

Who Can Fish What and Where: Chile's Tradeoffs in High Seas Fishing of Straddling Stocks

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Abstract *Chile has not yet ratified the U.N. 1995 Agreement on straddling/highly migratory fish stocks. This paper discusses key economic issues at stake from the viewpoint of a coastal state with important stakes in a straddling stock. The Chilean jack mackerel stock, one of Chile's most important fish resources, is in this category. This stock is currently caught on adjacent high-seas only by a Chilean-flag fleet, and currently there is no evidence of imminent competition from distant water fishing nations (DWFNs). We argue that ratification of the Agreement could imply negative effects on: (i) coastal states' sovereignty upon management measures within its Exclusive Economic Zone (EEZ) and (ii) national fishing companies' competitiveness. Despite this, the net cost/benefit balance depends on how binding the threat of DWFNs' fishing competition is expected to be. If the Agreement does go into force, coastal states with important stakes in straddling fish stocks will feel increased pressure to ratify as well. For the case of states that become parties to the Agreement, we discuss pending obstacles for achieving effective fishery management in the adjacent high-seas. We speculate about possible solutions to the 'New Member' and 'Interloper' problems. Regarding the former, enforceable closed access would seem to be legally feasible under the Agreement. In terms of effective enforcement against fishing by illegal interlopers, innovation in enforcement tools would be needed. In some cases, the latter may require further adjustments to the Law of the Sea Convention.*

Key words *Chilean jack mackerel, high-seas fishing, Law of the Sea Convention, regional fisheries management organizations, straddling stocks.*

Introduction

Chile is among the nations that currently have not ratified the United Nations 1995 Agreement on the conservation and management of straddling and highly migratory

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fish stocks (hereafter the Agreement). Chile, however, was among the first countries to seek a revision of the Law of the Sea Convention (hereafter UNCLOS), regarding the ruling of high-seas fishing operations (U.N. 1982). Chile's initial proposal was that, in the absence of enforceable new international norms concerning high-seas fishing of straddling stocks, enforcement of coastal states' conservation/management measures should be extended to the area comprising the adjacent high-seas. By contrast, the Agreement implies that control over the administration of, and fishing access to, straddling and/or highly migratory stocks have to be negotiated among the states with fishing interests in a given high-seas fishery, including coastal states as well as distant water fishing nations (DWFNs). This paper discusses key economic issues at stake in the decision of whether or not to ratify the *Agreement* for a coastal state like Chile, where one of its most important fish resources (the Chilean jack mackerel stock) performs straddling seasonal migration to the adjacent high-seas.

This paper does not attempt to provide a comprehensive analysis of the different controversies related to high-seas fishing (legal, biological, environmental, geo-political, and economic issues). We focus on the economic tradeoffs in key fishing options at stake in the case of a coastal state that exploits a straddling stock in adjacent high-seas waters.¹ We do not discuss possible geo-political implications, such as the 'Mar Presencial' concept (Martinez-Busch 1996; Joyner and De Cola 1993; Gilliland-Dalton 1993). Similarly, although we comment on some key controversies of interpretation about various clauses in the Agreement, we stop far from undertaking a thorough analysis of evolving legal concepts in the International Law of the Sea (see Balton 1999; Freestone and Makuch 1998; Tahindro 1997).

The fishery management of straddling stocks, with transboundary (in/out) migration between coastal states' EEZ and high-seas waters, is a complex problem—not only because it involves difficult scientific and technical issues (adequate knowledge about migratory patterns, biological consequences, and effective enforcement of high-seas fishing operations), but also because it implies the need to address potentially disruptive distributive issues. There exists underlying potential conflict between coastal states' desire to extend their jurisdiction to adjacent high-seas (beyond their current EEZs), and DWFNs' desire to harvest valuable fish stocks which are found in adjacent high-seas.

There are no unambiguous legal rules to follow when deciding who should rule over fishing access and management of straddling stocks while they are in high-seas waters. Similar to the evolution of other property right structures, the evolution of legal concepts regarding the exploitation of living resources in high-seas waters is conditioned by these resources' evolving scarcity and the bargaining strength of the claimants to their use. In the case of living resources in high-seas areas, legal evolution is still far from approaching a stationary state.

Since the replacement of the Holy Roman Empire (European Middle Ages) by a system of independent sovereign states having definite boundaries in the XVI century, it has been generally accepted that coastal states enjoy some rights to regulate, in their own interests, activities in the seas adjoining their coasts. Which rights, and over which sea areas, are matters that have been subject to controversy and evolution since then.

To illustrate, consider the legal evolution that has steadily occurred regarding the recognition of coastal states' sovereignty over their *territorial seas*. In the XVI and XVII c., early practice and doctrine used vague criteria such as the 'limits of

¹ In recent years, some vessels operating under Chilean flag have started fishing on high-seas waters which are not adjacent to the Chilean EEZ; e.g., in the Southern Ocean near the South Georgia Islands, as well as near the Kerquelen and Prince Edward Islands—in both cases fishing toothfish. Though these vessels are owned by Chile-based companies, the corporate control mostly belongs to Spanish capital.

visibility' to determine the extent of the waters over which control was claimed. Later, authors proposed the so-called 'Cannonshot' doctrine suggesting that coastal states' rights over sea waters be extended to the point at which those waters could be controlled by shore-based cannons. In contrast, Scandinavian states, at that time, claimed maritime dominion over fixed distances from the shore along the whole coastline, regardless of the presence or absence of shore batteries (eventually known as the 'four-mile Scandinavian league'; Churchill and Love 1985). These controversies continued throughout the formative period of modern international law in the XVII c.² In the late XVIII c., different concepts of territorial waters coalesced into a compromise that proposed a fixed limit of 3 nautical miles (nm) (e.g., in 1793 the USA adopted a 3 nm territorial sea for neutrality purposes). Evolution in this direction eventually led to the current limit of territorial waters at 12 nm (or 22 kms).

The legal recognition of a 200 nm (370 kms) EEZ by UNCLOS can be interpreted as part of the evolution described above. The EEZ limit represented significant support of coastal states' fishing interests. Nevertheless, UNCLOS left significant fish resources with poorly defined legal status. Straddling and highly migratory stocks have been in this category since then. As a result, in numerous cases they have faced increasing fishing pressure leading to overfishing consequences.³

The Agreement proposes a *negotiated* solution, among the interested nations, to the issues of control rights upon fishing access and management of straddling and/or highly migratory stocks. Given currently prevailing international conditions, the option of a further extension of coastal state's jurisdiction to adjacent high-seas waters seems less likely than the option of the Agreement's entry into force and the implementation of Regional Fishery Management Organizations (hereafter RFMOs) for dealing with these stocks. Taking this statement as a given premise and focusing on the case of the straddling Chilean jack mackerel stock, we discuss key economic issues at stake in Chile's decision of *whether or not* (or perhaps *when*) to ratify the Agreement.

The paper starts by describing the Chilean jack mackerel stock and its main fishing grounds. It then discusses the possibility of pursuing entry-deterrent fishing effort in the adjacent high-seas, against the possible arrival of DWFN fleets. Next, it analyzes the implications of ratifying the Agreement on coastal states' control over port use and their sovereignty over fishery management decisions within their EEZ. Then it discusses two key problems for achieving *effective* management institutions for high-seas fishing of straddling stocks: the 'New Member' and 'Interloper' issues. Concluding remarks are offered at the end.

The Chilean Jack Mackerel Stock

Among the Chilean fisheries exploiting straddling and/or highly migratory stocks, the South-Center jack mackerel fishery is by far the most important.⁴ Figure 1 repre-

² e.g., the concept of 'freedom of the seas' was proposed by the Dutch jurist Hugo Grotius as early as 1609, but it only became an accepted principle of international law in the XIX c. This was ideologically connected with other XIX c. freedoms (e.g., laissez-faire in economic affairs). 'Freedom of the seas' was vigorously pressed by the great maritime and commercial powers at that time, especially Great Britain.

³ In 1994, straddling stocks represented 14.3% of the world marine catch (including catches within and outside EEZs), while highly migratory stocks represented 5.4% of the global marine catch (Dr. Peter Manning, personal communication, WHAT Fisheries Resources Commission; WHAT: World Humanity Action Trust, London).

⁴ Other cases are the *Chilean sea bass* (*Dissostichus eleginoides*) industrial fishery in the Chilean Austral zone (total catch of around 4,000 tons in 1994, mostly for export markets) and the *swordfish* (Caldera/Coquimbo) fishery (annual catch of around 3,000 tons in the last three years; again, mainly for export markets).

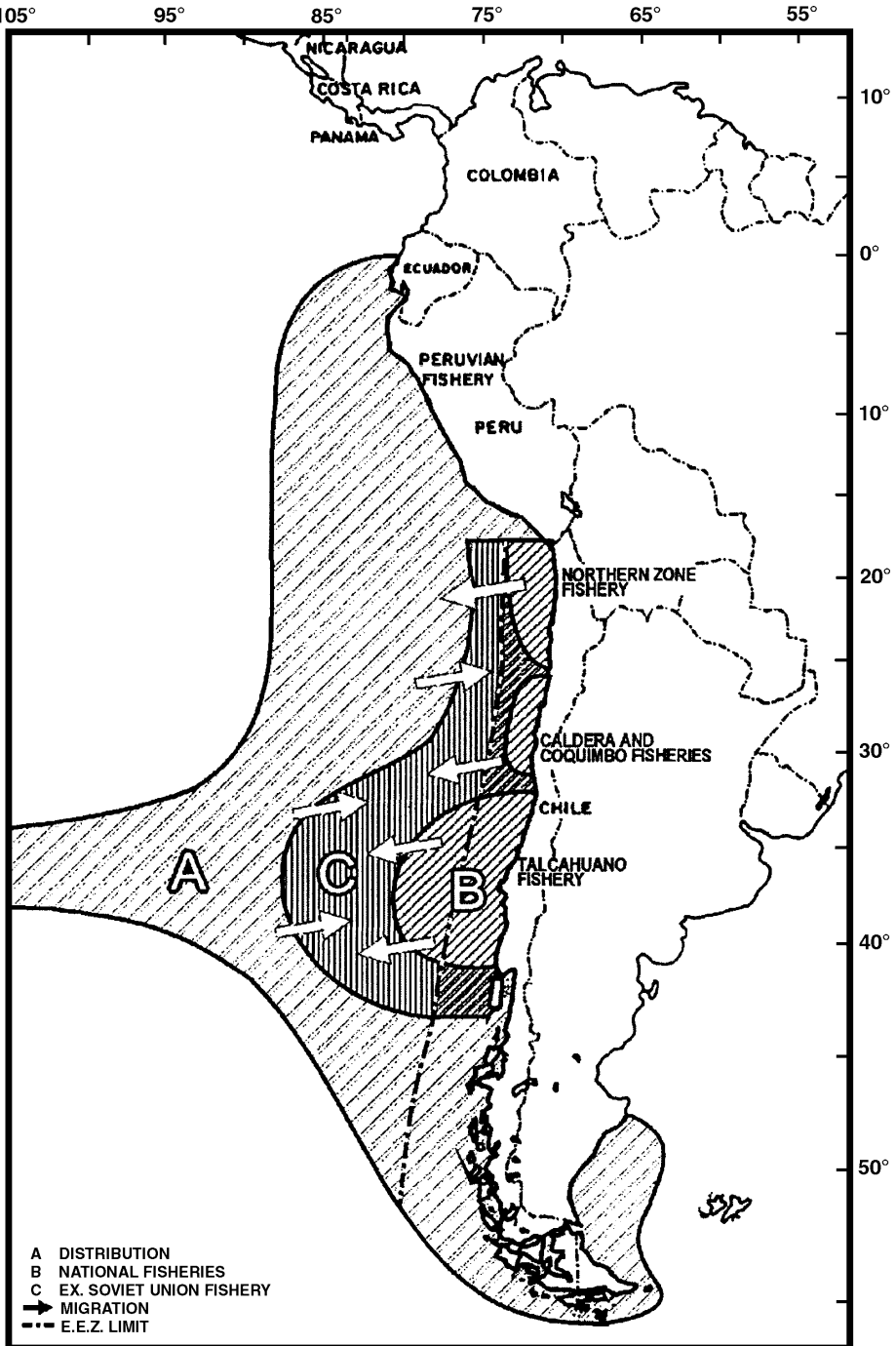


Figure 1. Spatial Distribution of Jack Mackerel Stocks in the Southeast Pacific

sents the overall spatial distribution (Area A) of jack mackerel stocks which, following a 'colonization' process that began in the early 1970s, extend into the South East Pacific as far as 900 nm off the coasts of Central Chile (along the Subtropical Convergence, around 40°S, reaching New Zealand and Tasmanian waters) (Serra 1991; Elizarov *et al.* 1993).

The so-called Chilean jack mackerel stock, distributed within Chilean waters and in the adjacent high-seas, reaching in some areas to about 110°W, is believed to be a *self-sustaining* stock (able to reproduce itself; Serra 1991). Evseenko (1987) suggested the existence of an *oceanic* stock, beyond 120°W and along the Subtropical Convergence reaching to New Zealand and Tasmanian waters, but it is as yet a pending question whether the oceanic stock is self-sustaining or needs inputs from the Chilean stock to persist.⁵

Off Chilean coasts, the jack mackerel is caught with other small pelagic species (*i.e.*, pilchard, anchovy) in four main fishing grounds: a Northern (NZ) fishery, a North Center or Coquimbo (NC) fishery, the Talcahuano or South-Center fishery, and an international fishery in high-seas adjacent to the Chilean EEZ (figure 1). Figure 2 shows the recent catch history of these fisheries. Since the early 1980s, private investment boomed in the Talcahuano fishery, initially triggering increased catches, which resulted later in overcapacity and overfishing (Peña 1997; Serra 1998).⁶ Since the early 1990s, the Chilean-owned fleet operating in the Talcahuano fishery expanded its fishing effort beyond the Chilean EEZ, reaching, in recent years, up to about 300 nm off the Chilean coastline. This evolution resulted in increased investment in vessels with capacity to reach high-seas areas (vessels with >800m³ of hold capacity). In 1995, vessels in this category represented 44% of the total fleet's hold capacity in the South-Center jack mackerel fishery (table 1).

During the 1970s and 1980s, the increasing abundance of the Chilean jack mackerel stock was one of the reasons underlying the expansion of Chilean fishing effort into adjacent high-seas areas. The parental stock expanded until 1989; afterwards, it began a declining phase as a result of relatively low recruitment (in the late 1980s and early 1990s) and increased catches (figure 3). Another important reason was the 1992 disappearance of the DWFN fleet that fished jack mackerel in the high-seas adjacent to Chilean and Peruvian waters.⁷ In 1990, this DWFN fleet caught 1.1 million tons of jack mackerel in adjacent high-seas waters in the South East Pacific, mostly in the adjacent zone off the Central Chile EEZ.

During 1997, a scarcity of adults became evident in the South-Center fishery (Serra 1998), the result of overfishing and a strong *El Niño* (from the middle of

⁵ There are two main competing hypotheses in this debate: a 'single stock' (Elizarov *et al.* 1993) versus a 'three stocks' theory (Storozhuk *et al.* 1987). Serra (1991) supports the theory of three independent stocks (Chilean, Oceanic, and Peruvian).

⁶ *De jure* closed access regulation has prevailed in this fishery since 1986, though achieving only limited effectiveness. Since 1993, it has been under 'full exploitation' status which opens the possibility of using total allowable catch (TAC) quotas, among other regulations (Peña 1996, 1997). So far, TACs have not been used in this fishery. During 1997–98, temporary closed fishing seasons were the dominant regulation. For 1999, a TAC proposal of 2 million tons has been under debate, subject to the possibility of free-cost allocated ITQs.

⁷ This fleet was mainly composed of vessels from Poland, Cuba, and Russia, the latter being dominant. It fished in this area from 1978 up to 1992; its main fishing grounds were located in high-seas areas in front of Central Chile. Forty-two Soviet vessels were sighted operating 210 to 250 miles off the Chilean Coast in 1981, increasing to 73 vessels by 1983, and to 80 one year later. During the late 1980s, it was composed of about 70 factory midwater trawlers (Crone-Bilger 1990, p. 118). For Russian vessels, the main products were frozen fish and fish meal. For Polish, it was canned fish. Retreat from this fishery was an economic consequence of the disintegration of the ex-Soviet Union and the economic collapse associated with it. While this fleet operated in this region, there was no collaboration between Soviet Union and Chilean counterparts.

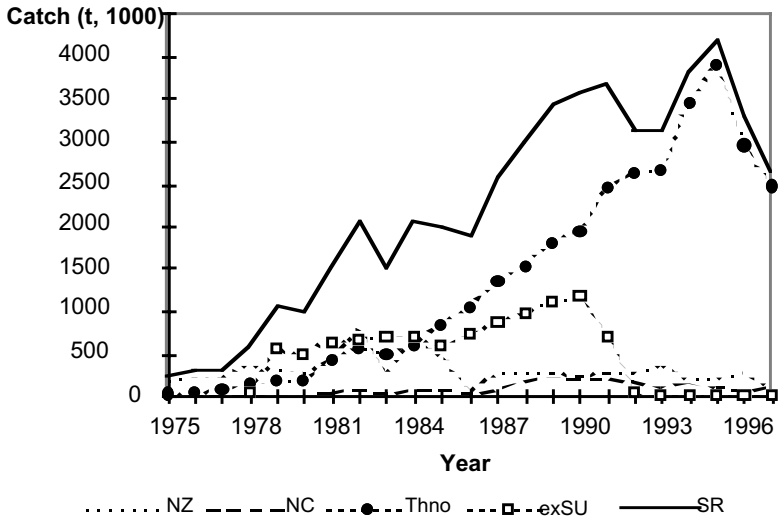


Figure 2. Jack Mackerel Landings in the Southeast Pacific Off the Chilean Coast [NZ = Northern Zone; NC = North Center; Thno = Talcahuano; ex-SU = ex-Soviet Union; and SR = (Total) Subregional]

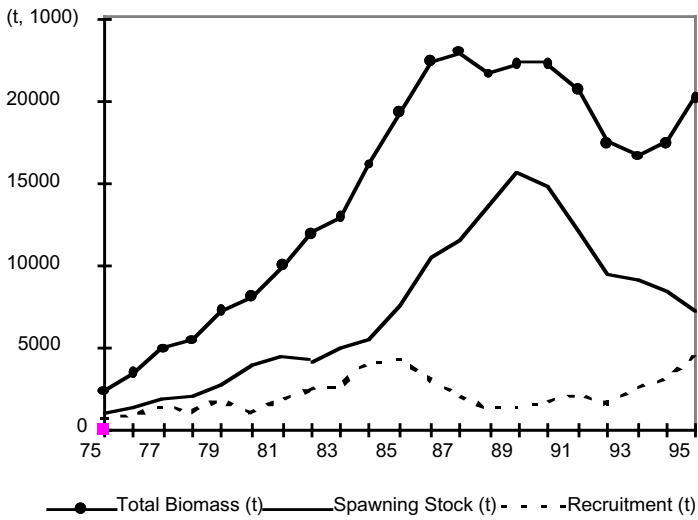


Figure 3. Abundance of the Chilean Jack Mackerel Stock (Covering the NZ, NC, Thno, and International Fishing Grounds)

Table 1
The South-Center Industrial Fishing Fleet

Year	Catch (tons, 10 ³)		Category 1 (80–300 m ³)		Category 2 (300–800 m ³)		Category 3 (above 800 m ³)		Total Fishery	
	Total	J. Mack.	N	SC (%)	N	SC (%)	N	SC (%)	N	SC (m ³ ; 10 ³)
1985	952.8	852.0	49	37.4	48	62.6	0	—	97	27.8
1986	1,127.9	1,050.5	46	30.2	47	69.8	0	—	93	29.5
1987	1,528.1	1,341.2	38	24.9	54	75.1	0	—	93	32.8
1988	1,704.4	1,438.8	38	19.7	66	78.2	1	2.1	105	39.7
1989	2,001.5	1,676.5	31	12.5	69	75.1	8	12.4	108	48.4
1990	2,091.2	1,859.5	45	15.6	83	67.6	12	16.8	140	60.4
1991	2,868.0	2,329.4	45	12.9	110	69.8	19	17.2	174	76.4
1992	2,881.2	2,471.8	42	11.7	109	67.1	22	21.3	173	78.5
1993	2,617.7	2,391.5	34	8.9	107	60.9	31	30.1	172	90.1
1994	3,423.5	3,124.6	28	6.4	94	52.4	45	41.2	167	97.0
1995	4,024.2	3,733.9	21	5.1	108	50.9	48	44.0	177	108.9

Catch (from regions V to X); Total: all species caught; J. Mack.: jack mackerel
 SC: fleet's storage capacity measured in m³; SC (%): % share in the fishery's total SC; N: number of industrial fishing vessels
 Source: IFOP (Chilean Development Fisheries Institute), unpublished data.

1997 up to early 1999). As a consequence, this fishery is undergoing a period of crisis. Given that the Chilean jack mackerel stock is currently passing through a delicate 'fully exploited' status (*i.e.*, no production surplus left, and significant uncertainty about sustainable catch levels), and that its main spawning area is located in the adjacent high-seas,⁸ the possible return of DWFN fleets to this high-seas area is perceived by the Chilean government and private vested interests as a sensitive subject.⁹ At the price and catch levels prevailing in the mid-1990s, the Chilean catch of jack mackerel generated around US\$650m/yr. in exports (Sarquis 1996). The regional employment provided by these fisheries has political importance as well, particularly in the case of the South-Center fishery.¹⁰

Entry-deterrent Fishing Effort in the Adjacent High-seas?

It is an open question whether it would be convenient for Chilean interests to allow further expansion of national fishing effort into the relevant adjacent high-seas as an entry-deterrent strategy preventing the potential arrival of DWFN fleets into this fishery. This is a proposal which might enjoy popular support in Chile; its economic convenience, however, is far from clear.

Let us suppose that current catch returns provide incentives for Chilean entrepreneurs to expand their fishing effort in this area, perhaps requiring further investment in vessels capable of reaching these high-seas waters. Two important issues should be addressed before regulatory approval is granted for further expansion of Chilean fishing effort in this area. First, the implications on the stock's sustainability. This stock is believed to be in a delicate "fully exploited" status (Serra 1998); hence, associated risks on the stock's reproductive capacity should be explicitly assessed (Peña, Barton, and Fuentes 1999). As long as the sustainable catch is below the levels caught during the mid-1990s (as it doubtless will be in the following years), further investment in fishing capacity would simply worsen an already existing over-capacity problem (especially given the absence of suitable alternative fishing grounds).

Second, it may still be argued that current restraints on Chilean fishing effort would be an unproductive (hence, too costly) policy, as they may simply result in increased chances for the arrival of DWFN fleets into the adjacent high-seas, without allowing for any secure long-run benefits for Chilean interests. This idea, as well as the proposal of increased domestic fishing effort as entry-deterrence against foreign fleets, presumes that higher fishing effort would not only reduce the stock availability in this fishery, but also the profitability of marginal effort units. In pelagic fisheries, however, marginal harvesting costs are often not very sensitive to changes in stock size, at least until the stock arrives at dangerously overexploited levels (Peña and Basch 2000; Basch, Peña, and Dufey 1999; Bjørndal 1989; Csirke

⁸ The seasonal migration of the Chilean jack mackerel stock consists of migrating from coastal to high-seas waters to spawn, returning to coastal waters for feeding.

⁹ Interest in this high-seas fishery has been shown in recent years by Japan and other Asiatic countries; *e.g.*, China. The Japanese have done research on the Chilean jack mackerel, exploring its abundance and its use for *surimi* production. Some opinions in Chile suggest that Russia could have interest to reenter this fishery, particularly if Chilean ports could be used to transship production.

¹⁰ In 1994, the regions involved in the South-Center fisheries area (regions V to IX) accounted for 56% of the direct and permanent industrial fishing jobs (harvesting and processing sectors) provided by capture fisheries in Chile (Nilo and Palta 1997). Adding industrial, artisanal, and aquaculture fisheries, permanent and direct fishing employment would represent around 100,000 jobs in Chile. The addition of temporary/transient related jobs could increase the latter figure to around 500,000 (Bernal and Aliaga, 1999).

1988). As a result, it is not clear that higher domestic fishing effort would be an effective entry-deterrent strategy against the arrival of DWFNs.

If DWFN fleets have been out of this fishery, it is probably due to the costs of moving these fleets into these fishing grounds, and to the costs of speedy transportation of the processed catch back to demand markets. The latter costs are probably affected by Chilean rulings on whether to allow or deny access to Chilean ports for landing or transshipment of fish caught by DWFNs in the adjacent high-seas.

The Agreement and Coastal States' Control over Port Use

Under UNCLOS, the lawful regulation of port use by any type of vessel is a matter which remains, in principle, fully dependent on the port state's national law;¹¹ while controversies of interpretation about the port state's rights in this area are subject to *voluntary* solution procedures (Montt, Iruarrizaga and Co. 1996). Would ratification of the Agreement change the port state's rights in this area?

We see two sets of issues regarding the answer to this question. In this section, we analyze issues related to landing or transshipment controls based on the enforcement of conservation or/and management (hereafter C/M) measures defined by the port state for straddling stocks which can be caught within its EEZ. We will refer to the second set of issues in the next section.

Article 23(3) in the Agreement recognizes the port state's right to "prohibit landings and transshipments where it has *been established* that the catch has been taken in a manner which undermines the effectiveness of subregional, regional, or global C/M measures *on the high-seas*" [italics is ours]. The latter includes measures adopted by a RFMO, which is the institutional setting proposed by the Agreement as a negotiated solution (among the coastal state and other interested fishing nations) for the management of straddling stocks in high-seas areas.

Notice that Article 23(3) makes no mention of the port state's right to prohibit landings and transshipments (of fish caught in the high-seas) when the catch undermines the effectiveness of C/M measures taken *within* the EEZ. However, Article 23(4) explicitly recognizes the exercise of coastal states' sovereignty over ports in their territories, "in accordance with international law." Therefore, as long as landing/transshipment controls cannot be questioned as discriminatory measures or unlawful barriers to trade, there seems to exist no impediment here for coastal state's sovereign exercise of port controls, if the latter are aimed at enforcing the effectiveness of C/M measures for straddling stocks which can be caught within the coastal state's EEZ.

¹¹ Questioning the preeminence of national law, relative to international law, concerning control of port use has already been attempted; *e.g.*, the EU's allegation against Canada's 1989 ruling which closed access to Canadian ports to EU's fleets, based on Article V of the 'Marrakech Agreement' (which established the World Trade Organization (WTO) as replacement to GATT). Article V establishes the obligation of WTO member states to ensure "freedom of transit through the territory of each contracting party... for traffic in transit to and from the territory of other contracting party." However, the application of this broad rule should not be directly valid for fishing vessels and their catch, as the latter does not necessarily represent an 'international trade' operation (on which article V is applicable to) between the coastal state and a DWFN fleet. The validity of this argument is strengthened when the coastal state's restrictions over port use are based on national legislation which has as its primary focus the enforcement of conservation measures concerning stocks harvested by that coastal state's vessels within its EEZ (Article XX(g) of the GATT Agreement exempts from GATT rules—subject to conditions of no arbitrary discrimination and no barriers to trade—policy measures relating to the conservation of exhaustible natural resources). In this case, Article 297(3a) of UNCLOS should also apply (it exempts any coastal state from accepting the submission to settlement of any dispute relating to *its sovereign rights* with respect to the living resources in its EEZ).

Nonetheless, Montt, Iruarrizaga and Co. (1996) argued that ratification of the Agreement would lead to accepting *compulsory* solution procedures if controversies of interpretation over the coastal state's rights in this area emerged.¹² In this case, the coastal state's rights over port use could become conditioned by International Law, as controversies of interpretation may be ultimately settled by an International Tribunal. However, for port state's measures, as those defined in this section, we believe this conclusion is invalid. Indeed, Article 32 of the Agreement extends to states which are party to the Agreement, the limitations on the applicability of procedures for the settlement of disputes, specified in Article 297 of UNCLOS. In particular, Article 297(3) exempts any coastal state from the obligation to accept submissions to settlement of "any dispute relating to its sovereign rights with respect to the living resources in the EEZ or their exercise, including its discretionary powers for determining the allowable catch, its harvesting capacity....and the terms and conditions established in its conservation and management laws and regulations."¹³ Therefore, from the perspective of landing or transshipment controls, which are based on enforcing C/M measures for straddling stocks caught within the EEZ, and which are in accordance with international law, we conclude that ratification of the Agreement would imply no change with respect to the coastal state's rights over port use under UNCLOS and current customary international law.

Coastal States' Sovereignty over Fishery Management Decisions (Including Port Use) within their EEZ

Here we discuss 'the other side of the coin' to the question on port state's control rights. We now argue that ratification of the Agreement could imply, under some conditions, subordination of coastal state's sovereign rights, regarding the management of a straddling stock caught within its EEZ, to C/M measures agreed by a RFMO for high-seas fishing of that stock.¹⁴ Potential conflicts of preeminence between the two key legal principles involved (coastal state's sovereign rights upon C/M measures within its EEZ, and RFMO's control rights over C/M measures for high-seas fishing of a straddling stock) belong to uncharted legal areas that emerge in the case of ratifying the Agreement.

Before discussing implications, let us set the basis of our claim: Article 3 states that Articles 6 and 7 (of the Agreement) not only apply to the C/M of straddling stocks and highly migratory stocks on the high-seas, but also to C/M measures to such stocks *while in waters under national jurisdiction (subject to*

¹² Article 27 of the Agreement establishes the "States' *obligation to settle* their disputes by peaceful means" (the latter are described in Articles 28-30). When referring to the settlement of disputes between states, UNCLOS uses less mandatory wording, "States Parties *shall seek* a solution (by peaceful means)..." (UNCLOS, Article 279).

¹³ The Chilean Fisheries Law (L.D. 430, 1991), in its Article 165(3) rules, "The Ministry [of Economics] can prohibit the landing, supplying and any other services provided to vessels at Chilean ports and within the Chilean EEZ, when there exists founded presumption that these vessels' fishing activities affect stocks harvested by Chilean vessels within the EEZ."

¹⁴ Tahindro (1997) seems to suggest otherwise. He argues that, when considering the clauses in UNCLOS and the Agreement as a whole... "It may be inferred... that the coastal states' interests might take priority over those of high-seas fishing states in circumstances where they would be unable to agree on compatible measures for the C/M of straddling stocks..." (p.18). This is Tahindro's personal interpretation, as it is the nature of our claim here.

the different legal regimes that apply within areas under national jurisdiction...) [italics ours]. Let us focus on Article 7.¹⁵

Article 7 refers to cooperation requirements for coastal states and DWFNs vis-à-vis the implementation of C/M methodologies (for straddling stocks) within and beyond the areas of national jurisdiction. Article 7 leaves, we believe, space for ambiguity and disputes of interpretation regarding preeminence between potentially conflicting legal principles. On one hand, Articles 7(1) and 7(2a) recognize the coastal state's sovereign rights upon C/M measures for fish caught within its EEZ.¹⁶ On the other, both Articles set potentially conflicting "duties of cooperation" for the relevant coastal state and DWFNs. Article 7(1a) states that the relevant coastal state and DWFNs "*shall seek...to agree* upon the measures necessary for the conservation of the [straddling] stock in the adjacent high-seas" [italics is ours] (the wording here does not differ qualitatively from the 'duty' established in Article 63(2) of UNCLOS). While Article 7(2) starts by stating, "C/M measures established for the high-seas and those adopted for the EEZ *shall be compatible...* To this end, coastal states and other states fishing in the high-seas *have a duty to cooperate...*" [italics is ours] (UNCLOS, Article 64(1), states the less mandatory "[the relevant coastal states and DWFNs] *shall cooperate* to ensuring conservation...within and beyond the EEZ.").

What is meant by "compatible" C/M measures? What happens if the coastal state is questioned by a DWFN as not fulfilling its "duty to cooperate?" Given that one of the key underlying issues at stake here is *who gets what rights* to fish the straddling stock on adjacent high-seas waters, and that the states involved may have different fishing objectives as well as assign different valuations to the right to exploit that stock, controversies of interpretation seem likely. We find no rulings in the Agreement, in UNCLOS, or in the combination of both, which could *unambiguously* settle disputes in this respect.

Consider an illustration of this point. On one hand, Article 7(2e) in the Agreement states that "[as part of the duty to cooperate for the purpose of achieving *compatible* measures in respect of straddling stocks, the relevant party states] shall take into account the respective dependence of the coastal states and the other states fishing in the high-seas on the stocks concerned." On the other, suppose that in the opinion of a DWFN whose vessels fish on the high-seas adjacent to a coastal state's EEZ, an existing or proposed C/M measure (set or suggested by the coastal state) would cause damage to its commercial fishing interests and to those of its communities that depend on fishing. Could this position be used as an argument against the adoption of rigorous management measures by the coastal state? Freestone and Makuch (1998) argue that a legal case could be made here for sustaining a controversy of interpretation.

Though it is true that Article 32 of the Agreement offers a *qualified* weaving through the "states' *obligation to settle* the disputes.." (Article 27), thereby diluting the chances of facing a *compulsory* solution procedure, the settlement between potentially conflicting legal principles in these disputes remains an uncharted legal territory.

¹⁵ Article 6 refers to application of the *Precautionary Principle* ('the absence of adequate scientific information shall not be used as a reason for postponing or failing to take C/M measures...') to straddling/highly migratory stocks. It includes conditions for parties to the Agreement such as, "States shall share the best scientific information available...", "States shall determine stock-specific reference points... and shall take measures to ensure that, when reference points are approached, they will not be exceeded." Settlement of the implications of exceeding 'reference points' is left to the states acting through a relevant RFMO.

¹⁶ Article 7(1) starts by stating, "Without prejudice to the sovereign rights of coastal states for the purpose of exploring and exploiting, conserving and managing the living marine resources within areas under national jurisdiction as provided for in UNCLOS,..."; while Article 7(2a) states that, "[as part of the duty to cooperate], C/M measures taken on the high-seas shall not undermine the effectiveness of measures taken by coastal states within areas of national jurisdiction."

In addition to conflicts of preeminence between legal principles and the rights of the states involved, there are two other important implications. First, conflicts in this area would obviously involve distributive disputes between coastal states and DWFNs. Coastal states would like to gain full control over fishing rights for straddling stocks in their adjacent high-seas, but the Agreement goes for a negotiated solution to this issue.¹⁷ Unless ratification of the Agreement were a complete failure (which seems unlikely),¹⁸ it is improbable, for the time being, that coastal states' distributive aims in this area could gain enough support to successfully challenge prevailing International Law on the matters affected. Moreover, we argue later that, in case the Agreement does enter into force for the parties to it, coastal states with important stakes in straddling fish stocks will feel pressure to ratify it as well, particularly when fishing competition from DWFN fleets in the adjacent high-seas represents a binding threat.

Second, suppose a coastal state and a DWFN have both ratified the Agreement and set a RFMO for managing a commonly exploited straddling stock in adjacent high-seas waters. Assume the DWFN fleet complies satisfactorily with all the C/M measures established by that RFMO for high-seas fishing. Suppose now the DWFN fleet requests access to coastal states' ports for landing or transshipping its catch from the adjacent high-seas. Could the coastal state deny or limit access to its ports?

Unless a sound case could be made against that DWFN fleet's high-seas fishing, based on negative effects on the effectiveness of the C/M measures for EEZ fishing of the same stock (a claim which may be difficult to substantiate if the DWFN fleet has been complying with the C/M measures negotiated within the RFMO), the denial of access to coastal states' ports would tend to appear unlawful under international law. In this case, the competitiveness of coastal states' fishing companies could be at stake.

The conclusions suggested in this section do not necessarily imply that ratification of the Agreement is a bad decision for a coastal state with important stakes in the exploitation of straddling stocks. One of the key conditionings of the convenience of whether or not to ratify the Agreement (or perhaps of the *optimal timing* for ratification, as modeled in Kaitala and Lindroos 1999) is how damaging the threat of fishing competition from DWFN fleets in the adjacent high-seas is expected to be.

Access to Fish Resources in the Adjacent High-seas: The 'New Member' Problem

Some commentators (*e.g.*, Hayashi 1996) have suggested that the Agreement (particularly, the combination of Articles 8 and 17) may undermine the concept of freedom of fishing on the high-seas, hence implying a departure from the letter of UNCLOS. We will not qualify this debate here. As numerous stocks caught in high-seas waters become scarcer, we share the view that, to avoid progression of wasteful overfishing in the high-seas (facilitated by UNCLOS's weaknesses in this respect),¹⁹ qualified controls on this freedom should be imposed. As Munro (1995) stated, "stable [*i.e.*, successful] cooperative management regimes for straddling and highly

¹⁷ States' relative bargaining strength on these matters would most likely be conditioned by issues going beyond 'fishery considerations.' States' relative international standing (*e.g.*, trade issues involved) should be expected to play a significant role.

¹⁸ Up to 10th June 1999, 23 states had ratified the Agreement. In order for the Agreement to enter into force, the minimum number of ratifying parties is 30 (Article 40).

¹⁹ When Balton (1999) refers to the enforcement implications from the application of UNCLOS' principle of exclusive flag-state jurisdiction over vessels on the high-seas, he uses the analogy of "a safe haven for bad [fishing] actors."

migratory stocks will not be possible unless the relevant adjacent high-seas become high-seas [*i.e.*, full common property] in name only.” Accepting this principle, could ratification of the Agreement lead to successful enforcement of cooperative management for a straddling stock? This section, and the next, discuss this issue.

On one hand, the Agreement (Article 8: para. 3, 4, and 5) does confer, to a given RFMO, *de jure* control rights upon access to high-seas fishing of the straddling stock under the RFMO’s jurisdiction. While Article 8 (para. 3 and 5) establish that states are *obliged to cooperate with* the relevant RFMO or to establish one where none exist [*italics is ours*], Article 8(4) rules that failure to observe this duty (*i.e.*, to become a member or participant in the RFMO, or agree to apply the C/M measures established by such RFMO), *bars access to the fishery resources* to which the measures established by members or participants of the RFMO concerned apply [*italics ours*].

On the other hand, Article 8 includes an ambiguous access condition for states wishing to become members of an already established RFMO.

States having a *real interest* in the fisheries concerned may become members of such organization... The terms for participation in such organization shall not preclude such states from membership or participation; nor shall they be applied in a manner which discriminates against any state or group of states having a real interest in the fisheries concerned (Article 8(3)) [*italics ours*].

The definition of ‘*having a real interest in the fishery*’ can involve controversy. If this were to imply *de facto* free access to the RFMO, it would bar any possibility of achieving an effective RFMO, as free-riding would eventually become the dominant strategy (Munro 1999). A possible way out of this would be that RFMOs could differentiate between allocating ‘participatory rights’ and ‘fishing rights.’ This differentiation seems legally possible under the Agreement.²⁰

The allocation of ‘participatory rights’ would serve RFMOs to fulfill their duty of not precluding any state ‘having a real interest in the fishery’ from participating in such organizations. The ‘participatory’ right (and the associated duties) would offer the *option* to obtain ‘high-seas fishing rights’ upon the straddling stock in waters under the RFMO’s jurisdiction. The conditions for being granted ‘fishing rights’ would be defined, through negotiation, when starting the RFMO. Article 11 of the Agreement defines basic criteria that could be used to differentiate between the nature and extent of ‘participatory rights’ and ‘fishing rights’.

In order that RFMOs could become *effective* organizations, the differentiation proposed should lead to *enforceable closed access* conditions (in terms of rights to fish the straddling stock on the relevant high-seas). Could then an effective RFMO be consistent with allowing new members *nondiscriminatory* access to ‘fishing rights’ on that high-seas fishery? An efficient solution would be to price access to these fishing rights; *e.g.*, by balancing the allocation of new members’ fishing rights to a corresponding surrender of fishing rights by one or more of the RFMO’s current members. Furthermore, to increase the chances that the RFMO could *effectively* manage the straddling stock; *e.g.*, withstanding unpredictable significant changes in the fishery’s productivity, the selling of fishing rights (*e.g.*, percentage shares in total allowable catch) should also allow for tradability and divisibility of fishing shares among RFMO’s current members, thereby making possible transfer payments from members with higher marginal valuation of these fishing rights to members with lower marginal valuation.

Unfortunately, even if the proposals above were implemented, and monitoring/control efforts led to effective enforcement of the RFMO members’ allocated fishing

²⁰ Personal communication with David Balton, one of the lawyers within the US team that participated in the negotiations concerning the writing of the Agreement.

shares, RFMOs' management success would still depend upon solving an additional problem; *i.e.*, the possibility of *illegal* fishing within high-seas areas under the RFMO's jurisdiction, by vessels operating under the flag of a state which, by own choice, has decided to be a nonmember of that RFMO. Munro (1999) calls this the 'Interloper' problem.

The 'Interloper' Problem

If the threat of interlopers' illegal fishing were to be binding, and the involved RFMO had no effective powers to stop it, then free-riding (*e.g.*, current members stop being dutiful parties to the RFMO) could easily dominate. RFMO's management efforts would then become ineffective.

Imagine a straddling-stock fishery where interlopers' illegal high-seas fishing would be a profitable activity. Under UNCLOS, enforcement of C/M measures on high-seas fishing falls under flag-state jurisdiction. Evidence has proven, however, that this approach can involve significant weaknesses (Balton 1999; Munro 1999). While maintaining the enforcement duties of flag states, as specified in UNCLOS, the Agreement attempts to strengthen enforcement powers upon high-seas fishing (for details, see Tahindro 1997; Freestone and Makuch 1998).

Regarding the C/M of straddling stocks, Article 17 of the Agreement states the principle that nonmember states of a given RFMO are not discharged from the *obligation to cooperate* with such RFMO. Under this principle, flag states are responsible, even if they are nonmembers of the affected RFMO, for enforcement as well as instituting proceedings against illegal fishing by interlopers operating under their flag.²¹ (Settlement of the implications of not fulfilling this flag-state obligation is decided, *in accordance with international law*, by the states' members of the RFMO.)

However, Part VI of the Agreement (particularly, Articles 20–21) makes RFMOs a vehicle for adopting and implementing inspection schemes upon vessels which are suspected of unauthorized fishing in waters under the RFMO's jurisdiction.²² Indeed, Article 21(1) sets the right, of a state party to both the Agreement and the affected RFMO, to board and inspect (in high-seas areas under the jurisdiction of the RFMO) any suspected vessel flying the flag of a state party to the Agreement, even if the relevant flag state is a nonmember of the affected RFMO.

Despite attempts to improve enforcement powers upon high-seas fishing, there remain two important areas of doubt regarding the chances of achieving effective enforcement against the threat of interlopers' illegal fishing. Firstly, it is yet to be tested whether or not *specific* enforcement tools, agreed within each RFMO, would deal satisfactorily with free-riding issues.

Secondly, and perhaps more importantly, Articles 20(6) and 21(1) of the Agreement, which attempt to strengthen enforcement powers upon high-seas fishing, would only be binding on *states parties to the Agreement*. In the case of Article 17, the same can be inferred (see Freestone and Makuch 1998, p.34). Hence, interlopers may find 'safe havens' by flying flags of states which choose to be nonmember of the affected RFMO as well as nonparties to the Agreement.

In a few cases, among currently existing RFMOs, successful enforcement of RFMOs' rulings seems to have occurred. For example, Munro (1999) cites the re-

²¹ Articles 18–19 describe the flag states' duties that emerge from the 'obligation to cooperate' with RFMOs.

²² For example, under Article 20(6), a given flag state may permit a concerned coastal state to board and inspect a vessel (operating under the former state's flag) which is suspected of unauthorized fishing within the coastal state's EEZ.

cent success (from 1996 to present) of a cooperative (five-state) management scheme for the (straddling) Norwegian spring-spawning herring stock.²³ As examples of promising enforcement actions taken by existing RFMOs, Balton (1999) cites the adoption (from 1994 to present) of multilateral trade embargoes, by state members of the International Commission for the Conservation of Atlantic Tunas (ICCAT), against permissive flag (nonmember) states whose vessels are engaged in damaging fishing activities against ICCAT's objectives.²⁴ Another recent example is the implementation (since 1997) by NAFO (North Pacific Anadromous Fish—salmon to all intents and purposes—Commission) of restrictions on landings of fish caught by *nonmember* states in transgression of NAFO's C/M measures.²⁵ The Commission for the Conservation of Antarctic Marine Living Resources has also adopted a modified version of NAFO's enforcement actions and is currently considering the possibility of complementary measures, such as a catch certification scheme.

It is yet to be seen if maintaining successful enforcement, in the examples quoted above, will require new enforcement tools or powers. Doubts in a similar direction underlie the future of the Agreement. Successful enforcement of the Agreement, in case it enters into force, might require further modifications to the International Law of the Sea (*e.g.*, to allow for international policing of 'bad' fishing actors throughout an 'International Fishing *Interpol*-like' institution).

Beyond the uncertainties surrounding uncharted legal grounds, opened by the possibility of the Agreement's entry into force, and as with many other regulatory decisions concerning marine fisheries, there are no absolute rules to follow when assessing the likelihood of effective enforcement of potential RFMO's C/M measures. The size and nature of the area under RFMO's jurisdiction, the stock migratory patterns and the available knowledge about them, the number and nature of the parties involved (*e.g.*, the relative resource valuations and bargaining strengths of RFMO's prospective members; the significance of interlopers' fishing threat), are examples of features which condition the likelihood of achieving successful fishery management.

Concluding Remarks

The Chilean jack mackerel stock is currently caught in adjacent high-seas off Chile's EEZ only by a fleet operating under Chilean flag. Though signs of interest in this fishery have been shown in recent years by some DWFNs (*e.g.*, Japan and Russia), we are not aware of current evidence signaling imminent competition from DWFN fleets in this area. This situation explains, to a great extent, Chile's current cautious position of 'wait-and-see' regarding ratification of the Agreement. In the meantime, Chile is pursuing preliminary talks with member states of the Permanent Commission of the South Pacific (Peru, Ecuador, Colombia, and Chile), in view of developing common-ground understanding about implications from a possible ratifi-

²³ The current scheme involves Norway (the dominant coastal state in this fishery), the Faroe Islands, Iceland, Russia, and the EU. The cooperative agreements are renewed annually. The year-by-year agreements are accompanied by bilateral agreements between pairs of 'players,' allowing exploitation rights in one another's waters; *e.g.*, the EU is allowed to take a certain amount of its harvest in Norwegian waters and vice versa. (Munro 1999, pp. 23–24)

²⁴ After identifying nonmember states whose vessels are engaged in damaging fishing activities, ICCAT can authorize its members to prohibit the importation of bluefin products from the nonmember States in question.

²⁵ A caveat: NAFO jurisdiction is upon a relatively compact high-seas area; hence the NAFO joint inspection scheme allows for effective monitoring of all relevant fishing activities by members and nonmembers alike (Balton 1999, p. 8).

cation of the Agreement.

We have argued that the Agreement does involve potentially conflicting legal principles, implying possible negative effects on coastal states' sovereignty upon conservation/management measures within their EEZs and the competitiveness of domestic fishing companies. This, by itself, does not imply that ratification of the Agreement would be a bad public decision from a coastal state's viewpoint. The cost/benefit balance depends on how binding the disruptive effects from DWFNs' noncooperative fishing competition are expected to be. How binding this threat could be depends on, among other things, the prevailing cost differentials between incumbent coastal state(s) and potential DWFN entrants. We are not aware of studies on relevant empirical parameters for assessing these issues in the Chilean jack mackerel high-seas fishery. Contributions in this area would be welcome.

We have also taken the view that, given the international coalitions which prevailed when negotiating the drafting of the Agreement, the option of the Agreement's entry into force (*i.e.*, having at least thirty ratifying parties) currently seems more likely than the possibility of extending coastal states' fishery-management jurisdiction to relevant high-seas waters. Moreover, if the Agreement does go into force, then coastal states with important stakes in straddling fish stocks will feel increased pressure to ratify as well (with the optimal timing for ratification depending on how binding the disruptive effects from DWFNs' fishing competition are perceived to be in each case). Otherwise, nonratifying states will run the risk of being preempted by states which are parties to the Agreement, as first claimants to 'having real interest' in a given high-seas fishery. Nonratifying states could thus endanger their initial bargaining position, in case the definition of access rules and fishing restrictions for a given high-seas fishery had to be negotiated with other states.

Beyond particular management details in specific high-seas fisheries, ratification of the Agreement would still leave significant questions unanswered. Among them, how to deal with the so-called 'New Member' and 'Interloper' problems. Regarding the former, the only way of achieving *effective* management would be if RFMOs were able to enforce *closed access* conditions. Under the Agreement, this could be achieved if RFMOs differentiated between allocating 'participatory' versus 'fishing' rights to new members. The former right would imply the option to get the latter, provided new members agreed to comply with the corresponding duties defined by the RFMO. 'Participatory' rights would be allocated to all states having a 'real interest' in the corresponding high-seas fishery, whereas 'fishing' rights could be subject to priced access. Tradability and divisibility of fishing rights, among current as well as prospective members of the RFMO, would enhance the economic efficiency embodied in such a management system, while at the same time making it more resilient to unpredictable changes in fishery productivity. Both features—priced access and tradable fishing rights—would seem to be legally feasible under the combined framework of the Agreement and the Law of the Sea Convention.

However, enhanced value creation from the proposals above could still face formidable obstacles if the 'Interloper' problem represented a binding constraint. It remains to be tested, at specific RFMOs, whether or not enforcement powers available under the Agreement could deal satisfactorily with interlopers' illegal fishing. Under the Agreement, current weaknesses in the prevailing principle of flag-state enforcement for high-seas fishing remain basically unchanged. Hence, effective enforcement would require RFMOs to use new enforcement tools (*e.g.*, trade sanctions, compliance catch labeling). In some cases, international agreement on further adjustments to the Law of the Sea Convention might be needed (*e.g.*, for setting an 'International Fishing Interpol-like' institution). For the moment, however, discus-

sion of these issues is still in the realm of speculation.

Finally, looking ahead, it seems likely that fishing effort will continue expanding to new fishing grounds, as profitability of current ones falls. It seems equally likely that high-seas areas in the South-East Pacific, as well as in the Antarctic Ocean, could sustain profitable development of new high-seas fisheries, provided successful advances in fishing technology and/or development of new fishing products (e.g., human-edible, krill-based products) were achieved. To make this a reality requires exploratory fishing effort, as well as further technological/scientific mastering. Despite that the *overall* challenge probably exceeds Chile's exclusive reach, Chile and other countries alike should develop strategies for becoming contributors in the efforts needed.

References

- Balton, D. 1999. Dealing with the "Bad Actors" of Ocean Fisheries. Paper presented at the *Conference on the Management of Straddling Fish Stocks and Highly Migratory Fish Stocks and the U.N. Agreement*. Bergen, Norway, May 19–21.
- Basch, M., J. Peña-Torres, and H. Dufey. 1999. Economies of Scale and Stock-dependence in Pelagic Harvesting: the Case of Northern Chile. *Cuadernos de Economía* 108(August):841–73.
- Bernal, P.A., and B. Aliaga. 1999. ITQs in Chilean Fisheries. Paper presented at the Conference *User Rights in European Fisheries*. Brest, France, May 5–7.
- Bjørndal, T. 1989. Production in a Schooling Fishery: the Case of the North Sea Herring Fishery. *Land Economics* 65:49–56.
- Churchill, R.R., and A.V. Love. 1985. *The Law of the Sea*. Manchester: Manchester University Press.
- Crone-Bilger, C. 1990. *International and Economic Policy Aspects of the Soviet Ocean-going Fishing Industry*. Ph.D. thesis in Economics, University of London.
- Csirke, J. 1988. Small Shoaling Pelagic Fish Stocks. *Fish Population Dynamics* (2nd edition), J.A. Gulland, ed., pp. 271–302. Chichester: John Wiley and Sons.
- Elizarov, A.A., A.S. Grechina, B.N. Kotenev, and A.N. Kuzetsov. 1993. Peruvian Jack Mackerel, *Trachurus symmetricus murphyi*, in the Open Waters of the South Pacific. *J. Ichth.* 33(3):86–104.
- Evseenko, S.A. 1987. Reproduction of the Peruvian Jack Mackerel, *Trachurus symmetricus murphyi*, in the Southern Pacific. *J. Ichth.* 27(3):151–60.
- Freestone, D. and Z. Makuch. 1998. The New International Environmental Law of Fisheries: The 1995 United Nations Straddling Stocks Agreement. *The Yearbook of International Environmental Law*, pp. 3–51. Oxford: Clarendon Press.
- Gilliland-Dalton, J. 1993. The Chilean Mar Presencial: A Harmless Concept or a Dangerous Precedent? *The International Journal of Marine and Coastal Law* 8(3):397–418.
- Hayashi, M. 1996. The 1995 Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks: Significance for the Law of the Sea Convention. *Ocean & Coastal Management* 29:51–63.
- Joyner, C.J., and P.N. De Cola. 1993. Chile's Presencial Sea Proposal: Implications for Straddling Stocks and the International Law of Fisheries. *Ocean Development & International Law* 24:99–114.
- Kaitala, V., and M. Lindroos. 1999. When to Sign an Environmental Agreement: The Case of High-seas Fisheries. Paper presented at the *Conference on the Management of Straddling Fish Stocks and Highly Migratory Fish Stocks and the U.N. Agreement*. Bergen, Norway, May 19–21.

- Martinez-Busch, J. 1996. Los Intereses Maritimos de Chile en Alta Mar. Paper presented at the *Sonapesca Conference*, Valparaiso, Chile, Mayo.
- Ministerio de Economia. 1991. *Ley General de Pesca y Acuicultura*, Decreto Ley No. 430, 28/9/91, Santiago, Chile.
- Montt, Iruarrizaga and Co. (Ltd.). 1996. Acceso a los Puertos por Naves Pesqueras Extranjeras de Acuerdo al Derecho Nacional e Internacional. *Mimeo*, Santiago, Chile, Mayo.
- Munro, G.R. 1995. Fishery Resources of the Pacific, the New International Law of the Sea and International Cooperation. *Mimeo*.
- _____. 1999. An Economic Review of the United Nations Agreement for the Implementation of the U.N. Convention on the Law of the Sea, relating to the Conservation and Management of Straddling and Highly Migratory Stocks. Paper presented at the *Conference on the Management of Straddling Fish Stocks and Highly Migratory Fish Stocks and the U.N. Agreement*. Bergen, Norway, May 19–21.
- Nilo, M., and E. Palta. 1997. Analisis de la Fuerza de Trabajo en el Sector Pesquero. Working Paper, Instituto de Fomento Pesquero, Valparaiso, Chile.
- Peña-Torres, J. 1996. Chilean Fishing Regulation: a Historical Perspective. *Cuadernos de Economia* 100(December):367–95.
- _____. 1997. The Political Economy of Fishing Regulation: The Case of Chile. *Marine Resource Economics* 12(4):239–48.
- Peña-Torres, J., J. Barton, and R. Fuentes. 1999. Desafios de Politica Pesquera en Chile: Opciones mas alla de la Coyuntura. *Estudios Publicos No. 75* (Winter):229–72.
- Peña-Torres, J., and M. Basch. 2000. Harvesting in a Pelagic Fishery: The Case of Northern Chile. *Annals of Operations Research* (forthcoming).
- Sarquis, S. 1996. Los Intereses Pesqueros de Chile en Alta Mar. Paper presented at the *Sonapesca Conference*, Valparaiso, Chile, Mayo.
- Serra, R. 1991. Important Life History Aspects of the Chilean Jack Mackerel (*Trachurus symmetricus murphyi*). *Investigacion Pesquera (Chile)* 36:67–83.
- _____. 1998. Investigación Evaluación del Stock del Jurel, 1997. *IFOP/SUBPESCA Informe Técnico Final*. 50 pp. plus Annex. Valparaiso, Chile.
- Storozhuk, A.Y., K.A. Truveller, A.L. Baturin, I.B. Guleva, and G.N. Nefedov. 1987. Estructura Poblacional del Jurel Peruano. *Biología y Pesca Comercial del Jurel en el Pacífico Sur, 1994*, D. Arcos and A. Grechina, eds., pp.131–40.
- Tahindro, A. 1997. Conservation and Management of Transboundary Fish Stocks: Comments in Light of the Adoption of the 1995 Agreement for the Conservation and Management of Straddling and Highly Migratory Fish Stocks. *Ocean Development & International Law* 28:1–58.
- United Nations. 1982. United Nations Convention on the Law of the Sea, U.N. Doc. A/Conf. 62/122.
- _____. 1995. Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks. UNGA Doc. A/CONF. 164/33, 3 August 1995 (New York, 24 July through 4 August).