vessel of foreign flag that is found in the maritime spaces under Argentine jurisdiction or in waters in which the Argentine Republic has sovereignty rights on the maritime live resources without having licenses or express authorization issued by the Undersecretariat of Fisheries is presumed to have been caught in said spaces.

ARTICLE 48: The fishing product load that is found aboard a fishing vessel of national flag that is found in a closed zone and that might not have been declared before the entry to such zone, is presumed that it has been caught in said spaces and shall be object of the penalties foreseen in this Act.

ARTICLE 49: The infringement to the Acts, decrees or resolutions that regulate the activities linked with the live resources of the sea and rivers under Argentine jurisdiction, whether national or foreign vessels, shall be sanctioned by the Undersecretariat of Fisheries, pursuant to the prescriptions in this Act.
(*Article substituted by art. 2° of the [Law N° 25.470](#) B.O. 17/10/2001*).

ARTICLE 50: In relation to the foreign vessels the Argentine Coastguard (Prefectura Naval Argentina) shall instruct the corresponding summary in order to determine the configuration of the infringement that is presumed. Once the instruction stage is over, the proceedings shall be presented to the Undersecretariat of Fisheries in order to determine the corresponding sanctions. The Undersecretariat of Fisheries shall order the reopening of the summary, by the court or by request of a part, if considered necessary.

ARTICLE 51: The Undersecretariat of Fisheries, before substantiating the corresponding summary, proves that it has been incurred in some of the illicit conducts typified in the in force regulations, shall apply one or more sanctions that are consigned below, according to the characteristics of the vessel, the seriousness of the illicit act and the background of the offender:

Penalty as from ten thousand pesos (\$10,000) to one million pesos (\$1,000,000);
Suspension of the registration in the records under the responsibility of the Undersecretariat of Fisheries to the vessel that committed the infringement, from fifteen (15) days to one year;
Cancellation of the inscription marked in the previous sub section;
Confiscation of the nets etc. and equipment;
Confiscation of the vessel.

The Undersecretariat of Fisheries shall establish the minimum amount of the penalty to be applied for the cases of serious infringements, such as fishing in the closed zone, fishing without authorization or using forbidden nets etc. techniques and equipment without harming others that are typified by the Undersecretariat of Fisheries. In this case, the penalty shall not be less than fifty thousand pesos (\$50,000) nor more than two million pesos (\$2,000,000) without detriment to what was established in sections 52 and 53 of this Act.

(Article substituted by art. 3° of the [Law N° 25.470](#) B.O. 17/10/2001).

ARTICLE 52: In addition to the sanctions foreseen in the previous section, the ship owner could be suspended of his registration, which could be extended to all the vessels that operate in the fishing activity when the seriousness of the infringement justifies it.

ARTICLE 53: In addition to the sanction foreseen in section 51 of this Act, the catching obtained by the fishing vessel during the fishing trip shall be confiscated. This could be substituted by penalty equivalent to the value of said catching on the market on the date of arrival to the port, pursuant to the prescriptions established by the Undersecretariat of Fisheries.

(Article substituted by art. 4° of the [Law N° 25.470](#) B.O. 17/10/2001).

ARTICLE 54: When dealing with foreign vessels, the Undersecretariat of Fisheries shall dispose of the retention of the vessel in Argentine port until prior substantiation of the respective summary, the payment of the imposed penalty is made or bail or another satisfactory guarantee is constituted.

The costs originated by towing, navigation, and port services, also custom, sanitary and migration services taxes, generated by the vessel which committed the infraction, as a consequence of the Infraction Commission to the present law, shall be paid by the owner of the vessel or its representative, previously to its release. *(Paragraph added by art. 5° of the [Law N° 25.470](#) B.O. 17/10/2001).*

When the infractions described in the present law are committed by Argentine vessels within Argentine jurisdiction waters, the sanctions will be dictated by the Undersecretariat of Fisheries, with a previous summary, illustrated by the Directorate of Fisheries and Aquaculture or the Coastguard (Prefectura Naval Argentina), determined by the Undersecretariat of Fisheries. All that without detriment of legal and/or custom sanctions which could correspond. *(Paragraph added by art. 5° of the [Law N° 25.470](#) B.O. 17/10/2001).*

ARTICLE 54 bis: The Directorate of Fisheries and Aquaculture will impute the infraction committed to this law to the supposed responsible person who, within the ten (10) working days after notification, will be able to:

a) Make himself present and initiate the defense of his rights;

b) Submit himself to the attribution. In this supposition, the fine and/or sanction imposed will be reduced to the fifty per cent (50%). In the event that the submission is done after the deadline established in the present article, previously to the administrative action which cancels the summary, the fine and/or sanction imposed will be reduced to the seventy five per cent (75%).

If it is required time limits and alternatives of payment of the fine could be offered, this will be regulated by the Undersecretariat of Fisheries.

(Article added by art. 6° of the [Law N° 25.470](#) B.O. 17/10/2001).

ARTICLE 55: The Undersecretariat of Fisheries shall discontinue the fishing trip in which the supposed infringement was committed when it considers it appropriate for the seriousness of the fact.

(Article substituted by art. 7° of the [Law N° 25.470](#) B.O. 17/10/2001).

ARTICLE 56: Before the presumption of serious infringement and although the substantiation of the summary might not have ended, the Undersecretariat of Fisheries shall through founded resolutions, suspend preventively the registration of the presumptive offender, until the final resolution is dedicated. In this case, the substantiation of the summary shall not surpass the term of sixty (60) consecutive days.

(Article substituted by art. 8° of the [Law N° 25.470](#) B.O. 17/10/2001).

ARTICLE 57: Once the suspension foreseen in the previous section is applied, the vessel shall not abandon the port during this period complying with the preventive measure, without the express authorization of the Undersecretariat of Fisheries.

ARTICLE 58: In case of recurrence within the five (5) years of having committed the infringement, the minimum and maximum established in the last paragraph of the section 51 shall be duplicated, without detriment to the greater penalty that might correspond by the seriousness of the infringement committed. For the recurrence, the vessel, and the ship owner shall be taken into account indistinctively.

ARTICLE 59: The sanctions imposed by the Undersecretariat of Fisheries shall be appealable within ten (10) working days after being notified, through reconsideration recourse before the Undersecretariat of Fisheries and appeal in subsidy before the Federal Fishery Council (Consejo Federal Pesquero). The reconsideration shall be solved within thirty (30) working days as from the date of its intervention. In case the preventive suspension foreseen in Section 56 has been applied, said term shall be reduced to ten (10) working days. If the resolution that solves the reconsideration recourse confirms the sanction, the one who committed the infraction is notified, and a prior deposit of the corresponding amount (if it deals with penalties) is made, the record shall be remitted within ten (10) working days to the National Court of Appeal in the Capital Federal, Buenos Aires (Camara Nacional de Apelaciones en lo Contencioso Administrativo de la Capital Federal), the one which shall understand as court of appeal.

(Article substituted by art. 9° of the [Law N° 25.470](#) B.O. 17/10/2001).

ARTICLE 60: The suspension or cancellation of the registration in the records demanded by this Act shall implicate the cessation of the Activities mentioned in Section 46. The sanctions shall be notified by the Undersecretariat of Fisheries to the administrative divisions or corresponding entities so as not to grant any kind of certificates that serve to facilitate the fishing operations for the catching, purchase, sale,

transport, elaboration, storage or export of the live resources originated from the fishing, its products or by-products.

(Article substituted by art. 10 of the [Law N° 25.470 B.O. 17/10/2001](#)).

ARTICLE 61: The ship owners who infringe the in force regulation shall be individually and jointly responsible for the sanctions established in section 51, subsequent and concordant and of the remaining consequences derived from the illicit act.

ARTICLE 62: When the infringing vessel is of national flag and without detriment to the sanctions foreseen in this Act for the ship owner, the Undersecretariat of Fisheries shall remit copy of what was acted to the Argentine Coastguard (Prefectura Naval Argentina) for the purpose of drawing up the corresponding summary with respect to the responsibilities of the captain and/or employer, who according to the seriousness of the infringement committed shall be sanctioned with one or some of the following:

- a) Warning;
- b) Penalty from one thousand pesos (\$1,000) to one hundred thousand pesos (\$100,000).
- c) Suspension of the authorization to navigate up to two (2) years;
- d) Cancellation of the authorization to navigate.

ARTICLE 63: The Undersecretariat of Fisheries shall not register corporations or business groups when one or more of their directors or administrators, managers, trustees, representatives or negotiators were sanctioned with suspension or cancellation of the registration in the records established by Section 41, due to infringements to this Act or to its regulation, as long as there is firm pronouncement. Furthermore, it shall eliminate those that are registered when, within a term that is fixed, do not exclude the infringer.

ARTICLE 64: When natural or artificial persons are sanctioned with cancellation of the registration in the record created by this Act based on firm sentences, neither the former, nor the latter, shall form part of the entities of representation, administration and/or direction of other corporations, nor business groups, to develop the activities foreseen in this Act, nor shall they act individually.

ARTICLE 65: The fines resulting from the definitive sentences dictated by infraction to the present law, shall be paid within the ten (10) working days since notification. In the event of absence of payment, its executive collection will be regulated by the norms of the book III, title I, chapter I, of the CPCC. When the fines imposed by the Undersecretariat of Fisheries were no recurred before the National Court of Appeal in the Capital Federal, Buenos Aires (Cámara Nacional de Apelaciones en lo Contencioso Administrativo de la Capital Federal), the absence of payment of them will result in the emission of a certificate of doubt issued in agreement with the statutory norms, and its collection will be regulated by the norms for the fiscal executions in the book III, title III, chapter 2, section IV, of the CPCC.

(Article substituted by art. 11 of the [Law N° 25.470 B.O. 17/10/2001](#)).

CHAPTER XIV

Complementary and Transitory Prescriptions

ARTICLE 66: With the purpose of a better fishing operative organization, the pertinent port authority shall jointly proceed with the Argentine Coastguard (Prefectura Naval Argentina) to carry out the transfer to other ports or especial zones of those ships that by their inactivity, abandonment or disuse, constitute a hindrance for the normal port operating conditions. The owner of the ship shall settle the cost of such transfer. In case of vessels subject to embargo or interdiction, the intervening judge shall authorize their transfer so as not to affect the normal development of the port activity.

ARTICLE 67: The prescriptions of this Act rule without detriment to rights and obligations that correspond to the Argentine Nation by virtue of the international treaties the Nation is part of.

ARTICLE 68: The National Executive Power (Poder Ejecutivo Nacional) shall regulate this Act within ninety (90) days as from its promulgation.

ARTICLE 69: The provinces with maritime littoral are invited to adhere to the regime of the present Act to enjoy the benefits hereby granted.

ARTICLE 70: The Undersecretariat of Fisheries shall summon the provinces with maritime littoral to join the Federal Fisheries Council in a term of sixty (60) days as from the promulgation of this Act.

ARTICLE 71: The Undersecretariat of Fisheries shall proceed within ninety (90) days after promulgating this Act, to the re-registration of all the vessels with in force fishing permit. The permits corresponding to the vessels that might not have operated during the last one hundred and eighty (180) days in an unjustified way for the Undersecretariat of Fisheries and the Federal Fisheries Council, shall expire automatically, no matter what its legal status is.

The pre-existing licenses of the vessels that comply with the requirements for their re-registration shall be registered in a definite way and shall remain subject to the fishing regime anticipated in the present Act.

ARTICLE 72: The Section 4 of Act 17.094, the sub section 1) of section 6 and the Section 8 of the Act 21.673, the Section 2 of the Act 22.260, and the Act 17.500, 18.502, 19.001, 20.136, 20.489, 21.514, 22.018, 22.107 and all other legal regulations in everything opposed to what is established in the present Act is hereby repealed.

ARTICLE 73: The Undersecretariat of Fisheries shall intervene, together with the responsible entities, in the training and formation of the fishing personnel aboard and the scientific and technical personnel related to the fishing activity establishing institutes appropriate to said purposes in the cities with ports. It shall also impel the necessary actions in order to organize with educational institution, union and business entities, official programs and training courses with possibilities of future employment, in specific tasks or activities to be developed in the areas of catching, industrialization and cultivation of fishing resources.

ARTICLE 74: The actions to impose sanction or infringement to this Act and its regulatory regulations prescribe after five (5) years. The term for the prescription shall begin to be counted as from the date of the infringement.

ARTICLE 75: Remit to the Executive Power.

COMPLEMENTARY DECREE 748/99

This decree regulates Law N° 24922. Scope of Application. Federal Fishery Council. Preservation and Administration of Live Marine Resources. Fishery Regime. Crew. National Fishery Fund. Infringements and Penalties. Guarantees. Supplementary and Transitory Provisions.

Buenos Aires, July 14, 1999.

In view of docket N° 800-002661/98 of the Registry of the Department of Agriculture, Livestock, Fishery and Food reporting to the Ministry of Economy and Public Works and Services and Law N° 24922 which establishes the Federal Fishery Regime

WHEREAS

The Federal Fishery Regime introduces modifications to the regime of title to and administration of live resources available in marine spaces subject to Argentine jurisdiction.

The rights that the Republic of Argentina has on its Exclusive Economic Zone (EEZ) and on its continental shelf are “sovereign rights” pursuant to Law N°24543 which approves the 1982 United Nations Convention on Sea Rights.

Pursuant to the declaration of the Argentine Government made in section 2, subsection c), last paragraph of Law N° 24543 and the provisions of Law N°24922, the Republic of Argentina is entitled to adopt, in accordance with the applicable international law, all the measures it may deem necessary to comply with the obligation to preserve the live marine resources in its EEZ and its adjoining area.

It is necessary to contemplate, in certain situations, the scopes of Law N° 24922, in view of the wide spectrum covered by fishery.

As provided in Decree N° 214 dated February 23, 1998, the Department of Agriculture, Livestock, Fishery and Food reporting to the Ministry of Economy and Public Works and Services is the Application Authority for Law N° 24922.

Provisions are included in respect of the nature and powers of the Federal Fishery Council, an inter-jurisdictional body comprised by representatives of the Nation and the Provinces with seashores, which was created under section 8 of Law N° 24922, to determine its relationship with the Application Authority under said law.

The new infringements and penalties regime requires a clear and efficient proceeding that will ensure the managers their right of defense.

The General Administration of Legal Affairs reporting to the Ministry of Economy and Public Works and Services has intervened accordingly.

This decree is issued in accordance with the powers granted by section 68 of Law N° 24922 and section 99, subsection 2 of the National Constitution

Now, therefore

THE PRESIDENT OF THE ARGENTINE NATION DECREES:

CHAPTER I - Scope of Application of the Federal Fishery Regime

ARTICLE 1. The provisions of Law N°24922 include:

- a. The sustainable management of the live marine resources.
- b. All activities involving harvesting, exploitation, preservation and research of marine resources.
- c. Control and surveillance of fishing vessels activities in Argentine waters.
- d. Coordination of measures for the protection, preservation and management of live marine resources in the Argentine Territorial Sea and the EEZ, among the jurisdictional authorities of the Nation and Provinces with seashore.
- e. The preservation and research measures that the Republic of Argentina may adopt in respect of the live marine resources available in its EEZ and adjoining area, in accordance with applicable international law standards.
- f. Fishery and research activities of Argentine flag vessels in international waters, offshore and licensed to operate in waters subject to the jurisdiction of other States.
- g. Fishery and research activities of foreign flag vessels in Argentine waters.
- h. Processing, transformation, carriage and storage of fishery products in national jurisdiction.

ARTICLE 2. The measures adopted by the Application Authority in the terms of section 5, subsection c) of Law N°24922 will be immediately applied and they will stand in force unless the Federal Fishery Council resolves to have them reviewed. Where such measures provide for restrictions to the exercise of the fishery, the Application Authority will coordinate with the Argentine Coastguard (*Prefectura Naval Argentina*) reporting to the Ministry of Interior, the adoption of all measures necessary to ensure that the vessels will not depart from a harbor, enter a harbor or leave waters affected by such measures and to proceed to their prompt detention if they fail to obey.

CHAPTER II - Federal Fishery Council

ARTICLE 3. The members of the Federal Fishery Council will take such actions and adopt such measures as are necessary to ensure its regular operation and the full compliance with the duties assigned to it by Law N° 24922.

Each member may have one (1) alternate member appointed by the same appointing jurisdiction, to act in lieu of the active member in case of impediment.

ARTICLE 4. Any actions taken and resolutions issued by the Federal Fishery Council, as well as the decisions made by the Application Authority at its request, will be binding for the Nation and the Provinces with seashore.

ARTICLE 5. The Federal Fishery Council may request the Application Authority to take such actions as fall within the latter's venue. The Application Authority will proceed to consider them, within ten (10) calendar days after the request, and should it oppose to their approval, such refusal will have to be duly grounded.

ARTICLE 6. In an emergency where the Federal Fishery Council is unable to meet to discuss the matters of its competence, the Application Authority may issue the necessary resolutions. Such resolutions will be notified to the Federal Fishery Council within five (5) calendar days after their issuance and a meeting of the Federal Fishery Council will be summoned for their ratification.

ARTICLE 7. Upon a resolution of the Federal Fishery Council affecting the legal rights or interests of individuals, a motion of reconsideration may be filed, which will exhaust the administrative channels provided under and according to the proceedings established in National Law of Administrative Proceedings N°19549 and its Regulations approved by Decree N°1759/72, 1991 restated version.

CHAPTER III - Preservation and Management of Live Marine Resources

ARTICLE 8. Maximum Sustainable Profitability (MSP) of a species means the maximum tonnage allowed to be caught per year, without affecting its preservation.

ARTICLE 9. Maximum Allowable Catch (MAC) of a species means the maximum tonnage that may be caught in a year as fixed by the Federal Fishery Council according to the Maximum Sustainable Profitability and economic and social considerations of the fishery sector. The Maximum Allowable Catch (MAC) may be reviewed on the grounds of resource preservation reasons.

ARTICLE 10. For the purpose of the provisions of section 22 of Law N°24922, the activities involving research, profitability and preservation of live marine resources carried out in areas adjoining the Argentine EEZ will be subject to the exercise of the rights, the fulfillment of the duties and the protection of the interests of the Republic of Argentina in the terms of Law N°24543 which approves the 1982 United Nations Convention on Sea Rights and other international law standards approved by the Republic of Argentina.

CHAPTER IV - Fishery Regime

ARTICLE 11. The Application Authority will establish the formalities to be met in order to obtain the qualifications provided in section 23 of Law N°24922 and the conditions for the development of the activities.

The Federal Fishery Council will determine the fee payable upon the presentation of the projects.

ARTICLE 12. Vessel qualifications and Individual Catch Quotas (ICC) as well as catch authorizations will be subject to:

- a. The Maximum Sustainable Profitability (MSP) of the resources.
- b. The condition, abundance and availability of the resources allowing to grant an ICC or a catch authorization.
- c. Other conditions as provided by the Federal Fishery Council.

ARTICLE 13. The holders of qualifications, as provided in section 23 of Law N°24922, ICC's and catch authorizations will develop their activities in accordance with the conditions fixed at the time they are granted. The failure to comply with any of the obligations may give lieu to the revocation of the qualification, notwithstanding the

application of the other penalties that might correspond pursuant to the provisions of Law N°24922 and its regulatory standards.

ARTICLE 14. The persons referred to in section 24 of Law N°24922 and/or the entities resulting from their association, will only be qualified to engage in fishery after they have been registered with the Fishery Registry created under section 41 of Law N°24922 as fishery permit holders and provided they have been granted, as applicable, an ICC or catch authorization. The failure to comply with these obligations will be penalized as provided in section 51 and concurrent provisions of the mentioned law.

ARTICLE 15. The Application Authority will issue the necessary rules to:

a. ensure the fulfillment of the obligation to unload fishery products in Argentine ports and coordinate, with the competent authorities, the necessary measures to guarantee their proper control;

b. establish the conditions in which transshipments may be authorized in Argentine ports or qualified areas, being able in such cases to fix a fee for such concept;

The Application Authority will determine the areas allowed for transshipments in cases where the occupation of harbor facilities and/or the non availability of wharf space may so require;

c. establish the conditions to authorize unloading in foreign harbors or qualified areas, in the event of duly evidenced force majeure or in the case of vessels authorized to operate offshore and/or on international waters, as coordinated with the competent organisms.

ARTICLE 16. The General Customs Administration (*Dirección General de Aduanas*) of the Federal Administration of Public Income (*Administración Federal de Ingresos Públicos*) reporting to the Ministry of Economy and Public Works and Services, will, with the participation of the Application Authority and within sixty (60) calendar days counted as from the effective date of this decree, issue the necessary rules to carry out the control it has to exercise in connection with the transshipment of fishery products in qualified areas and their unloading in foreign harbors.

SECTION I - Permits and vessel activities

ARTICLE 17. For the purposes established in section 22 of Law N°24.922, the fishing permits and temporary fishing permits mean fishing pools access authorizations granted to fishing vessels as provided in section 28, first paragraph of the mentioned law.

The Application Authority will determine the formalities and conditions to obtain such qualifications.

ARTICLE 18. The catch products obtained by Argentine flag fishing vessels offshore and/or on international waters will be deemed of national origin for the purpose of their commercialization in local and international markets, and to all effects they will be subject to the legislation in force.

ARTICLE 19. The authorization to unload fishery products in foreign harbors will be requested to the competent Argentine authorities seven (7) business days prior to the arrival of the vessel at the harbor, in accordance with the regulations established by the Application Authority and the customs authorities.

ARTICLE 20. The activities of Argentine flag fishing vessels having offshore permits and the products obtained from such activities will be subject to the fulfillment of the preservation standards applicable in the area of operation. Likewise, they will be subject to the national legislation in force in the field of taxation, on board labor, health, prevention and penalties.

SECTION II - Catch Quotas

ARTICLE 21. The species subject to the catch quota regime will be managed by Individual Catch Quotas (ICC).

Individual Catch Quota (ICC) will mean a percentage of the Maximum Allowable Catch (MAC) assigned to the fishing permit holders, after the reserves provided in Chapter V, section 9, subsection k) and Chapter VIII, section 27, last paragraph, of Law N°24922 have been made.

ARTICLE 22. Only such persons as are registered with the Fishery Registry as fishing permit holders and meet all other conditions and requirements established by the Federal Fishery Council to that end, will be entitled to be ICC holders.

SECTION III - Permit transfers and vessel replacement

ARTICLE 23. Fishing permit transfers will only be allowed when the following conditions have been met:

- a. The permit is in good standing and its holder is registered with the Fishery Registry.
- b. Any of the events provided in section 30 of Law N°24922 occurs.
- c. The vessel will not have remained inactive for one hundred and eighty (180) calendar days or more without justification, pursuant to the provisions established by the Federal Fishery Council.
- d. Neither the assignor nor the assignee will have been adjudicated a bankrupt.
- e. The parties will have evidenced the fulfillment of their tax and social security obligations.
- f. Other requirements established by the Application Authority will have been met.

ARTICLE 24. The transfer of fishing permits between vessels of the same company or holding will be conditioned to their not causing or producing an increase in the fishery efforts.

ARTICLE 25. To transfer the ownership of a vessel having a fishing permit, ship-husbands and/or ship-owners must request the prior authorization of the Application Authority so that it will verify that the transferee meets the conditions and requirements required from the owner.

Upon the owner's request, the Application Authority will issue a certificate recording the fishing permit conditions, the obligations pending fulfillment and the existence of pending summary proceedings for infringements to the fishery legislation.

The transferee will jointly and severally assume the obligations arising from the fishery legislation to be fulfilled by the owner in respect of the vessel being transferred.

The Application Authority will determine the formalities to be met by the corresponding application and the supplementary documentation to be filed.

ARTICLE 26. To determine the useful life of a fishing vessel in the terms of section 30 of Law N°24922, the Application Authority will take into account technological and economic efficiency criteria.

ARTICLE 27. The transfer of fishing permits and vessels with fishing permits will only take effect after their approval by the Application Authority and their notation on the Fishery Registry.

ARTICLE 28. Once the transfer of a fishing permit has been authorized the replaced unit will be automatically deleted as fishing vessel and the new vessel recorded on the Fishery Registry.

For such purpose the Application Authority will serve notice to the Argentine Navy Prefecture reporting to the Ministry of Interior.

SECTION IV - Control and Surveillance

ARTICLE 29. For the purpose of the provisions of section 31 of Law N°24922, the competent health control organisms will agree with the Application Authority the rules intended to establish the time, place, manner and other requirements for the sanitary control of the fishery products. The competent organisms will agree with the Application Authority the rules that will govern fishery products carriage and transit and the respective documentation.

ARTICLE 30. The Application Authority will issue rules concerning the catch affidavits – such as fishing and production reports – referred to in section 32 of Law N°24922, and those necessary to ensure their fulfillment.

The national and provincial organisms will provide all the necessary information and cooperation for the Application Authority to instrument the control and data exchange systems, as well as the verification of the accuracy of the affidavits filed to them.

ARTICLE 31. The ship-husbands and ship-owners of fishing vessels, exclusively, will bear the cost of the satellite equipment required by the Application Authority, as well as the expenses incurred in their installation and maintenance.

ARTICLE 32. The person liable for any foreign flag fishing vessel who intends to enter sea spaces under Argentine jurisdiction or in waters over which the Republic of Argentina has sovereign rights to marine live resources, without the fishing permit or authorization issued by the Application Authority, will previously inform the Undersecretariat of Fisheries of the Department of Agriculture, Livestock, Fishery and Food reporting to the Ministry of Economy and Public Works and Services about her location and declare the catch and the fishery products on board. As long as she stays in these waters, the fishing gears and arts will be stowed.

ARTICLE 33. The Application Authority, through the competent organisms will have power to carry out inspections and verify the declared cargo, and to order its transportation to a harbor if any alleged infringement to the laws and regulations of the Republic of Argentina is found.

ARTICLE 34. The Federal Fishery Council will determine the conditions, formalities and documentation to be filed for the approval of fishing projects which have the

participation of foreign flag bareboat charters, for the commercial exploitation of under-exploited or non exploited species. Fishery products resulting from their activity will be deemed of national origin.

CHAPTER V – Crew

ARTICLE 35. The ship-husband of a fishing vessel is the person liable for the fulfillment of the obligations referred to in subsections a) and b) of section 40 of Law N°24.922, this decree and the regulations to be issued there under. The failure to comply with such obligations will cause the ship-husband to be subject to the penalties provided in section 51 and concurrent provisions of the mentioned law.

ARTICLE 36. The Application Authority through the National Administration of Fishery and Aquiculture of the Undersecretariat of Fisheries of the Department of Agriculture, Livestock, Fishery and Food reporting to the Ministry of Economy and Public Works and Services, at the request of the ship-husband, may exceptionally authorize foreign crew to be on board where there is no Argentine crew available, as provided by the Federal Fishery Council.

ARTICLE 37. Legally organized unions of workers who serve on board fishing vessels, must furnish to the Undersecretariat of Fisheries of the Department of Agriculture, Livestock, Fishery and Food on fortnight basis, the list broken down by task type, vessel type and harbor of crew members, both national and foreigners with over a ten (10) year duly evidenced permanent residence in the country, who are duly qualified and available to embark.

The Application Authority, through the Undersecretariat of Fisheries of the Department of Agriculture, Livestock, Fishery and Food will instruct the Argentine Navy Prefecture reporting to the Ministry of Interior, not to authorize the departure for fishing of vessels the crew of which fails to comply with the required legal and regulatory conditions and to see the entries on the Crew Enrolment Book for compliance with such obligations.

CHAPTER VI - National Fishery Fund

ARTICLE 38. The Application Authority will issue the necessary rules to receive the sums that for any concept are payable to the National Fishery Fund as well as the amounts payable on account of transfer fees, as provided in section 27, last part, of Law N°24922.

ARTICLE 39. The fishing authorizations provided in Chapter III, section 23, subsection d) of Law N°24922 for scientific or technical research purposes will be subject to the payment of a fee, in such form and manner as determined by the Application Authority, according to the resolution of the Federal Fishery Council.

ARTICLE 40. After the expiration of the term fixed for the payment of fees, duties, royalties and other obligations referred to in the foregoing sections, the Application Authority will demand the payment thereof within ten (10) days after the receipt of notice.

If upon the expiration of this term the corresponding payment has not been made, the Application Authority will issue a debt certificate and it will commence fiscal

enforcement proceedings according to Book III, Title III, Chapter II, Section IV of the National Code of Procedure in Civil and Commercial Matters.

The resolution providing for the commencement of debt enforcement proceedings will also establish the automatic suspension of the liable party in the Fishery Registry. This resolution will stand in force until the debt and its accessories have been fully settled.

ARTICLE 41. When the aforesaid suspension has been provided, the Application Authority will give notice of the resolution to the Argentine Coastguard reporting to the Ministry of Interior in order to avoid the departure for fishing purposes of the vessel(s) involved.

CHAPTER VII - Infringements and Penalties

SECTION I - Foreign flag vessels

ARTICLE 42. When an order has been given for the detention of a foreign vessel in a harbor, the ship-husband will bear all the expenses incurred in her towing and laydays as well as the preservation of the vessel and the cargo in the holds.

The guarantee referred to in the last paragraph of section 54 of Law N°24922 will cover both the fine and all expenses mentioned in the preceding paragraph.

ARTICLE 43. The Application Authority will determine the proceedings to be followed to seize the vessel, the obtained harvest and the fishing gears and arts and for their subsequent auction.

SECTION II - Application of Penalties

ARTICLE 44. If an infringement as referred to in section 49 of Law N°24922 is found to have been purportedly committed, the Application Authority will order the commencement of the proper summary proceedings to investigate the alleged infringement, determine the liable party(ies) and apply the corresponding penalties.

The Application Authority may delegate to the National Administration of Fishery and Aquiculture of the Undersecretariat of Fisheries of the Department of Agriculture, Livestock, Fishery and Food reporting to the Ministry of Economy and Public Works and Services, the commencement of the summary proceedings in respect of the persons liable for the Argentine flag vessels.

ARTICLE 45. Once the summary proceedings have been ordered, notice will be given to the party allegedly responsible for the infringement, so that within ten (10) business days after notice, such party may file a defense and evidence inherent to his rights and establish special domicile within the Federal Capital.

ARTICLE 46. The authority ordering the summary proceedings will admit the pieces of evidence deemed appropriate or it may dismiss them on reasonable grounds. Likewise, said authority will order the filing of the proper evidence in a term to be determined by it.

ARTICLE 47. Upon the expiration of the term to accept or dismiss the evidence, the authority will, in a thirty (30) calendar day term, issue the final report, advising the penalty to be applied or the acquittal and, along with a draft resolution, it will file the

report to the Application Authority with the intervention of the competent legal services.

ARTICLE 48. Once the resolution to terminate the summary proceedings has been issued, it will be notified to the responsible parties who may bring against it the motions provided in section 59 of Law N° 24922.

ARTICLE 49. The National Law of Administrative Proceedings N° 19549, its amendments and the Administrative Proceedings Regulations approved by Decree N°1759 dated April 3, 1972, as restated in 1991 will be suppletorily applied in the summary and administrative motion proceedings mentioned above.

ARTICLE 50. The proceedings mentioned in the foregoing sections will be applicable when the Application Authority orders the commencement of summary proceedings instructed by the Argentine Navy Prefecture reporting to the Ministry of Interior, against parties liable for foreign flag vessels.

SECTION III - Actions

ARTICLE 51. The payment of the fines imposed under section 51 of Law N°24922 will be made within ten (10) business days from the notification of the penalty resolution.

ARTICLE 52. If the term fixed in the previous section expires and the corresponding amount has not been paid, its collection will be enforced.

When the penalties condemning to the payment of the fine are final in administrative forums, a debt certificate will be issued as provided in section 65 of Law N°24922 and the collection will be made in accordance with the proceedings set forth in Book III, Title III, Chapter III, Section IV of the National Code of Procedure in Civil and Commercial Matters.

ARTICLE 53. The deposit payable before filing the appeal with the National Court of Appeal in the Federal Capital (Camara Nacional de Apelaciones en lo Contencioso Administrativo de la Capital Federal) may be replaced by any of the guaranties established in section 57 of this decree.

ARTICLE 54. The Application Authority will order the suspension of the departure for fishing of any infringing vessel until the payment of the imposed fine has been made, provided it is enforceable.

ARTICLE 55. The Application Authority will note down on the Fishery Registry the penalties for infringements to the fishery legislation in force, as provided in section 7, subsection h) of Law N°24922.

CHAPTER VIII - Guarantees

ARTICLE 56. The Application Authority will generally determine the cases in which a guarantee will be required in order to obtain an authorization to engage in the activities regulated under Law N°24922 and this decree.

The guarantee amount will be fixed by the Application Authority according to the activity involved, the fine amount and the owed duties, royalties or fees, plus interest and accessories, as applicable.

ARTICLE 57. The interested parties may select any of the following forms of guarantee, to the satisfaction of the Application Authority:

- a. Cash deposit
- b. Deposit of public debt bonds
- c. Banking guarantee
- d. Guarantee insurance
- e. Insurance bond
- f. Other guarantees authorized by the Application Authority.

CHAPTER IX - Supplementary and Transitory Provisions

ARTICLE 58. The Department of Agriculture, Livestock, Fishery and Food reporting to the Ministry of Economy and Public Works and Services, in a term of not more than forty five (45) calendar days counted as from the effective date hereof, will file a draft structure for the organization of its jurisdiction in order to adapt it to the powers assigned under Law N°24922 and its regulatory standards.

ARTICLE 59. The Department of Agriculture, Livestock, Fishery and Food may delegate to the Undersecretariat of Fisheries the exercise of the powers deemed necessary for the best fulfillment of its duties.

ARTICLE 60. The provisions of Law N°20489 which governs the Scientific and Technical Research of the Live Sea Resources are applicable except for the provisions referring to the marine live resources. The scientific and technical research projects concerning these resources will be governed by law N° 24922, this decree and the rules issued accordingly.

ARTICLE 61. Decree N°2236 dated October 24/91 and sections 13 and 14 of Chapter II of Decree N°343 dated April 16/97 are hereby repealed.

ARTICLE 62. This decree will become effective on the day next following its publication in the Official Gazette.

ARTICLE 63. Be its notified, published, given to the National Administration of the Official Registry and filed. MENEM. Jorge A. Rodríguez. Roque B. Fernández.
Date published: July 19/99.

APPENDIX IV

CAIPA - RESUMEN EJECUTIVO

FUNDAMENTO DE LA PRESENTACIÓN

Al tomar conocimiento del inicio del proceso de evaluación independiente de la pesquería de vieira patagónica en la plataforma argentina bajo los estándares del MSC creímos necesarios presentarnos como parte interesada a efectos de aportar nuestra posición y parecer al respecto.

Habiendo realizado nuestra propia evaluación del actual estado de la pesquería (del cual se adjunta un breve informe) no podemos mas que concluir que la pesquería de vieira patagónica no cumple con los Principios y Criterios del Marine Stewardship Council (MSC) para Pesca Sustentable.

Una pesquería sustentable se define, para el propósito de la Certificación MSC como aquella que es conducida de forma tal que, entre otros objetivos sea gestionada y operada de forma responsable, en conformidad con leyes y regulaciones locales, nacionales e internacionales.

Por otra parte en la consulta de expertos sobre la elaboración de directrices internacionales para el ecoetiquetado de productos pesqueros de captura marina, se elaboro un proyecto de directrices entre el 19 y 22 de octubre de 2004 en Roma (Italia) que entre otras cuestiones señalan que los principios que deberían aplicarse a los sistemas de ecoetiquetado deben:

- ✓ Respetar y cumplir con las leyes y reglamentos pertinentes.
- ✓ Ser transparentes.
- ✓ No ser discriminatorios, no crear obstáculos al comercio y asegurar una competencia leal.

Es por ello que entendemos que siendo que en la Pesquería de Vieira Patagónica no se observa el cumplimiento de estos principios como unidad de manejo, mal puede considerarse el sistema como apto para su evaluación. Objetivamente no existe competencia leal ni transparencia en la explotación de dicho recurso ya que el mismo se encuentra reservado de manera monopólico a dos empresas que se han transformado en dueñas del recurso, agravado ello por una ausencia total de un plan de manejo razonable que permita cumplir minimamente con el Principio 3 que se detalla a continuación:

La pesquería debe estar sujeta a un sistema efectivo que respeta leyes y estándares locales, nacionales e internacionales e incorporar marcos institucionales y operacionales que requieran el uso responsable y sustentable del recurso.

Esto resulta claramente vulnerado por la falta de un plan de manejo, lo cual se encuentra agravado por la denuncia del plan de manejo anterior, el cual no respeto la vigencia de la Ley 24.922 (Ley Federal de Pesca) y que motivo por parte de la SAGPyA elevar las actuaciones a la Oficina Anticorrupción.

Con fecha 8 de agosto de 2005 el CFP dicta la Resolución 4/2005 que establece algunas medidas de Manejo para la Vieira Patagónica. En líneas generales estos lineamientos resultan similares a los establecidos en la Disp. (SSP) 17/99 el cual determinaba un plan de manejo que genero oportunamente su derogación habida cuenta de que la misma no contemplaba las normas de la Ley 24.922 relativa al otorgamiento de permisos de pesca y de las cuotas de captura.

En este sentido si bien la Res. (CFP) 4/2005 fundamenta la exclusividad de la distribución del recurso a solo dos empresas por medio de autorizaciones de captura, esto seria solo posible en el marco de la plena vigencia de un régimen de administración pesquera basado en la asignación de cuotas de captura. No resulta jurídicamente aceptable ordenar las pesquerías en base a autorizaciones de captura evitando de esta manera aplicar el Régimen de pesca establecido por la Ley. Por otra parte y de acuerdo a lo establecido en el art. 27 (L.24.922) las cuotas de captura, como Régimen de Pesca elegido por la Ley, serán concesiones temporales que serán instrumentados de manera tal **de evitar concentraciones monopólicas**, situación que las medias de manejo actual no solo no contempla sino que por el contrario lo favorece.

En este marco esta forma de administración del pesquería resulta claramente violatorio de los derechos adquiridos por los buques que cuenta con permisos irrestrictos , que por medio de planes de manejo que no cumplen las disposiciones emanadas de la Ley, excluyen a los mismo de las pesquerías a las cuales tienen pleno derecho.

VIEIRA PATAGÓNICA (*Zygochlamys patagónica*)

Descripción de la especie.

Este molusco bivalvo se distribuye desde Tierra del Fuego hasta los 35° S, se lo encuentra a profundidades de entre 40 y 200 metros. Las concentraciones más importantes, denominadas bancos se localizan entre 39° 30' S y 42° 30' S entre profundidades de 80 y 120 metros. Se encuentran bajo la influencia del frente de talud conformado por la convergencia de las corrientes de Malvinas y Brasil. La especie es dioica con dos pulsos de reproducción, en primavera y a fines del verano. Las larvas son planctónicas hasta el momento del reclutamiento en el fondo para luego continuar bajo condiciones de vida sésil. Tiene una longevidad de entre ocho a 10 años, la talla mínima de captura (55 mm de alto total) es alcanzada entre los tres a cinco años, dependiendo la misma de la latitud. La talla máxima registrada es de 91 milímetros de alto total. Las densidades máximas detectadas fluctúan entre 0,21 y 0,23 kg./m² (ver Ciocco et al., 1998).

Antecedentes de la Pesquería

Se trata de una pesquería relativamente joven (se inicia en 1996), con pocos participantes; dos empresas extranjeras con cuatros buques que tienen el acceso exclusivo (los buques luego se redujeron a tres).

La vieira comenzó a ser explorada en 1994, luego de que la empresa Wanchese le ofreciera al Instituto Nacional de Investigación y Desarrollo Pesquero (Inidep) iniciar

investigaciones para determinar si existía la posibilidad de realizar una pesca económica y biológicamente viable.

Los resultados fueron aceptables y desde el año siguiente el tonelaje de capturas fue en constante aumento. Según datos oficiales, en el primer año se pescaron alrededor de 1800 toneladas; en 1996 más de 3 mil; en el 2000 se llegó a las 5.112 y el año 2002 se batieron todos los récords: hubo 6.325 toneladas, resultando el último año (2004) unas 5.890 toneladas.

Características de la Pesquería

La pesquería esta basada en la distribución de la CMP entre las dos empresas existentes a la fecha. Es decir que funciona mediante cuotas individuales por empresa. La flota se caracteriza por ser buques factorías denominados “scallopers” que utilizan redes de arrastre de fondo. Las restricciones internacionales sobre este tipo de pesquerías han favorecido la demanda y el valor de esta especie. El valor de primera venta (exportación) oscila entre 3.000 y 5.000 U\$S la tonelada de callo (esto represento U\$S 25.029.623 de valor exportable de enero a noviembre de 2004).

Existe una Comisión de Seguimiento del plan de manejo, donde participan; la parte científico - tecnológica (INIDEP), la Autoridad Nacional de Aplicación y las dos empresas (una de Canadá y otra de EEUU). Reconociendo las características sésiles del recurso, la base del manejo de esta especie es la rotación de áreas en función del disturbio por pesca y por banco. Los criterios de extracción de una cierta cantidad de biomasa, tienen en este sistema de manejo, un papel secundario. El Proyecto Vieira del INIDEP establece niveles de cosecha en función de porcentaje de barrido por banco o área de captura realizada por cada buque, de esta forma, cada banco con una superficie determinada, es sometido a un esfuerzo de pesca (o barrido) igualmente proporcional a las cuotas que cada empresa posee.

Para cada banco se establecen dos factores condicionantes: nivel de cosecha y área barrida. Para el primero, se ha sugerido la extracción del 40 % de la biomasa de ejemplares de talla comercial. Para el segundo, se permite ejercer un esfuerzo pesquero acorde con la superficie de dicha área barrida. Este nivel resulta tentativo y factible de cambio en función de conocer la incidencia del disturbio sobre el reclutamiento y la composición de la comunidad. Tanto para uno u otro caso, se ha planteado implementar el esquema de rotación de área o banco una vez que se llega al nivel limite establecido. Se han establecido dos unidades de manejo integrada por diferentes bancos. Hacia el norte se encuentra la Unidad Norte de Manejo (bancos San Blas, Reclutas y MdQ), encontrándose los dos últimos bancos dentro de la Zona Común de Pesca (ZCP) Argentino – Uruguay. Hacia el sur se ubica la Unidad Sur de Manejo (bancos SAO, SWSAO, Valdés, Tango B y SW-Tango B). Para 1999 se estimó para los bancos prospectados en ésta Unidad, una biomasa de 131.800 toneladas considerando todas las tallas y de 96.000 toneladas considerando únicamente la talla comercial.

Pesquero ésta es la cifra límite de embarcaciones que por ahora podrían operar en el Mar Argentino. Según creen, dar más permisos significaría abrirle la puerta a la depredación.

El año 2002, el 76% de las capturas fueron desembarcadas en la ciudad donde -según se estima- existen alrededor de 200 personas trabajando directamente en el sector. El 24% restante de los desembarcos llegó a tierra a través del puerto de Ushuaia.

En el caso de Glaciar, sus principal compradores son Francia y Canadá a los que -según difundió la empresa- el año 2002 les vendió su producción por 20 millones de dólares.

En el caso de Glaciar, el procesamiento del recurso se realiza a bordo de los buques, donde los callos son clasificados por tamaño y se los congela individualmente.

Por su parte Wanchese tiene un grado menor de elaboración ya que no clasifica las capturas por tamaños y sólo las congela.

Los principales competidores de la Argentina en el mercado internacional son en estos momentos Perú, Estados Unidos y China, el gran productor y exportador de vieira que ejerce una fuerte incidencia sobre el mercado.

Reseña de la legislación aplicable.

□ Resolución 150/96

El día 19 de marzo de 1996, mediante el entonces Secretario de Agricultura, Pesca y Alimentación Felipe Sola, dicta la Resolución 150/96 autorizando la captura de vieira patagónica (*Zygochlamys patagónica*). En la misma autoriza su captura exclusivamente a aquellos buques en cuyos planes de captura este incluida dicha especie. Asimismo establece áreas de exclusión de la actividad pesquera para la citada especie y encomienda a la Subsecretaria de Pesca la elaboración de un Plan de Manejo para la vieira patagónica, el cual tendría una duración de cuatro (4) años, prorrogable por uno (1) mas. El mismo contendría medidas transitorias de administración las que serian ajustadas periódicamente en función de los datos que se obtuvieran a partir de las tareas de investigación desarrollados y de los valores de captura y esfuerzo pesquero de la flota comercial.

□ Disposición 17/99

Con fecha 17 de marzo de 1999 el Subsecretario de Pesca Sr. Eduardo Auguste emitió la Disposición 17/99 el cual establecía el plan de manejo de la especie Vieira Patagónica por un periodo determinado. Dicho plan reconoce dos unidades de manejo las que integran diferentes bancos. Hacia el norte de la latitud 39° 30'S se establece la unidad norte de manejo, donde se localizan los bancos Reclutas y MdQ. Estos bancos se encuentran en el sector argentino de la Zona Común de Pesca Argentino – Uruguay. Hacia el sur de la latitud 39° 30'S se establece la unidad sur de manejo, donde se localizan los bancos San Blas, SAO, SWSAO, Valdés, Tango B y SW-Tango B.

La mencionada disposición fija los siguientes aspectos: se establece un plan de manejo de la especie vieira patagónica por un periodo de cuatro años a partir del dictado de la

misma. Dicho plazo podrá ser prorrogado por un año más, si la situación del recurso así lo hiciera aconsejable, de acuerdo con los informes presentados por el INIDEP.

La captura se realizará durante todo el año calendario, pudiendo la autoridad de aplicación establecer vedas temporales por zonas, cuando los informes científicos así lo aconsejen.

Se crea en el ámbito del INIDEP una comisión de seguimiento conformada por un representante de citado organismo, un representante de la Dirección Nacional de Pesca y Acuicultura y un representante de cada una de las empresas dedicadas a la captura de la especie, a efectos de evaluar el estado del recurso y de las capturas, proponer acciones y determinar las necesidades que pudieran producirse en relación a la explotación del recurso por parte de los buques pesqueros.

La captura máxima permisible de la especie será determinada en forma anual por el Consejo Federal Pesquero de acuerdo con los parámetros sugeridos por el INIDEP, discriminándose en dos unidades de manejo al norte y al sur del paralelo 39°S. La captura máxima permisible se establecerá en toneladas de captura bruta y con relación a los bancos preexistentes. En el supuesto que durante un año se descubriera un nuevo banco, lo que se produzca en el mismo no será descontado de la captura máxima permisible, durante ese año. El INIDEP determinará anualmente las dimensiones y las coordenadas de cada banco, a efectos de poder precisar fehacientemente los bancos incluidos en la captura máxima permisible.

Cada buque con permiso de pesca para la especie vieira patagónica deberá disponer de veinte días anuales para tareas de investigación, la que se llevará a cabo con la dirección del INIDEP, con el personal que éste designe y en las condiciones que determine. El costo de la investigación estará a cargo de las empresas armadoras.

Cada buque deberá contar con un o por el INIDEP al menos en el cincuenta por ciento de los viajes de pesca, salvo que dicho organismo por razones fundadas determine una frecuencia menor.

La captura máxima permisible determinada para cada año será distribuida en forma exclusiva entre las dos empresas poseedoras de permisos de pesca. Inicialmente se otorgará a cada una de ellas el treinta y cinco por ciento de la misma. El treinta por ciento restante será asignado por la Subsecretaría de Pesca en forma total o parcial, equitativamente y de acuerdo con las necesidades de cada empresa y por el resto del año que se trata.

El otorgamiento de nuevos permisos de pesca sólo será considerado una vez finalizado el periodo previsto por el plan de manejo y se evaluará tal posibilidad de acuerdo a los informes presentados por el INIDEP.

Las infracciones a la Disposición 17/99 SAGPyA serán sancionadas de conformidad con lo establecido por la Ley N° 24.922.

□ Resolución 829/99

Con fecha 7 de diciembre de 1999 la SAGPyA emite con firma del Sr. Ricardo J. Novo la Resolución 829/99 Ratificando la Disposición N° 17/99 de la Subsecretaria de Pesca, con pequeñas modificaciones a la misma.

□ Resolución 107/2001

El Sr. Antonio T. Berhongaray (SAGPyA) en fecha 16 de febrero de 2001 emitió la Resolución 107/2001 que deroga la Resolución N° 829/99-SAGPA y la Disposición N° 17/99-SSP relacionadas con un plan de manejo de la vieira, instruyendo a la Dirección

Nacional de Pesca y Acuicultura de esta Secretaría, para que dentro de los treinta días de la presente elabore un plan de manejo para la consideración del suscripto. Por último remite copia de las actuaciones vinculadas a la OFICINA ANTICORRUPCIÓN a los efectos que hubiere lugar. Fundamenta esta decisión en la consideración que extralimitándose en la función encomendada por la Resolución N° 150/96 y en sus propias atribuciones, la ex Subsecretaria de Pesca dicta la Disposición 17/99, la cual a su vez fue ratificada por Resolución 829/99, modificando a su vez los artículos 6° y 8°. Que por otra parte la resolución 829/99 fue dictada con posterioridad a la vigencia de la ley 24.922 y de su Dto. Reglamentario 748 del 14 de julio de 1999, no teniendo en cuenta las normas de la Ley Federal de Pesca y de su reglamentación relativas al otorgamiento de permisos de pesca y de las cuotas de captura.

- Resolución (CFP) 4/2005 – Medias de Manejo.

Informe Técnico del INIDEP 12/05

Científicos del Instituto Nacional de Investigación y Desarrollo Pesquero recomiendan mantener y no incrementar la capacidad pesquera de la flota que opera sobre la vieira patagónica.

Así lo indica el Informe Técnico 12/05 que llegó la semana pasada al Consejo Federal Pesquero y que reseña el funcionamiento de la flota, captura y desembarco de callo durante el 2004, año en el que se desembarcaron 5.890 toneladas de callo de vieira, sobre un total de 42.065 toneladas de vieira entera de talla comercial.

La flota habilitada para operar sobre el recurso se compone de los buques pesqueros Erin Bruce y Mister Big (Wanchese) y Atlantic Surf I y Atlantic Surf III (Glaciar Pesquera), los cuales generaron estos niveles de captura, sensiblemente menores a los registrados en el 2003, cuando se desembarcaron 6.018 toneladas de callo, y que se caracterizaron por tener una mayor presencia de Observadores, puesto que las mareas con ellos a bordo alcanzaron el 67,8% del total, el mayor valor en los 9 años de la pesquería.

Según señala el estudio, el año pasado se realizaron 34 mareas completas y 5 fraccionadas. La flota totalizó 1.138 días de mareas, con 901,5 días en tareas de pesca, con un área de barrida total que ascendió a los 1.957 Km².

La pesquería de vieira patagónica tiene dos unidades de manejo, la Norte y la Sur. En la Norte no hubo capturas y en la Sur se habilitaron tres sectores específicos. El INIDEP recomendó en ésta una captura de 20.312 toneladas y la estimada fue de 19.820 toneladas.

De todas formas las capturas de mayor envergadura fueron realizadas fuera de la Unidad Sur de Manejo, específicamente en el Banco de Tres Puntas –en aguas nacionales lindantes al Golfo San Jorge–, con 22.215 toneladas. En el área fuera de la Unidad Norte de Manejo sólo se capturaron 30 toneladas.

La disminución observada de funcionamiento de la flota en cuanto a días de marea y pesca está relacionada al transitorio cese de actividades del buque Erin Bruce, que se hundió en la escollera norte del puerto local hacia finales de octubre.

Los científicos del INIDEP observaron que las capturas “se logran en zonas cada vez más limitadas surgiendo un lógico aumento en la capacidad de localizar y vulnerar el recurso”. En ese sentido indican que “esto es esperable como consecuencia de un mayor conocimiento de la distribución espacial de densidad del recurso por parte de la flota”.

C.P.N. Mariano Emilio Perez
Gerente Ejecutivo
Cámara de la Industria
Pesquera Argentina

EXECUTIVE SUMMARY

FOUNDATION OF THE PRESENTATION

When we knew about the beginning of the independent evaluation process for the Patagonian scallop fishery in the Argentine Continental Shelf against the MSC Standard, we believed that to make a presentation as a stakeholder declaring our opinion and position in regard to this matter was necessary.

Once we completed our own evaluation of the current status of the fishery (a brief report is attached to this summary) the most important thing that we could conclude is that the Patagonian scallop fishery does not comply with the MSC Principles and Criteria for Sustainable Fishing.

A sustainable fishery is defined, for MSC Certification purposes, as one which is managed and operated in a responsible way, complying with local, national and international laws and regulations.

On the other hand, during the expert determination of the international guidelines for the ecolabelling of fish and fishery products from marine capture fisheries, conducted between 19 and 22 October 2004 in Rome (Italy), some of the guidelines developed specify that principles applied to ecolabelling systems must:

- ✓ Respect and comply with pertinent laws and regulations.
- ✓ Be transparent.
- ✓ Be non discriminatory, not create obstacles to trade and ensure fair competition.

We think that the Patagonian scallop fishery doesn't comply with this principle as a management unit and therefore it is not suitable for evaluation. Objectively, there is neither fair competition nor transparency in the exploitation of this resource, as currently, there is a monopoly comprised of two fishing companies which have become owners of the resource. This situation is aggravated because of the lack of a reasonable management plan which permits minimal compliance with the Principle 3:

“The fishery is subject to an effective management system that respects local, national and international laws and standards and incorporates institutional and operational frameworks that require use of the resource to be responsible and sustainable.”

This is clearly violated because of the lack of a management plan, aggravated by the denouncement of the last management plan, which didn't respect the validity of the Law 24.922 (Federal Fishing Law). This situation motivated SAGPyA to invite participation of the Anticorruption Office.

Dated 8 August 2005, the FFC passed Resolution 4/2005 which establishes some management measures for the Patagonian scallop. In general, these guidelines are similar to those established by Decree (SSP) 17/99, which determined a management plan that generated its own abolishment because it did not observe the norms of Law 24.922 in relation to the fishing permits and fishing quotas.

In this sense, although the Res. (CFP) 4/2005 establishes the exclusivity of the distribution of the resource, solely to two fishing companies, this should only be possible with a fishing administration regimen based on the allocation of fishing quotas, completely in force. As a consequence, it is legally unacceptable to manage the fisheries based on fishing authorizations avoiding the application of the fishing regimen established by the Law. Besides, and in accord with the Art. 27 (L. 24.922), the fishing authorizations, as a Fishing Regimen adopted by Law, these will be temporary permits which will be arranged in a way to avoid monopolies. This situation is not only contemplated by the current management measures but, on the contrary, favored by them.

In this framework the current administration of the fishery clearly violates the rights acquired by the vessels which have unrestricted fishing permits, excluding them from the fisheries which have rights, through management plans which don't comply with the intentions established by the Law.

PATAGONIAN SCALLOP (*Zygochlamys patagónica*)

Description of the species

This bivalve mollusc is distributed between Tierra del Fuego until 35° S, between depths of 40 and 200 m. The main concentrations, of denominated beds, are located between 39° 30' S and 42° 30' S, between a depth of 80 and 120 m. They are influenced by the Shelfbreak Frontal System resulting from the convergence of the Malvinas and Brazil Currents. The sexes are separate with two reproduction pulses, in spring and late summer. The larvae are planktonic until they settle on the seafloor to continue living as a sessile organism. Their lifespan is between 8 and 10 years, the minimum catch size (55 mm total height) is reached between 3 and 5 years, depending on latitude. The maximum size registered is 91 mm of total height. The maximum densities detected fluctuate between 0,21 and 0,23 kg./m² (see Ciocco et al., 1998).

History of the Fishery

It is a relatively new fishery (it was initiated in 1996), with few participants; two foreign companies with four vessels, which have the exclusivity to fish (later the vessels were reduced to three).

Exploration of the Patagonian scallop began in 1994, after the fishing company Wanchese offered to initiate surveys to determine if there was a possibility to carry out an economically and biologically viable fishery to the Instituto Nacional de Investigación y Desarrollo Pesquero (INIDEP).

The results were acceptable and since the year following, the tonnage of catch increased constantly. Based on official data, in the first year 1800 tonnes were captured; in 1996 more than 3000; in 2000 5112 tonnes and in 2002 the record was reached: 6325 tonnes. The catch achieved in the final year (2004) was 5890 tonnes.

Characteristics of the Fishery

The fishery is based on the distribution of the TAC between the two fishing companies to the present date. This means that it functions through individual quotas for each company. The fleet is characterized by factory vessels named scallopers, which use otter nets. The international restrictions for these kind of fisheries have favored the demand and value of this species. The value of first sale (exportation) is between US\$ 3.000 and 5.000/ tonne of callus (This represented an exportation value of US\$ 25.029.623 between January - November 2004).

An Advisory Commission created for the follow-up of the management plan represented by INIDEP, the Undersecretariat of Fishing and the two fishing companies (one from Canada and the other from the USA) is in place. Recognizing the sessile characteristics of the resource, the basis of the management of this fishery is the rotation of areas depending on the disturbance of fishing by bed. The criteria for extraction of a determined biomass quantity has a secondary role in this management system. The Scallop Project of INIDEP establishes levels of catch for each vessel. In this way each bed with a determined surface, is subject to a fishing effort equally proportional to the quotas which each enterprise has.

For each bed two conditioning factors are established: level of catch and towed area. For the former, an extraction of 40% of the biomass of commercial scallops has been suggested. For the latter, a fishing effort consistent with the surface of the towed area is permitted. This level can be changed depending on the knowledge of the effect of the disturbance on the recruitment and the composition of the community. For one or the other case, the management based on rotation of areas or beds once the established level is reached, is proposed. Two management units integrated by different beds were established. To the north there is the North Management Unit (San Blas, Reclutas and MdQ beds), the latter two are placed within the Argentine-Uruguayan Common Fishing Zone (ZCP in Spanish). To the south there is the South Management Unit (SAO, SWSAO, Valdés, Tango B y SW-Tango B beds). In 1999 biomasses of 131.800 tonnes considering all sizes and 96.000 tonnes considering only the commercial size were estimated for these beds.

experts think that the allocation of more permits could open the door to overexploitation.

In 2002, 76% of catches were landed in Mar del Plata where – as is estimated – nearly 200 people are directly involved with the sector. The other 24% were landed in the port of Ushuaia.

The main international markets for Glaciar are France and Canada who – as declared by the company – paid U\$20 million for the production in 2002.

Glaciar processes the resource on board, where the calluses are classified by size and individually frozen.

Wanchese freezes the product without classification.

The main competitors of Argentina in the international markets are Peru, United States and China. The latter is the main world scallop producer and exporter and has a strong influence on the market.

Legislation

Resolution 150/96

Resolution 150/96 authorizing the capture of Patagonian scallop (*Zygochlamys patagonica*) was released on the 19th of March of 1996, through the Secretary of Agriculture, Fishing and Food, Felipe Sola. This Regulation authorized the vessels which had plans of capture that included fishing the above mentioned species. As well, no-take zones were established and the preparation of a Management Plan for the Patagonian scallop, which would last four (4) years with a extension of one (1) year more was entrusted to the Sub-secretariat of Fisheries. The management plan was to specify provisional administrative measures, which would be periodically adjusted, depending on the data obtained from the research and catches and fishing effort provided by the fleet.

Prescription 17/99

Dated the 17 March 1999 the Subsecretary of Fisheries Sr. Eduardo Auguste released Prescription 17/99 which established the management plan for the Patagonian scallop species for a specified period. This plan recognizes two management areas integrated by different beds. The north management unit is established to the north of 39° 30' south latitude, where the Reclutas and MdQ beds are located. These beds are within the Argentine-Uruguayan Common Fishing Zone. The south management unit is established to the south of 39° 30' south latitude, where the San Blas, SAO, SWSAO, Valdés, Tango B and SW-Tango B beds are located.

This resolution specifies the following aspects: a management plan for the Patagonian scallop for 4 years after the resolution was published. The deadline can be extended by another year, depending on the situation of the resource specified in the INIDEP reports.

The fishing operations are permitted throughout the year, and the Subsecretariat of Fisheries can establish closed seasons by area, when it is advised by scientifically based reports.

An Advisory Commission constituted by one representative from INIDEP, one representative from the National Fishing and Aquaculture Direction and one representative from each fishing company involved in the fishery is in place to evaluate the status of the resource and catches, to propose actions and to determine the necessities related to the exploitation of the resource exerted by the fishing vessels.

The total allowable catch shall be determined annually by the Federal Fishery Council according to the parameters suggested by INIDEP, for each management unit. The total allowable catch will be established in tonnes of entire scallop according to (the existing) beds. In the event that one new bed is discovered, the capture obtained from it during the year will not be discounted from the total allowable catch. INIDEP will determine annually the dimensions and coordinates of each bed, in order to reliably define the beds included in the total allowable catch.

Each vessel with fishing authorization for the Patagonian scallop shall be made available 20 days a year for research activities. INIDEP will carry out these activities, designate the personnel involved and determine the conditions. The costs will be a charge against the fishing companies.

Each vessel must have an INIDEP observer on board for at least 50% of the fishing trips, unless INIDEP determines that a lower frequency of crewing with On Board Observers is possible.

The total allowable catch determined by year will be exclusively distributed between the two companies holding fishing permits. Initially, the 35% will be allocated to each company. The remaining 30% will be assigned by the Undersecretariat of Fisheries totally or partially, equitably and according to the necessities of each company.

The allocation of new fishing authorizations will only be considered once the period established by the management plan is finalized, and the possibilities will be evaluated based on the INIDEP reports.

The infractions to Resolution 17/99 SAGPyA will be sanctioned according to the specifications of Law N° 24.922.

Resolution 829/99

SAGPyA released Resolution 829/99 dated on 7 December 1999 and signed by Sr. Ricardo J. Novo ratifying Prescription N° 17/99 of the Undersecretariat of Fisheries, with few modifications.

Resolution 107/2001

Mr. Antonio T. Berhongaray (SAGPyA) released Resolution 107/2001 dated on 16 February 2001, which abolishes Resolution N° 829/99-SAGPA and Prescription N° 17/99-SSP, both related to a management plan for scallops, specifying the National Fishing and Aquaculture Direction that will elaborate a management action within 30 days. Finally, copies of the associated actions were sent to the ANTICORRUPTION OFFICE. This decision was promulgated in the event that the ex-Subsecretariat of Fisheries went too far in its function entrusted by Resolution N° 150/96 and by its own responsibility, dictated in Prescription 17/99, which was ratified by Resolution 829/99, modifying articles 6° and 8°. On the other side, Resolution 829/99 was decided after the validity of the Law 24.922 and its Complementary Decree 748 dated on 14 July

1999, without consideration of the norms established by Federal Fishing Law and its regulations relating to the allocation of fishing authorizations and quotas. Resolution (FFC) 4/2005 – Management Measures.

Resolution (FFC) 4/2005 – Management Measures

INIDEP Technical Report 12/05

Scientists of the Instituto Nacional de Investigación y Desarrollo Pesquero recommend to maintain and not increase the fishing capacity of the fleet operating on Patagonian scallop.

This is indicated in INIDEP Technical Report 12/05, which was sent to the Federal Fishery Council last week, detailing the functioning of the fleet, captures and landings of callus during 2004, when 5.890 tonnes of muscles (callus) were landed, from a total capture of 42.065 tonnes of entire commercial scallops.

The fleet authorized to operate on the resource is composed by the fishing vessels named; Erin Bruce and Mister Big (Wanchese) and Atlantic Surf I and Atlantic Surf III (Glaciar Pesquera), which generated these levels of capture, slightly lower than in 2003, when 6.018 tonnes of muscle was landed, and was characterized by a higher presence of observers with 67,8% coverage, which is the highest value since the beginning of the fishery.

According to this study, 34 complete and 5 fractioned surveys were carried out last year. The fleet totaled 1.138 days at sea, with 901.5 fishing days, and a total towed area of 1.957 Km².

The Patagonian scallop fishery has two management units, North and South. In the North Unit there was no capture and in the South Unit three specific sectors were opened. INIDEP recommended 20.312 tonnes of capture in this unit and 19.820 tonnes of capture was estimated.

The highest captures were obtained outside the South Management Unit, specifically in Tres Puntas Bed – in national waters near the Golfo San Jorge – (22.215 tonnes). In the North Management Unit only 30 tonnes were fished.

The reduction of the functional fleet in regard to days at sea and fishing days is related to the temporary cessation of activities of the Erin Bruce, which sunk in port, last October.

INIDEP scientists observed that the catches “are obtained in areas increasingly delimited with a logical improvement in the capacity to localize and exploit the resource”. In this sense they indicate that “this is expected as a consequence of an increment in the knowledge of the spatial distribution of density of the resource on behalf of the fleet”.

APPENDIX V

PEER REVIEWERS COMMENTS ON PATAGONIAN SCALLOP FISHERY

PEER REVIEWER 1

General Comments

Overall, this report provides an accurate description and summary of the information related to the Patagonian scallop, their fishery and the background environmental information. I have not found inconsistencies with the scientific literature, and I believe that most issues have been adequately covered in this report. I fully agree with the certification outcome. The following are just a few comments on the content.

Comments in relation to Conditions and Recommendations

General comments

This section is very important, to a large extent because it is the place where the Assessment Team uses their very valuable expertise and experience to suggest how to improve the sustainability of the fishery. Thus, I have no doubts that their comments will set an important part of the scientific agenda for the next years in relation to this resource. However given this importance, I suggest that a paragraph clearly explaining their purpose/objective be added to each Recommendation. In particular, describing how it may help in the management of this fishery.

Particular comments

Condition 4: This Required Action is not very clear for me. It is well known that in this type of resource (benthic, sedentary species) individual fecundity is often not related with recruitment intensity (or just reproductive success). I agree that there should be some kind of average stock-recruitment relationship, but the high variance of this relationship make it not very useful to use the values of individual fecundity. This is because, independently of the gamete output of each individual, other factors such as density (here, distance from their reproductive partners) are more important. I therefore recommend exploring the value of high/low density patches (as surrogated of individual density) in predicting reproductive success.

Performance Indicator 1.1.1.3.

Recommendation: Given the time span (4 years), and the possibility of not having new cohorts to follow, it is important to realize that this comparison may not be fully possible (or fully comparable).

Performance Indicator 1.1.1.6.

Recommendation: Same as in Condition 4.

Performance Indicator 2.1.1.3

Recommendation: It is unclear what is the meaning of “Quantitatively study the ecological relations in the benthic community”, it will better to explain in more detail. In any case it is important to properly classify the trophic mode of the most important species. Unfortunately, most known species in this system have been adjudicated to different trophic levels mainly based on the literature, which is in many cases based on the morphology of the mouth of the gut. However, this classification has only been objectively evaluated a few times. For example, species that can be classified as filter

feeders can also be detritivorous, which in terms of understanding a food web make an important difference. I therefore suggest using modern techniques to make this evaluation, at least for the most important species in terms of biomass. This result is crucial for the **Recommendation of Performance Indicator 2.1.5.2.**

Minor comments

Summary

Page 5, line 3: Economic Exclusion Zones should be Economic “Exclusive” Zones.

1. Introduction

1.1. The fishery proposed for assessment

Page 7, line 18: same as above in relation to Exclusion>> Exclusive.

1.2. The assessment process

Page 8, line 3: Instead of “sessile” it is better to describe this stage as “sedentary”.

1.5.1. Scientific Publications Consulted

This section needs to be edited for standardization of references description and journal citation (abbreviated or full name). Moreover, to have this section separated from the section “1.5.2. Technical Reports” may be confusing since in the text is not always clear if the cited reference belongs to a Scientific Publication or a Technical Report. There are also several Technical Reports cited in the other section.

Page 15, last reference: Should be BRAZEIRO and not BRAZIERO

Page 20: Here and in general avoid multiple references of the same information. For example,

The reference of Schejter et al. 2000, 2001 and 2002 are actually the same. The first two are congress abstracts that provide the same information but in different meetings, but the full information is in the paper published in the Journal of Shellfish Research. If this is the case, this should be the only used reference.

1.5.5. REDES National Fishing Industry Magazine

Page 31: The two references of LASTA, M. (1996) have the same page numbers.

Page 36, end of second paragraph: Lasta et al., 1998 is a or b?

2.1. Biological and Ecological Aspects of Patagonian Scallop

Page 36, line 1: Notice that “clappers” is not a synonym of “empty scallops”. The name clappers, is used when both shells of a dead scallop (or any bivalve) are still attached by the ligament.

Page 36, line 4-5: Please delete the reference to my personal communication. This is a quite obvious statement.

Page 36, line 8-9: As far as I remember in this thesis the author performed an “integrated dynamic model”.

2.3. Current Operation

Page 37, 3rd paragraph: The estimation of the fishing gear efficiency is correctly stated. However, as far as I know there is not an improvement of this efficiency in the fishing fleet. The values of better fishing efficiency are those of the research fishing gear (no used in the fishery). Thus the fishing efficiency of the gear used commercially is still the same as estimated by Lasta and Iribarne (1997).

Page 40, line 2-3: It is unclear the basis for the statement “The variation in catch reflect the fact that only three vessels operated during some years”, but I am not really sure that it is true.

Biomass estimates

Page 41, last paragraph: According to what I saw in technical reports “random samples” were obtained from some beds, but the most important beds are always sampled following a “regular grid”.

Page 42, table 3: It will be better if SD’s are also provided in the table.

Caption of Table 3: Please check. When it said ... commercial **captures**... I believe that it should said ..commercial **estimated** biomass....

Inset in Figure 10A: Black bars should be referred as Commercial Catch instead of Total Catch.

Caption of Figure 10: Again, instead to Total Catch should refer to Commercial Catch. After A. it should said Total Scallop Biomass and.... After B, it should say Total Scallop Biomass estimated...

2.4. Management System

Page 43, line 22 (number 2): In page 36 (two last lines) it refers to 3-5 years. I believe that this is the correct number.

Page 44, last three lines: In this case “scallop beds” are not synonymous of “subpopulations”. Actual stock or population identification has never been performed in this species. Thus, up to now this remains as a hypothesis to be tested. Moreover, this should be one of the major targets for research in the next few years in order to understand the dynamics of this species, and improve their management.

2.9. Environmental Features

Page 54, line 12 (b): Besides the effect described here, it is interesting to notice that there is also a large amount of discarded biological material that increases the amount of food for detritivorous species (i.e., ophiourids). This may have secondary effects, given that these species are also likely to feed on scallop larvae. Thus, increases food for these species may at the end have negative effects on scallops. This process should be explored.

Page 54, last paragraph: The Patagonian Current (PC) is not identified in Fig. 13.

Page 54, last line: My personal communication is not necessary. This is a well-known fact.

Page 55, Figure 13: There are no references in the caption to ABP and MBP.

Page 55, caption of Figure 13: “Shadows” and “white areas” referred may not be clearly identifiable in the figure printout.

Page 55: Based on the available information I do not think that there is enough information to talk about “metapopulations”. I have no doubt that the scallop beds conforms a metapopulation system, but to identify these systems is one of the major challenges of the research that support this fishery.

Page 55 and 57: it will be better if SBFS, NPFS and SPCFS area also identified in Fig. 13.

Page 57, second paragraph: I believe that the whole description belongs to the SBFS.

Page 75, 1.1.1.1: The most (or only) used common name of the scallop *Aequipecten tehuelchus* is “tehuelche scallop”.

Page 77, 1.1.1.3, line 5: It should be Valero, 2002 instead of 2001.

Page 77, 1.1.1.3, line 7: It should be Valero et al. 2001. The second reference should be Valero 2002 (not 2001).

Page 77, 1.1.1.3, line 9: This also should be Valero (2002).

Page 86, 3rd paragraph: The estimation of Bremec et al. (2004) is under the assumption of only one capture event. May be implicit, but it is better to clearly state this assumption.

Page 90, 2nd paragraph: Spatial precision of $10 \pm$ m sounds a little bit too much. Most GPS data have a precision of around 40 m. It will be nice to check this data.

Page 92: Same as above.

Page 95, 2nd paragraph: The correct word is “sedentary” instead to “sessile”. In the same paragraph: Instead of “spatially complex distributions” it will probably be more appropriate to refer to “spatially persistent structures (or distribution)”.

Page 120, paragraph 3: I am not really sure that they refer to CPUE. To avoid misunderstandings I will suggest using just “production”.

Page 173: I guess that refers to “5 tonnes of **muscle** per day”. Then, the word “density” is incorrect; it should be “production”.

PEER REVIEWER 2

The general conclusion that the Patagonian scallop fishery meets the objectives of the three independent principles necessary for certification by the Marine Stewardship Council as a “well managed and sustainable fishery” is agreed to as a correct conclusion. That is not to say that there are some serious concerns which will be discussed later in this review. Precaution is necessary.

The Patagonian scallop fishery is a well managed resource based on the available scientific information. This reviewer is impressed with the amount of information that has been gathered about the biological reference points used to manage the resource in the context of a commercial fishery. The management system that is in place to regulate the fishing activities of the two commercial enterprises is impressive and appears to be quite effective and results to date are satisfactory.

1.1.1.1 - There is good information on the identification of the target species and the landings of *Z. patagonica* and *A. tehuelchus* can be identified. However, it is curious that landings for the *Tehuelche* scallop were reported for only one year (2002). Why is that?

1.1.1.2 - Life history is understood. Agreed. The observations that there are two spawnings, spring and autumn, is interesting but not unique. It would be interesting to measure differences in spawning magnitude relative to latitude, paying attention to interannual variations in spawning patterns.

1.1.1.3 - Population dynamics of the species. A score of 75 may be a bit low. Total mortality rates between 0.31 and 0.46 are driven, in a large part, by fishing induced mortality. Natural mortality rates, especially those of younger animals may be elusively high. However, it may be important if natural mortality is viewed as a constant, i.e. 0.1. Since the scallop beds are fished on a rotational basis and the average size of scallops have declined, then the natural mortality rate for older scallops may not be an issue. I trust that the integrated model for growth (age) and mortality by Valero has taken these observations into account.

1.1.1.4 - Geographical range is known. Agree. The use of a fixed grid survey design along with kriging is an excellent approach.

1.1.1.6 - Information on recruitment. Agreed. There is no known relationship between parental stock and recruitment. For one, variations in larval settlement and survival may be too high.

1.1.1.7 - Information on biomass/density. Generally agree. As stated before, the fishery independent assessment of each scallop bed have a high degree of accuracy compared to fishery dependent information. (This reviewer’s opinion). This reviewer has questions about the claim that the conversion coefficient data allows “precise estimates” of the number of scallops caught and fishing mortality. The efficiency of the mechanical shucking process using steam and eviserators is variable as is any mechanical process. Temperatures, flow of product, condition of product, skill and attention of human operators all combine to give only estimates of the outcome. I do not have access to the reports that document the degree of “leakage” in the system. This reviewer has seen

finished product with muscle pieces and fragments along with pieces of viscera which indicates “precision” is lacking. Shell height:meat weight ratios determined at the time of the survey would be a better indicator of biomass.

1.1.1.8 - Age and/or size structure of the stock. Agree to a point. The issue here is that the size structure of scallops on the bed being fished as determined by the samples from the trawl catch is partially dependent on the selectivity and performance of the trawl. We know that the selectivity characteristics of the 120 mm mesh trawl is poor which complicates that data set. Also, this reviewer has no information on the characteristics of the survey dredge used. More information on the selectivity and efficiency of both the survey dredge and the commercial trawl would help this assessment.

1.1.2.1 - Fishery removals are recorded. Generally agree. The catch for each trawl is recorded as meat weight.....is that the muscle (callus) or is it the “unpeeled scallops?” This reviewer will make the assumption that it is: meat weight = callus = muscle. In any event, if the numbers of scallops harvested is determined by a conversion ratio as stated on page 87, this reviewer would caution that somatic weight/scallop is highly variable depending on season, latitude, depth and any interannual variations that may be evident. This reviewer is of the opinion that estimates of fishery removals are a weak part of this certification process. This reviewer is impressed that nearly 100% of the scallop discards survive. That is the highest estimate of discard survival recorded for a wild scallop fishery. It would be interesting to see data documenting the degree of shell damage (cracks, chips, disarticulation) after size sorting and just prior to discarding.

1.1.2.2 - The age and/or size structure of catches. Agree. What are the quantities (measure) that make-up the sub-sample? This comment also refers to comments in 1.1.2.1 about fishery removal estimates.

1.1.2.3 - Fishing effort is recorded. Agree.

1.1.2.4 - Spatial distribution. Agree.

1.1.2.5 - Fishing gear is known. Agree.

1.1.2.6 - Gear selectivity is known for the fishery. Generally agree. The 120 mm mesh trawl net is not very selective for the target size (> 55 mm). The gear is 95% selective at the end of their first year (< 25 mm). The selectivity characteristics of the gear are barely acceptable for a sustainable fishery despite the claim of “nearly 100%” discard survival. Improvements in gear selectivity should be encouraged. There is a comment that the use of square mesh panels may be explored. This is a very good idea.

1.1.3 - Appropriate reference levels have been developed for biomass and fishing mortality rates. Agree with a score of 70. It is a useful strategy for this particular fishery to set area specific TACs. Setting the TAC at 40% of the commercial biomass (> 55 mm) may be excessive as there is no apparent strong justification. It is a bit contradictory to close an area to fishing where juveniles exceed 50% of the population to protect recruitment if “nearly 100%” of the discards survive.

1.1.4.1 - Management strategy in place to adjust harvest. Agree. Although some of the criteria may be weak as previously mentioned, the mechanism to control fishing is strong. Rotational fishing strategy is a strong element for management.

1.1.4.2 - Clear and tested decision rules for effective management. Agree.

1.1.4.3 - Appropriate management tools - input/output controls. Generally agree. The tools are available, but I question the reasons given in this section. I will comment later in this review.

1.1.5 - Spatially structured assessment.

1.1.5.1 - Spatially structured stock assessment methodology that is relevant. Agree. The score of 80 is a little low. This is because of the distinct characteristics of each bed (in regard to fishing pressure, recruitment, mortality, etc.). The use of a rotational management strategy overcomes many of the difficulties associated with a traditional fishery.

1.1.5.2 - Assessment is spatially structured. Agree. As above for 1.1.5.1 but including a reinforcement with the positive elements of the fine scale grid pattern used in surveys. A score of 80 is low.

1.1.5.3 - Assessment tested by simulation for uncertainties. Disagree with the score of 60. Too low. Effort to develop a series of sensitivity analyses in order to test uncertainties around biomass estimates and fishery yield could be useful.

1.1.5.4 - Assessment evaluates consequences of harvest strategies. Agree with the score of 70. Although the assessment of biomass is tight, the adjustment of the TAC at 0.4 of commercial biomass is essentially a guess justified by only 6 years of data. There will be more later on this topic.

1.1.6 - Stocks are at appropriate reference levels.

1.1.6.1 - Overall population is at appropriate reference level. Agree with score of 70. Again there is that weakness associated with the TAC and only 6 years of data on the fishery.

1.1.6.2 - Local areas of the resource not overfished. Generally agree but note comment above.

General comment. Much of the justification for the scores in 1.1.5 and elsewhere are based on annual assessments. For example the TAC at 0.4 of commercial biomass and the claim that the total biomass and commercial catches remain constant suggest that overfishing doesn't occur. Certainly that is a reasonable conclusion from the data available. However, this reviewer is concerned that there could be a different conclusion. Since 1999, the annual landings fluctuate little, despite variations in fishing capacity/effort, as landings for 1999 and 2000 were from only 3 vessels. What factor is limiting the total commercial catch if the capacity of the fleet is greater than 6000 MT? In other words, what is constraining the fishery? That constraint(s) should be in the

context of the commercial TAC at 0.4 and the total biomass. The use of commercial landings with all the uncertainties around the conversions to meat weight (seasonal and interannual variations, variations in the efficiency of the shucking and evisceration process, etc.) may not be a good measure to use in the fishery in order to determine a degree of stability of the resource. Another way to approach this issue might be to use numbers of scallops at age or size rather than biomass. The use of numbers at age or size would more accurately portray the flow of scallops entering the commercial fraction on an annual basis and could even be used to help set an annual or multi-year TAC. This could be better than reliance on the use of commercial sized scallops (> 55 mm) (a modest fraction of total biomass), and harvest limited to 0.4 of the commercial sized biomass.

1.3 - Fishery does not significantly alter age or genetic structure.

1.3.1 - Adequate information on structure and reproductive capacity. Score of 70 is low given the variations associated with latitude and potential interannual variations, the available information is more than adequate for the management of the fishery.

1.3.2 - Sex/age/genetic structures are monitored. Score of 70 is low. Appropriate research is underway. See comment above.

1.3.3 - Stock assessment indicates impairment. Agree.

1.3.4 - Effective harvest strategy does not impair reproductive capacity. Agree. Biomass/number at age assessments could be useful.

2.1.3 - Risks to the ecosystem.

2.1.3.1 and 2.1.3.2 - Risks to non-target species and discards. Agree. Additional benefits could be gained with trawl modifications. As mentioned previously, experiments with square mesh panels could improve scallop selectivity and reduce the bycatch of invertebrates and small fish. The report notes that significant portion of the invertebrates epifauna is attached to scallop shells. This is commonly seen in other scallop fisheries where mature scallops are left undisturbed for a period of time. Heavy growths of invertebrates epifauna is observed on *Placopecten magellanicus* in the closed fishing areas on Georges Bank. Since the older scallops are removed through harvesting as the scallop beds are opened (reopened), it would be interesting to note changes in the invertebrate epifauna over time. Removal of a significant portion of the substrate for invertebrate epifauna may have long-term effects. Would these changes be important? That would be the question to ask.

2.1.4 - Strategies to address negative impacts of the fishery on the ecosystem. Score of 80 is low. Scoring indicators are unrealistic.

2.1.5 - Assessment of impacts and associated risks.

2.1.5.1 - Assessment has been conducted and monitoring system in place. Agree.

2.1.5.1 - Impacts on ecosystem from removal of stocks. Agree. Return of empty shell to the benthos is important. Impacts of discarded scallop viscera are not noted. It could be

a positive aspect of the fishery. Is any research being conducted on impacts of discarded scallop viscera?

2.1.5.3 - Impacts on ecosystem from removal of non-target species. Agree.

2.1.5.4 - Fishery impacts on structure. Agree.

2.1.6 - Unacceptable impacts on ecosystem.

2.1.6 - No unacceptable impacts. Agree.

2.2 - Fishery does not threaten biological diversity nor endangered or threatened species.

2.2.11 - 2.2.2.2 - Agree on all accounts.

2.3 - N/A

Principle 3 - Effective management system

3.1.1 - 3.1.6 - Agree with high scores.

3.1.7 - Management provides for financial support of management and research.

3.1.7.1 - Adequate funding for management. Agree.

3.1.7.2 - Adequate funding for research. Agree somewhat. Industry partners appear to offer support for catch data, observer coverage and other research activities. Additional research is needed on gear performance and processing efficiency.

3.1.7.3 - Funding source. Agree.

3.1.7.4 - Providers of funding have appropriate security for their interests. Agree.

3.2 - Management specifies measures and strategies that control exploitation.

3.2.1 - 3.2.1.3 - Agree. Much of this material has been presented earlier in the assessment.

3.2.2 - Management identifies use of appropriate gear.

3.2.2.1 - Fishing gear suitable for harvest target species. Agree somewhat. The inferences about dredges and modified trawl gear may be questioned. The description of “tickler chains attached to the foot rope” is difficult to imagine without a diagram. Is the reference to tickler chains in the configuration of a “Texas drop chain” or something else? The description of a tickler chain that causes scallops to swim off the sea floor and minimizes the capture of immobile benthic invertebrates is questionable for this fishery. This is an area for productive research. Agree with the reports comments on trawl disturbance of the bottom.

3.2.2.2 - Fishery does not use poison or destructive practices. Agree.

3.2.3 - Fishery recovery plans.

3.2.3.1

3.2.3.2 - Rebuild target and non-target stocks. Agree with high mark.

3.2.4 - Ability to limit or close fishery. Agree.

3.2.5 - Consider no take zones. Agree.

3.2.6 - Management system specifies other measures and strategies to achieve goals. Agree.

3.2.7 - Fisheries operations minimize mortality of non-target stocks, reduce discards and minimize operational waste.

3.2.7.1

3.2.7.2

3.2.7.3

3.2.7.4

3.2.7.5 - Agree to the generalizations presented in this section. The commercial companies have a great incentive to maintain an efficient fishery. The degree of management appears to be sufficient. The discarding of non-target species appears to be a problem. As stated before, the capture of non-target species may be reduced with appropriate fishing gear modifications.

3.2.8 - Social incentives that contribute to sustainable fishing.

3.2.8.1

3.2.8.2 - Agree. No information to support a different conclusion.

3.3 - Management is effective to meet MSC principles and criteria.

3.3.1

3.3.2 - Agree.

3.3.3 - Management incorporates research plan.

3.3.3.1

3.3.3.2 - Agree. The concept of a compulsory 20 day survey for each fishing vessel is excellent.

3.3.4 - Management system considers all relevant information.

3.3.4.1

3.3.4.2

3.3.4.3 - Agree.

3.4 - Management system contains a process monitoring and evaluating performance.

3.4.1.1

3.4.1.2

3.4.1.3

3.4.1.4

3.4.1.5

3.4.1.6

3.4.1.7 - Agree with high marks.

3.4.2 - Management requires assessments and fishery impacts are periodically conducted.

3.4.2.1

3.4.2.2

3.4.2.3

3.4.2.4 - Agree.

ASSESSMENT TEAM RATIONAL FOR POINTS RAISED BY THE PEER REVIEWERS

PEER REVIEWER 1

Comments in relation to Conditions and Recommendations

General comments

The Assessment Team has included a paragraph to more clearly explain the purpose and objective of each recommendation in Section 7.2.

Condition 4 and Recommendation on Performance Indicator 1.1.1.6.

*Although there is no relationship known in *Z. patagonica*, and little relationship has been found between parental stock and recruitment in scallops in general, McGarvey et al. (1993) found egg production was correlated with recruitment in two Georges Bank populations of *Placopecten magellanicus* and this correlation was stronger and held more widely when egg production of older scallops alone was considered. They concluded that the two scallop populations may be reproductively self sustaining stocks. Furthermore, recent modelling of larval dispersal in the Caribbean concluded that marine populations must rely on mechanisms enhancing self-recruitment rather than depend on distant 'source' populations (Cowen et al., 2002). There is sufficient doubt in this field to hedge management bets by collecting sufficient information to allow further analysis.*

This required action is focused to determine the differences in fecundity and quality of sexual products at age/size with the aim to better estimate the impact of the fishery. It is clear that the environmental variables play an important role in the recruitment success, but this doesn't mean that the spawning stock can be reduced to a point in which the individuals don't release sexual products capable of overcoming the forces of natural selection and survive. In this regard it is important to cite Froese (2003), who proposed indicators as measures for effective management of the stocks. One of these refers to "permits megaspawning individuals to grow" based on the fact that for most species egg production increases exponentially and eggs tend to be bigger (in larger parents), which could mean a higher percentage of hatching and increased fecundity. As well, the older megaspawning individuals are living reserves of good genes and can be considered as a "life insurance" when bad recruitments occur, due to adverse environmental conditions or habitats not suitable for juveniles.

For these reasons, the Assessment Team thinks that more studies on structure and reproductive capacity of this species are necessary.

The fecundity data will provide input to simulation models of the fishery and its management.

Recommendation on Performance Indicator 1.1.1.3.

It is a risk that the information cannot be improved because of the lack of a new recruitment within those 4 years. Nevertheless, the Assessment Team thinks that with the level of information collected until now, plus what will be added, that the fishery will be able to show a reasonable comparative scenarios between zones.

Natural mortality (M) is the more difficult parameter to obtain, and its spatial variability requires that it is estimated several times, using the same technique in order

to allow comparison. M has a strong influence on the life cycle of one cohort, and defines the exploitation strategy.

Recommendation on Performance Indicator 2.1.1.3.

The recommendation to quantitatively study the ecological relationships within the benthic community is left open in order to permit the researchers to develop their own methodologies. The Assessment Team noted that INIDEP's research programme is oriented in this direction.

2.4. Management System

Page 43, line 22 (number 2): In page 36 (two last lines) it refers to 3-5 years. I believe that this is the correct number.

Lic. Mario Lasta specified 3-4 years.

2.9. Environmental Features

Page 54, line 12 (b).

Peer Reviewer 1 recommends that impact of returned viscera should be explored. The Assessment Team was not informed of any such work. The discarding of scallop viscera in the Georges Bank scallop fishery is suggested to have acted as food subsidy for scavenging fish species one of which may have increased in abundance in response to this (Link and Almeida, 2002). Fish have not been observed or sampled on scallop habitat in Argentina but such food subsidy effects may result in increasing populations of scavenging invertebrates.

Page 75, 1.1.1.1: The most (or only) used common name of the scallop *Aequipecten tehuelchus* is "tehuelche scallop".

*This is a misinterpretation of the wording: "..., a bay scallop, Aequipecten tehuelchus, ..." was written to differentiate a coastal species (Tehuelche scallop) from a sea scallop (*Z. patagonica*).*

NOTE. Peer Reviewer 1's suggestions not mentioned here have been accepted by the Assessment Team.

PEER REVIEWER 2

1.1.1.1 *The fleet is authorized to fish only Patagonian scallop (Zygochlamys patagonica). There are a few aggregations of Tehuelche scallop along the Buenos Aires Provincial coast resulting from sporadic larval settlement. These aggregations have been exploited by the coastal fleet which fished mussels in the past. Currently, there is not a fleet which can fish Tehuelche scallop if a good sporadic recruitment is discovered, mainly because of the processing and marketing requirements. During late 2001 and part of 2002 a very interesting bed of Tehuelche scallop (Aequipecten tehuelchus) located in national waters, was found. The FFC invited the non factory vessels to exploit Tehuelche scallop in national waters, but no one showed interest in doing so. The FFC authorized temporarily the Patagonian scallop fleet to fish Tehuelche scallop, with the aim to reduce the fishing pressure on the former, mainly in beds within the North Management Unit. Prior to initiation of the fishing activity on Tehuelche scallop, a monitoring program was implemented for approximately 20 days, with a strong participation of the fishing fleet and on board observers.*

1.1.1.2 *The Assessment Team agrees with his comments on two spawnings. Zygochlamys delicatula on an ecologically very similar habitat, along the continental shelf of southern New Zealand, in the same depth range and along a shelf-break front and associated with canyons, likewise spawns twice, in spring and autumn; spring eggs being larger (Michael and Cranfield, 2001). The NZ scallop Pecten novaezelandiae generally spawns twice; the first a partial spawning in spring producing fewer planktonic larvae but resulting in good settlement; the autumn spawning produced much larger numbers of planktonic larvae but resulted in poor settlement. In one year a third summer spawning has also been observed (Cranfield, 1984). The reproductive strategy could be regarded as bet hedging in an uncertain environment. Observations over the years should reveal how important this is in Z. patagonica.*

1.1.1.3 *The Assessment Team does not believe the score should be raised, as mortality levels, and the dynamics of maturity are important factors in understanding the population dynamics of Patagonian scallops. The reasons for maintaining the scores are based on discussion during the consultation, and the video showing the operation of the net. The mortality of Patagonian scallop juveniles is low and not high as the Peer Reviewer 2 has mentioned. As well the juveniles are immediately returned to the sea and their survival needs investigation.*

1.1.1.6 *Although there is no relationship known in Z. patagonica, and little relationship has been found between parental stock and recruitment in scallops in general, McGarvey et al. (1993) found egg production was correlated with recruitment in two Georges Bank populations of Placopecten magellanicus and this correlation was stronger and held more widely when egg production of older scallops alone was considered. They concluded that the two scallop populations may be reproductively self sustaining stocks. Furthermore, recent modelling of larval dispersal in the Caribbean concluded that marine populations must rely on mechanisms enhancing self-recruitment rather than depend on distant 'source' populations (Cowen et al., 2002). There is sufficient doubt in this field to hedge management bets by collecting sufficient information to allow further analysis.*

The fecundity data will provide input to simulation models of the fishery and its management.

1.1.1.7 *INIDEP does not calculate the number of individuals captured and the estimation of natural mortality from the conversion coefficient. On board processing presents lack of precision which reduces the efficiency. The value of 7,14 for the whole fleet (variability between beds) and throughout the year (seasonality of muscles) appears to adequately estimate biomasses of processed commercial scallops from the landings of muscles.*

The conversion coefficient is used to estimate de availability of scallop muscles of different size, through the Shell height:meat weight ratios determined at the time of the survey.

1.1.1.8 *Age or size structure of areas on the beds being fished is not determined using the capture samples obtained from the commercial fleet.*

The estimations of size composition (principally, age studies which are in process) are made using data from annual dredge research surveys. The gear used has 10 mm mesh size, which has demonstrated to adequately avoid the escape of recently recruited individuals. INIDEP selectivity estimations show that the dredge is not size-selective.

1.1.2.1 *The points by the Peer Reviewer 2 are answered in information received from INIDEP and incorporated in the Public Comment Draft Rreport.*

In regard to "...nearly 100% of the scallop discards survive", it is necessary to specify that the result was from two experimental captures in 1995 and 1997, the latter after two years of fishing.

INIDEP have indicated to the Assessment Team that the study of the degree of shell damage after size sorting and just prior to discarding is in process.

1.1.2.2 *The sub-samples taken in research surveys are approximately 7% of the total catch (sample) per haul (capture average by haul: 140 Kg, DS: 110; n: 148; weight average of the sub-sample: 6,7 Kg; DS: 4,8; n: 148).*

Biomasses of sub-sample (10 Kg) are taken by On Board Observers from the total capture (1500 Kg) per haul in the commercial fleet. These sub-samples are used to estimate the proportion of scallops by haul or the size structure distributions of target and non target species. In this case the magnitudes are lower but the frequencies are higher. Remember the central limit theory.

1.1.2.6 *The Assessment Team recommends further development of the gear to reduce selection of undersized scallops. The Assessment Team understands that the problem of selectivity is compensated by the return to the sea of the individuals lower than 55mm (minimum legal size). Nevertheless, considering that there is no conclusive information on survival of discarded juveniles, it is appropriate to have trawl nets that capture individuals higher than minimum legal size. The question is if it is really possible to achieve this in this kind of fishery?*

1.1.3 *With the development of rotational fishing strategies and area closures, limit and target reference points are not appropriate (Hart, 2003). Setting the TAC at 40% of the recruited biomass is appropriately cautious in a developing fishery in which management regimes are still evolving. Common sense says that despite "nearly 100%" survival, it is not logical opening an area with a high percentage of juveniles, which can be captured more than once, thus increasing the mortality and creating destabilizing disturbances by passage of the otter nets over the bed. At present the fishery is still in*

the establishment place and adaptive fishing management is being applied to perfect the system. It is simpler to consider only the fraction of the population of legal size and establish a harvest rate for it.

1.1.4.1 The rotational fishing strategy should be strengthened over the next five years to further improve management of the fishery.

1.1.5.1 The score of 80 reflects the Assessment Team's consideration of how the fishery meets the emphasis on modelling management stated in this scoring indicator. The Assessment Team agrees that the use of a rotational management strategy overcomes many of the difficulties associated with a traditional fishery. Rotational fishing strategies have been modelled (see Breen and Kendrick, 1997; Hart, 2003). The use of predictive models for rotational fishing as it was applied to the P. magellanicus fishery (See Hart, 2003) should be investigated.

1.1.5.2 The score of 80 reflects the Assessment Team's consideration of the emphasis on modelling management again in this scoring indicator.

1.1.5.3 The evaluation was made to fulfil the requirement of the MSC Principles. The score has been set at 60 because the indicator is about simulation and this has not been attempted in this fishery. Even though for these kinds of population, highly dependant on recruitment (and highly variable), simulation is more an intellectual exercise than reality, these studies must be initiated to evaluate the effects of the present harvest strategy over long periods with different scenarios.

1.1.5.4 This fishery is new and judgement of many criteria is based on the quality of research results used to drive its management. Biomass estimates are tight and are based on harvest strategies developed from only 6 years catch data. Simulation of harvest strategies could test their effects over a hundred year period to give much greater confidence in their sustainability without the inherent risks of a real collapse, or the need to wait for more years of real fishing data.

1.1.6.1 It is true that there are only 6 years of data, but the measure is conservative, so long as the stock and the fraction of extraction are maintained at present levels.

1.1.6.2

General comment. The use of the commercial TAC at 0.4, has successfully maintained the sustainability of the resource during its establishment. The Assessment Team agrees with the Peer Reviewer 2, that there is uncertainty in the conversion of commercially caught meat weight to estimated biomass of processed commercial scallops.

The value of 7,14 for the whole fleet (variability between beds) and throughout the year (seasonality of muscles) appears to adequately estimate biomasses of processed commercial scallops from the landings of muscles.

It is used to estimate the availability of scallop muscles of different size, through the Shell height:meat weight ratios determined at the time of the survey.

1.3.1 The scoring reflects on how the Assessment Team found the fishery meets the scoring indicators.

1.3.2 *The scoring reflects on how the Assessment Team found the fishery meets the MSC scoring indicators.*

The reasoning for this condition is discussed above in Performance Indicator 1.1.1.6.: Although there is no relationship known in Z. patagonica, and little relationship has been found between parental stock and recruitment in scallops in general, McGarvey et al. (1993) found egg production was correlated with recruitment in two Georges Bank populations of Placopecten magellanicus and this correlation was stronger and held more widely when egg production of older scallops alone was considered. They concluded that the two scallop populations may be reproductively self sustaining stocks. Furthermore, recent modelling of larval dispersal in the Caribbean concluded that marine populations must rely on mechanisms enhancing self-recruitment rather than depend on distant 'source' populations (Cowen et al., 2002). There is sufficient doubt in this field to hedge management bets by collecting sufficient information to allow further analysis.

2.1.3.1 and 2.1.3.2 *Neither scoring indicator 2.1.3.1., nor 2.1.3.2., is concerned with risks to non-target species or discards, nor about mitigation of effects. They deal with the amount of information available on the nature and extent of non-target species caught in the fishery, and the survivability of such bycatch discarded. Peer Reviewer 2's comments seem to be applicable to 2.1.4.*

2.1.4 *The Peer Reviewer 2 thinks the score of 80% is too low. The Assessment Team scored the fishery at this level using the scoring indicators established. Peer Reviewer 2 says these scoring indicators are unrealistic, so perhaps it is not surprising that he finds the mark too low.*

Peer Reviewer 2 also discusses the importance of measuring changes in invertebrate benthic fauna over time as he would expect to see long term changes with the removal of a significant portion of the substrate (the scallop shells themselves) on which invertebrate epifauna attach. After ten years of fishing no such change is apparent in this scallop fishery either in the species composition, or diversity or relative volumes of bycatch.

Peer Reviewer 2 makes the valuable suggestion of testing square mesh panels that could improve scallop selectivity and reduce the bycatch of invertebrates and small shells.

2.1.5.2 *Peer Reviewer 2 asks whether there is any research being carried out on impact of returned viscera? The Assessment Team was not informed of any such work. The discarding of scallop viscera in the Georges Bank scallop fishery is suggested to have acted as food subsidy for scavenging fish species one of which may have increased in abundance in response to this (Link and Almeida, 2002). Fish have not been observed or sampled on scallop habitat in Argentina but such food subsidy effects may result in increasing populations of scavenging invertebrates.*

3.1.7.2 *Peer Reviewer 2 suggests additional research is needed on gear performance and processing efficiency. This is a valuable recommendation to the client. Gear research investigating the most effective use of tickler chains, and mesh size and shape (square mesh) to reduce bycatch and hence reduce fishing impacts of gear on the seafloor and the benthos (scoring indicator 3.2.2.1) would be valuable new short-term research.*

3.2.2.1 *The data discussing the effect of epifaunal bycatch saturating dredges is well established in fishers' catches and divers' observations of gear fishing on the seafloor, of an oyster fishery in which this bycatch has been progressively eliminated by over-fishing. Dredges in this fishery became more and more efficient as bycatch was reduced and the benthic fauna depleted (see Cranfield et al., 1999; Cranfield et al., 2003). In the New Zealand fishery for the systematically and ecologically closely related scallop to Zygochlamys patagonica (Z. delicatula), fishers commenced the fishery using dredges. Dredges rapidly became saturated with bycatch and were grossly inefficient so fishers then tested trawling to reduce bycatch and reduce sorting to an economic level. However, only as fishers modified their trawls with heavy tickler chains that caused the scallops to swim up off the seafloor and be captured in the trawl gear (which was not hard down on the seafloor) did they reduce bycatch to a reasonable level (Michael and Cranfield, 2001). The video of the Patagonian gear catching scallops (M. Lasta pers. comm.) showed scallops in this fishery doing something very similar. The comments reported in this scoring indicator are not inferences, but are based on sound evidence. The tickler chain used in this fishery is 22 m long and 92 Kg weight, so it is not so heavy.*

3.2.7.1 *Peer Reviewer 2 reiterates the importance of reducing the capture of bycatch by testing larger mesh panels in trawl and trials of square mesh. Some of these ideas appear to have been tested informally by the fishing companies. Because of the importance of this issue, it would be useful to recommend that the fishery undertake systematic trials measuring the effects of fishing operations on catch of scallops, size range of scallops and quantities and composition of bycatch and use this information to agree on long term gear modifications.*

NOTE. Peer Reviewer 2's suggestions not mentioned here have been accepted by the Assessment Team.