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Subject : Specific Agreement No 26: Ex-post evaluation of the current Protocol to the Fisheries Partnership Agreement between the European Union and the Kingdom of Morocco, Impact study for a possible future Protocol to the Agreement

Delegations will find attached the above document, partially declassified (fourth part)<sup>1</sup>.

<sup>1</sup> See also EXT 1 INIT + ADD 1-2, 4-5.

The presentation of the strategy for the development and competitiveness of the fisheries sector identifies 5 flagship projects:

Develop aquaculture (project A4): on the basis of the finding that the aquaculture structure is little developed in Morocco despite the potential offered by the sector, the Halieutis strategy provides for increasing aquaculture production to 200 000 tonnes by 2020 (it stands at only a few hundred tonnes at present). The launch of the strategy starts with the establishment currently under way of a governmental agency specialised in the sector, and investments in a research centre with INRH in Agadir.

Manage the fisheries on the basis of quotas (project A2): this involves implementing management plans for the main fisheries of the EEZ. Fisheries management is already a longstanding process. The first management plan was adopted for octopus in 2004, followed by a management plan for small pelagic species at the end of 2008. Two other management plans are in preparation, one for the exploitation of prawns and hake, the other on the exploitation of seaweeds. The management plans are complex schemes which aim to distribute the fishing possibilities on the basis of quota per segment and per vessel within a segment. This plan is accompanied by more intensive control procedures (traceability, concentration of landings). In parallel, the plans introduce mechanisms for restructuring the industries concerned to absorb overcapacity by promoting the conversion of vessels and industries and by encouraging, through calls for tenders, the emergence of integrated fleet-conversion projects. It is therefore an approach which has already been well launched in the recent past.

New fishing port in the south of the Kingdom (project B1): the major project was the construction of a fishing port in Boujdour, which has almost been completed. This new port will allow decongestion of the ports of Laayoune and Dakhla, which are in a state of near saturation with the coastal sardine fleet, and also to accommodate new units for the exploitation of the pelagic stocks in the south. There is also a project to extend the port of Dakhla.

Dedicate areas in ports to fishing and ensure effective management (project B2): The first initiative taken was to designate the ONP as lead fishing ports manager (global operator) through a contract signed with the State. At present, a transitional phase is in progress with the former principal operator (the National Ports Agency), which is gradually withdrawing from the fisheries field. The ONP will not receive additional budgets, but intends to withdraw from the operation of ports (hiring of fish crates, provision of tools) the income necessary for its management task. The heavy construction work and infrastructure maintenance remains the responsibility of the State.

Create 3 centres of competitiveness of marine products in the North, Centre and South of the Kingdom (project C3): the underlying idea is to reserve developed land on which the processing industries, the companies supplying services to these industries, and training, research and development institutes will be able to concentrate. These centres are also a response to the geographical dispersal of the processing units in some areas. There is already a similar centre in Agadir inaugurated in 2009, but which still needs to be reinforced. For the other two centres, one will probably be created in Tangier and will be intended for both agriculture and fisheries. The second will be either in Laayoune or Dakhla, with the latter site having the edge at present.

The other projects of the Halieutis strategy are also at relatively advanced stages. For the projects relating to the improvement of the performance of the sector, major achievements have been recorded by the ONP and its partners (especially the agency in the south) in the recent past. This refers to the construction of new fish markets in Safi (EUR 3.8 million), Tan Tan (EUR 3 million), Mohammédia (EUR 1 million), Larache (EUR 2.2 million), Agadir (EUR 6.5 million), and Boujdour (EUR 2.1 million) and Laayoune (EUR 4.2 million) in the south of the country, new fishing villages (Imoutlane EUR 3 million), N'Tireft (EUR 13 million) and Lassarga (EUR 7 million) and Labourida (EUR 7 million) in the south. Two wholesale markets have also been constructed at Casablanca (≈ EUR 10 million) and Oujda ≈ EUR 5 million). Other projects are in progress (see § 4.1.2 concerning the ONP).

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As regards the project to adapt and modernise the fishing effort (project A3 of the matrix), Morocco launched a coastal fleet modernisation programme already in 2007 (regeneration of the fleet, introduction of prototypes), and a programme to upgrade the artisanal and coastal fleet with a view to improving the quality of the catches on board and the living conditions of the seamen. The strategy of this programme, known as the IBHAR programme, was to make available public subsidies to encourage private investment. This programme did not have the desired effects and did not generate to enthusiasm among professionals. The relatively low level of subsidies granted (10% to 15% for the upgrading) would explain this lack of success. The DPM is currently contemplating, with the assistance of the FAO, a new IBHAR II programme which would better correspond to the expectations of the profession.

The Halieutis strategy does not break with the past. In fact, the strategy largely integrates initiatives which have already been launched, incorporating innovating policies, such as the development of aquaculture. The advantage of this new strategy is to assemble the various components of the sector development strategy within a consistent framework, involving in a single steering unit (called the Project Management Office) the various institutional and private actors (the DPM, ONP, INRH, the professionals, the development agencies, etc.). The Halieutis strategy also has the advantage of being multiannual, extending to the medium term (2020), which will allow the objective to be pursued independently of any political changes at the head of the Ministry in charge of the sector. Finally, another advantage of the integrated strategy is that it fixes quantified macroeconomic targets, such as the tripling of sectoral GDP in the future, the near doubling of employment in the sector, the growth in market shares on the international market or the increase of consumption in Morocco. It is pointed out that a large part of the success of the Halieutis strategy is based on the exploitation of the small pelagic species in the southern area, the only stock of the Moroccan EEZ which has potential for development. The forthcoming implementation of the management plan for these species should be followed attentively.

The financing required for the Halieutis strategy has not yet been precisely assessed. At the time of assignment of the task, several studies were in progress to define more precisely the strategies to be implemented and the associated cost. The EU sectoral support under the current Fisheries Agreement (EUR 13.5 million per year, i.e. EUR 54 million over the 4 years of the current Protocol) forms part of the potential sources of financing for the implementation of the national fisheries policy. This aspect is dealt with in greater depth in the next section.

#### **4.2.2 The EU support for the fisheries sectoral policy**

The outlines of the EU support for the fisheries sectoral policy (amounts and measures) were defined in 2005 at the time of initialling the Agreement and its application Protocol. The Protocol to the Agreement provided for a maximum total annual amount of EUR 13.5 million and targeted certain measures, including:

- at least EUR 4.75 million (at least EUR 19 million over 4 years) reserved to the modernisation and upgrading of the coastal fleet;
- an amount of EUR 1.25 million (EUR 5 million over 4 years) per year to abolish driftnets;
- and the rest (i.e. a maximum of EUR 7.5 million per year, EUR 30 million over 4 years) to be distributed between scientific research, restructuring of artisanal fishing, upgrading of marketing channels and promotion of domestic consumption, mechanisation of methods of landing and handling fish, training and support for professional organisations.

The Protocol to the Agreement with Morocco therefore stands out from the majority of other protocols to fisheries agreements concluded by the EU in that it targets well upstream of the priority measures and amounts, which gives it a constraining nature. In general, the other protocols to agreements do not favour specific measures and the associated amounts, leaving the two parties to agree on the management and objectives of the sectoral support. The explanation is that

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the programme for the modernisation and upgrading of the coastal fleet (the IBHAR programme) was already launched in Morocco and that the abolition of driftnets derived from a longstanding commitment to the ICCAT, which prohibited this practice for fishing swordfish in the Mediterranean in 2004, but allowing Morocco until the end of 2011 to adapt.

The function of monitoring, control and surveillance of the fisheries does not appear among the themes retained for EU sectoral support, even though it is one of the priorities for EU sectoral support in almost all the other fisheries partnership agreements in force. This area is very politically sensitive in Morocco. It involves the Royal military forces (navy, gendarmerie) which are in charge of all the activities regarding the protection of national territory (waters under jurisdiction and coastline). Undoubtedly on account of lack of time during the negotiations, these partners could not be associated in the discussions.

As provided for in the Protocol, the use of the EU sectoral support was adopted by the Joint Committee. The adoption took place in March 2008, i.e. a little later than initially anticipated (3 months at most after the entry into force of the Protocol). On this date, the Protocol to the Agreement had already been in force for over a year. The original matrix is shown below. It provides for a gradual commitment of the amounts, automatically carrying over the amounts paid in 2007 to the other years as a consequence of the lack of matrix for the first year of the Agreement.

Table 32: Initial distribution of the EU financial support for the sectoral policy. Source: DUE Rabat

	2007	2008	2009	2010	TOTAL
Support available	13 500 000	13 500 000	13 500 000	13 500 000	54 000 000
1- Support for the modernisation and upgrading of the coastal fleet	0	9 250 000	8 500 000	8 250 000	26 000 000
2 - Contribution to the abolition of driftnets	0	500 000	2 000 000	2 500 000	5 000 000
3 - Scientific research	0	2 000 000	3 000 000	3 000 000	8 000 000
4 - Support for the upgrading of marketing channels	0	3 000 000	3 000 000	2 000 000	8 000 000
5 - Support for the mechanisation of methods of landing and handling fish	0	0	1 500 000	1 500 000	3 000 000
6 - Training	0	250 000	370 000	380 000	1 000 000
7 - Support for professional organisations	0	0	1 500 000	1 500 000	3 000 000
<b>TOTAL</b>	<b>0</b>	<b>15 000 000</b>	<b>19 870 000</b>	<b>19 130 000</b>	<b>54 000 000</b>

The amounts allocated to the programmes for the modernisation of the fleet and abolition of driftnets correspond to the amounts in the Protocol. Programme 1 for fleet modernisation receives support amounting to EUR 26 million (nearly half the support available) and the programme for abolition of driftnets EUR 5 million as provided for. The rest of the support available (EUR 23 million over 4 years, 43% of the total) is distributed between research (EUR 8 million), marketing support (EUR 8 million), mechanisation of the ports (EUR 3 million), training (EUR 1 million) and support for professional organisations. The matrix adopted at the time proposed a few target indicators, but not for all the measures.

The ONP has been designated as principal management body for the financial management of these budgets. The main reason is that the budget rules prohibit the Minister responsible for fisheries from carrying forward budgets from one year to the next. The amounts not committed return to the general State budget. The mechanism adopted was to pay the amounts provided for under measures 1, 2, 4, 5 and 7 in the form of annual subsidies to the ONP. The ONP, as a public institution, can carry forward the budgets from one year to the next. The ONP settles the expenses on the request of the DPM. As regards the support for research, the amounts are paid in the form of subsidy to the INRH. For training, the budget remains at the DPM and is drawn down by the technical directorate in charge.

Between the adoption of the matrix in 2008 and 2010, both parties have found that drawdown on the budgets for sectoral support was far less than forecasted (EUR 45.4 million of the EUR 54 million provided for, i.e. 84% of the budget). By measure, the balance can be presented as follows:

- For the programme for the support of modernisation and upgrading the coastal fleet which accounted for nearly 50% of the support, no commitment had been made. According to the discussions held during the mission, the IBHAR programme proved to be a failure. The fisheries professionals did not take advantage of this programme which aimed to subsidise at variable rates (10% to 15%) the private sector investments in the fisheries sector. The rates proposed were too low to create the desired leverage. The DPM, in cooperation with the FAO, considered a new version of this IBHAR programme which in addition was to receive a relatively substantial supplementary contribution from the State (≈ EUR 58 million contracted with the State).
- As regards the abolition of driftnets (EUR 5 million), no commitment had been made either. According to the information received, this programme was more difficult to implement than foreseen. The abolition of driftnets was to be accompanied by socio-economic measures adapted to the alternatives adopted by the targeted vessel owners (destruction of the vessel or destruction of the gear only). The programme was also to take account of the financial compensation measures and programmes for the retraining of the seamen concerned, which took longer than foreseen. To this were also added related technical problems such as that of the pollution generated by the destruction of nets made of synthetic material. During 2010, the outlines of the programme were completed and it will cost more than provided for. The DPM stated that it started up the commitment of the bulk of the budget in the second half of 2010.
- Concerning the scientific component, the amounts were drawn down as planned between 2008 and 2010. The INRH, whose ordinary budget is deemed insufficient (see § 4.1.3, page 50) used the amounts for financing annual surveys, the maintenance of the research vessels and investments made in new laboratories (Casablanca, Tangier). Other investments originally planned, especially in a fisheries research and technology centre in Laayoune could not be launched for lack of funds.
- For measures 4 and 5 (support for marketing and mechanisation of the ports), the commitments were only partial (EUR 3 million out of the EUR 11 million provided for both the two measures). The EUR 3 million expenditure was used to finance a study for the definition of a strategic plan for the development of the ports of the Kingdom and for the financing of pilot projects (containers, unloading equipment). The delay in drawing down funds is attributable to the implementation of a major reform concerning port management. As of 1 January 2010, the ONP was officially designated Global Operator of the fishing ports, bringing to an end an institutional situation in which the responsibilities were shared between various parties. It is understandable that this reform could have delayed the taking of initiatives. This having been said, the ONP and its partners did not remain inactive during the period with investments in the modernisation and construction of the fish markets at Laayoune, El Jedida, Mohammedia and the commissioning of the wholesale markets of Casablanca and Oujda (under study). These investments were made without the sectoral support of the EU.
- With regard to the training component, the amounts of support were committed at the planned rate. The DPM used the EUR 500 000 earmarked for investments in the maritime training institutes of Al Houceima, Larache, Safi, Essaouira, Laayoune and Dakhla. It is usually a matter of purchasing educational material (simulators, machine tools).
- Finally, the amount for the support of professional organisations was not the subject of any commitment in 2010 and therefore EUR 3 million out of the EUR 3 million provided for remained available. According to the information received, no disbursement was made for lack of ideas for structuring initiatives. The professional organisations (chambers of sea fisheries) apparently requested financing for equipment in the form of 4x4 vehicles or investments in meeting/conference rooms, which the DPM refused. At the end of 2010, the policy adopted was to finance structural facilities such as refrigerated lorries, stands for the sale of fisheries products or fitting out of shops, which comes more under support for consumption.

The underutilisation of the sectoral support led to the two partners reviewing the matrix. A new matrix was adopted during the Joint Committee meeting held in February 2010, taking account of the amounts agreed in the Protocol, the state of underutilisation under certain measures and the institutional reform which had occurred in 2010 as regards the fishing port management. The new matrix adopted is indicated below.

Table 33: Distribution revised in February 2010 of the support for the sectoral strategy. Source: DUE Rabat

(in EUR million)	Initial	New	Funds available	Final distribution
1- Support for the modernisation and upgrading of the coastal fleet	26.0	21.0 (- 5)	26.0	21.0
2 - Contribution to the abolition of driftnets	5.0	12.0 (+7)	5.0	12.0
3 - Scientific research	8.0	8.0	3.0	3.0
4 - Support for the upgrading of marketing channels	8.0	11.0 (fusion)	8.0	8.0
5 - Support for the mechanisation of methods of landing and handling fish	3.0			
6 - Training	1.0	1.0	0.4	0.4
7 - Support for professional organisations	3.0	1.0 (-2)	3.0	1.0
<b>TOTAL</b>	<b>54.0</b>	<b>54.0</b>	<b>45.4</b>	<b>45.4</b>

The major changes consist in

- A reduction by EUR 5 million of the budget provided for the modernisation of the coastal fleets to reduce it to EUR 21 million, an amount which remains higher than the minimum amount provided for by the Protocol. This amount remains to be disbursed in full over the rest of 2010 and 2011.
- An increase of EUR 7 million in the budget provided for the abolition of driftnets to bring the total support under this heading to EUR 12 million, which is more than double the amount provided for in the Protocol (EUR 5 million). This budget would now be paid out almost in full at the end of 2010.
- A concomitant reduction of EUR 2 million in the amounts set aside for support to professional organisations, with the budget for this measure falling from EUR 3 million to EUR 1 million over the four years of the Agreement. This amount still remains to be disbursed in full.

The other major change was to merge measures 4 and 5 in a single measure "management of the fishing ports", legitimised by the designation of the ONP as institutional focal point in this area. A total of EUR 8 million remains for disbursement.

As regards the training and research components, which had worked well up to then, the amounts still available ( $\approx$  EUR 3.4 million) will be disbursed in 2010 without problem.

It should be noted that 8 months after the adoption of this new matrix, the DPM has had a new proposal forwarded to the Commission for the readjustment of the amounts (September 2010). The amount earmarked for the fleet modernisation programme which does not work could be reduced to EUR 13.8 million, which is below the amount earmarked by the Protocol to the Agreement. The support to the programme to abolish driftnets would be increased to EUR 16.3 million (as compared to the EUR 5 million earmarked by the Protocol and the original matrix, then the EUR 12 million of the new matrix of 2010). The fishing port management and support to professional organisations components would also have their amounts reassessed. These proposals should be validated at a future meeting of the Joint Committee.

The EU support for the sectoral policy has therefore as a whole been little utilised. The failure of the IBHAR fleet modernisation programme is the main reason for this (originally, it was to mobilise nearly half the sectoral support). The delay in the implementation of the programme for the

abolition of driftnets is another explanation for the underutilisation, but the amounts would now be disbursed in full and are well above those set aside in the initialled Protocol in 2005. An amount of EUR 8 million still remains to be spent for the management of the fishing ports. In view of this substantial underutilisation of the sectoral support, and in the absence of sufficient visibility concerning the future commitments, the Commission in 2010 invoked the clause in Article 7 of the Protocol and paid Morocco only 50% of the EUR 13.5 million provided for sectoral support in 2010. At the present stage, it is foreseeable that most of the sectoral support will be spent or close to being spent at the end of the Protocol, apart from the EUR 21 million (or EUR 13.8 million if the matrix is revised again) targeted on the IBHAR programme, which seems to be in deadlock. This amount represents more than a third of the sectoral support provided for by the Protocol.

### **4.3 International integration**

In 1995, Morocco signed the United Nations Convention on the Law of the Sea and the Agreement on Straddling Fish Stocks.

Morocco has interests in the cross-border fisheries managed by the RFOs. The country has therefore been a member of ICCAT since 1969, in particular as regards bluefin tuna and swordfish fisheries. Morocco is also a member of the GFCM for pelagic and demersal fisheries in the Mediterranean and of CECAF, which is an RFO with an advisory role under the FAO. The country is also a signatory to CITES and is a member of the International Whaling Commission.

Morocco is required by ICCAT to comply with the resolution on the elimination of the driftnets still used to catch swordfish. The cut-off date for compliance is the end of 2011. In August 2010, Morocco adopted Law No 19-07 banning that practice definitively as from 1 August 2011. An elimination programme is underway, funded to a large extent from sectoral EU support under the current agreement. The other important aspect of Morocco's ICCAT agenda is the management of bluefin tuna fisheries. Morocco mainly uses traps (85% of the national quota) and seiners to fish that species. It says it has kept to its undertakings and obliged trap owners to release any bluefin tuna caught in excess of the quota during the last fishing season. Morocco has campaigned, within CITES, against the inclusion of bluefin tuna in Annex I to the Convention in order to safeguard producers who sell 100% of their catch on the Japanese market.

Morocco has undertaken at international level to combat IUU fishing. Although it is still in the process of adopting a formal plan, it has already shown encouraging signs, such as preventing a vessel suspected of fishing illegally in a NEAFC zone from landing its catch in Agadir (Morocco is not a member of NEAFC). The country is also cooperating with the Norwegian authorities to combat IUU fishing.

Morocco has signed 22 fisheries cooperation agreements with various African countries (Mauritania, Ghana, Angola, etc.), Arab countries (Libya, Egypt and Yemen), South American countries (Chile, Peru), European countries (France, Spain) and Asian countries (Japan). Those cooperation agreements mainly concern training and product promotion as well as the harmonisation of positions within the RFOs. Not all these agreements are operative, but they do exist.

Lastly, Morocco is home to the headquarters of ATLAFCO and makes an annual grant of around EUR 60 000 to that organisation's permanent secretariat, which is based in Rabat and housed in a ministry building. ATLAFCO is not particularly active on the policy front, and above all performs a networking role.

## 5 STATE OF FISHERIES RESOURCES

The Institut National de la Recherche Halieutique (INRH) is the national institution responsible for issuing scientific opinions on the management and conservation of the resources exploited in Morocco's national EEZ. To do this, the INRH relies on statistics gathered on vessel activity (catches, fishing effort) and the results of port sampling and sea surveys. The INRH carries out this work independently. Every three years, the available data are analysed by CECAF scientific working groups consisting of scientists from other countries in the sub-region and scientists from the EU Member States with fishing interests in the region (Spain in particular). Assessments relating to large pelagic species (tunas) are conducted jointly within an overarching ICCAT framework.

This section describes the main aspects of the assessment of stocks of small pelagic species, demersal species and large pelagic species in the Atlantic Ocean. Mediterranean stocks are not included in the assessment as EU fleets do not have access to them.

### 5.1 Small pelagic species

#### 5.1.1 General presentation

Of the nine coastal small pelagic species present in the North-West Africa sub-region between Morocco's North Atlantic waters and Senegal's South Atlantic waters, seven are fished off the coast of Morocco:

- sardine (*Sardina pilchardus*, clupeidae);
- round sardinella (*Sardinella aurita*, clupeidae);
- short-body sardinella (*S. maderensis*, clupeidae);
- chub mackerel (*Scomber japonicus*, scombridae);
- Cunene horse mackerel (*Trachurus trecae*, carangidae);
- Atlantic horse mackerel (*Trachurus trachurus*, carangidae) and
- anchovy (*Engraulis encrasicolus*, engraulidae).

The two species not present off the coast of Morocco are the yellow horse mackerel (*Caranx rhonchus*, carangidae) and the Bonga shad (*Ethmalosa fimbriata*, clupeidae). They are found further to the south, between Cape Timiris (Mauritania) and southern Senegal.

The sardine, Atlantic horse mackerel and anchovy prefer temperate waters, while the sardinella, Cunene horse mackerel and chub mackerel prefer tropical waters – hence their respective latitudinal distribution.

These gregarious species migrate long distances up and down the West African coast in response to environmental conditions; stocks are generally cross-border and shared between the neighbouring countries in the sub-region (Morocco, Mauritania, Senegal and Gambia).

In the period 2000-2009, an average of over 48% of small pelagic catches taken in the North-West Africa sub-region as a whole, not including those of yellow horse mackerel (*C. rhonchus*) and Bonga shad (*E. fimbriata*), were taken in Moroccan waters. These included 91% of all sardine, 62% of all chub mackerel and 61% of all Atlantic horse mackerel catches. The adjacent Mauritanian EEZ is the second leading fisheries zone in the sub-region, particularly for mackerel and horse mackerel. Sardinella stocks are located further south, and are mainly fished in the zones off Mauritania and Senegal.



Table 34: Average per-species production for the North-West Africa and Morocco sub-region in the period 2000-2009. Source: INRH

Species	N-W Africa Sub-Region (t)	Morocco (t)	Morocco / Sub-region (%)
Sardine	737 144	667 841	90.6
Round sardinella	382 686	23 301	6.1
Short-body sardinella	142 980	1 756	1.2
Mackerel	204 175	126 513	62.0
Atlantic horse mackerel	95 245	58 121	61.0
Cunene horse mackerel	235 971	37 817	16.0
Anchovy	133 819	18 234	13.6
<b>Total</b>	<b>1 932 020</b>	<b>933 583</b>	<b>48.3</b>

Along the Atlantic coast of Morocco, small pelagic stocks cover four fishing zones. Each zone constitutes a small pelagic fishery:

- northern zone, from Cape Spartel to El Jadida (35°45' - 32°N);
- zone A, from El Jadida to Sidi Ifni (32°N - 29°N);
- zone B, from Sidi Ifni to Cape Boujdor (29°N - 26°N);
- zone C, from Cape Boujdor to Cape Blanc (26°N - 21°N).

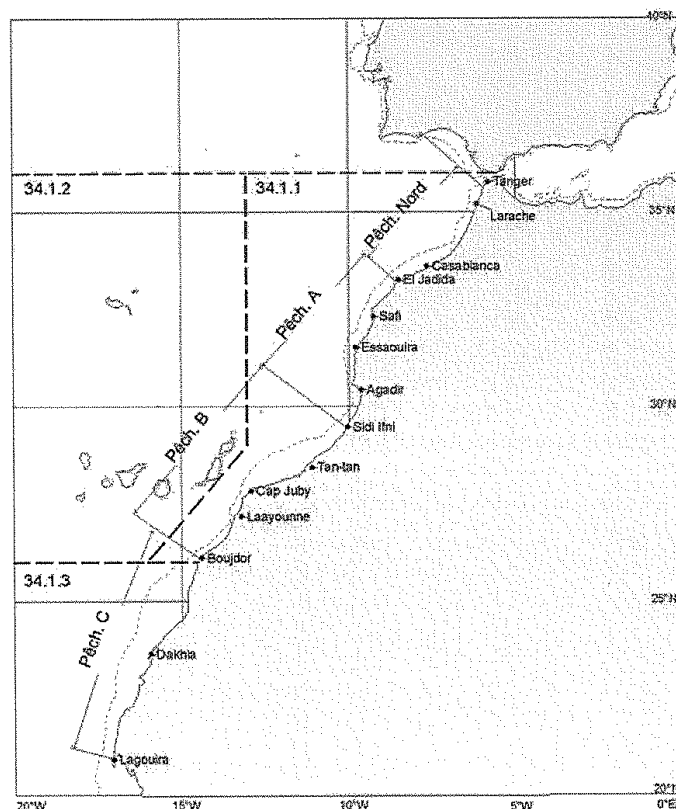


Figure 14: geographical boundaries of small pelagic fisheries. Source: INRH

In the Morocco EEZ, the available biomass varies from one zone to the next. Several acoustic surveys are performed each year by INRH scientists on board research vessels belonging to the Institute. The results of the 2008 zonal abundance survey (biomass and number) for small pelagic resources are shown in table below.

Table 35 : Estimated abundance of small pelagic species off the Atlantic coast of Morocco in 2008 (source: CECAF)

Weight in 1000 tonnes Number in millions	April-May-June 2008						November-December 2008			
	Cape Spartel – Cape Cantin (Northern zone)		Cape Cantin – Cape Boujdor (zones A + B)		Cape Boujdor – Cape Blanc (zone C)		Cape Cantin – Cape Boujdor (zones A + B)		Cape Boujdor – Cape Blanc (zone C)	
	Weight	Number	Weight	Number	Weight	Number	Weight	Number	Weight	Number
Sardines	145	3 608	760	14 630	3 447	40 843	685	17 608	3 404	31 232
Mackerel	68	633	277	4 291	234	2 858	432	7 802	400	4 870
Horse mackerel	112	910	286	4 161	327	5 528	136	553	613	7 479
Anchovies	102		155		23					
Sardinellas									992	
<b>TOTAL</b>	<b>427</b>		<b>1 478</b>		<b>4 031</b>		<b>1 253</b>		<b>5 409</b>	

In 2008, the total apparent biomass of small pelagic species off the coast of Morocco was 5.9 million tonnes in the spring (7% in the northern zone, 25% in zones A and B, and 68% in zone C); and almost 6.7 million tonnes to the south of Cape Cantin in winter (19% in zones A and B, and 81% in zone C). The biomass of small pelagic species was therefore highest in zone C ( $\approx 70\%$ ). The rest of the biomass was spread between the other zones, with the 'central zone' (zones A and B) accounting for between 20 and 25% of the biomass. The biomass in the northern zone was low in comparison to the other zones.

In the spring of 2008, the breakdown of small pelagic biomass for the northern and central zones (zones A and B) and zone C was as follows:

- northern zone: 34 % sardines, 26% horse mackerel, 24% anchovies and 16% mackerel, at a total estimated biomass of 427 000 tonnes (7% of the biomass of small pelagic species in Moroccan waters);
- zones A and B: 51% sardines, 19% mackerel, 19% horse mackerel and 11% anchovies, at an estimated biomass of 1.5 million tonnes (25% of the total biomass);
- zone C 86 % sardines, 8% horse mackerel horse mackerel and 6% mackerel, at an estimated biomass of 4 million tonnes (68% of the total biomass).

### 5.1.2 Fisheries in the northern zone

A fleet of around one hundred coastal seiners fishes for small pelagic species in this fishery. Twenty category 1 European seiners are also authorised to fish in these waters. That fleet, which mainly fishes for anchovies, and to a lesser extent sardines, is authorised to operate from Cape Spartel to the latitude of Kenitra (35°28 N), outside the 2 mile limit. Within that zone, it is authorised to fish at night, using lights, from Cape Spartel to the latitude of Asilah (35°28 N). The average annual catch for the EU seiners operating in this zone is 1 000 tonnes, or 3% of the total catch.

In 2009, catches of these species totalled almost 32 000 tonnes. The sardine (*S. pilchardus*) is the main species targeted. In the period 2000-2009, sardine catches rose to a maximum of 21 000 tonnes in 2004, before declining to 9 100 tonnes by 2009. Concurrently, chub mackerel (*S. japonicus*) and the Atlantic horse mackerel (*T. trachurus*) have begun to constitute an increasingly large proportion of the catch – in particular mackerel, catches of which have been in excess of 10 000 tonnes since 2005.

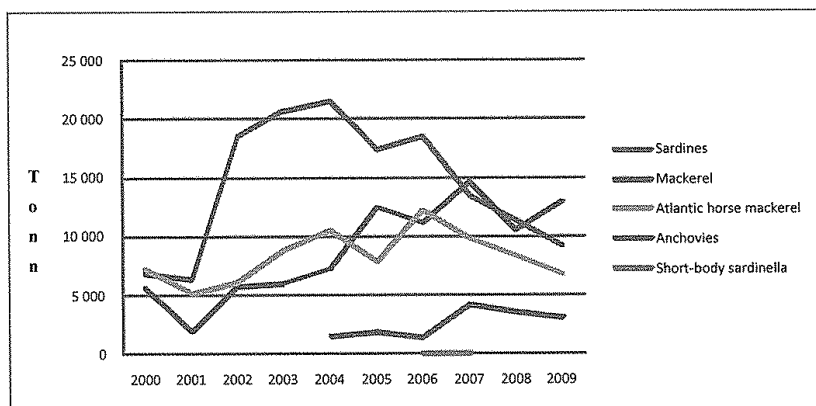


Figure 15: Change in per-species production for small pelagic species in the northern zone between 2000 and 2009. Source: INRH.

### 5.1.3 Zone A fisheries

The small pelagic fleet in this fishery consists of almost 150 coastal seiners. Foreign vessels do not have access to this fishery.

In 2009, total small pelagic catches stood at 52 000 tonnes, of which 61% was mackerel, 21% sardines, 10% anchovies and 8% Atlantic horse mackerel. Sardine catches, which totalled almost 75 000 tonnes in 2003, slumped to 10 800 tonnes in 2009. This low sardine availability was nevertheless accompanied by an increase in mackerel catches. Since 2004, mackerel catches have, on average, constituted over 50% of the small pelagic catches taken in this zone.

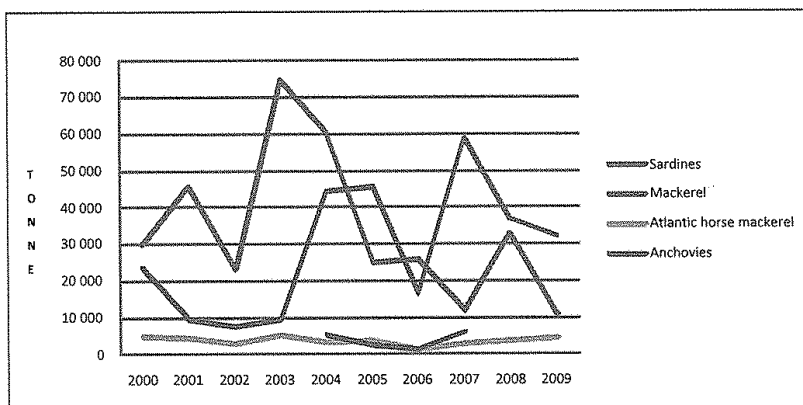


Figure 16: Change in per-species production for small pelagic species in zone A between 2000 and 2009. Source: INRH.

#### 5.1.4 Zone B fisheries

Over 300 coastal seiners operate in this zone.

In 2009, small pelagic catches stood at over 600 000 tonnes, most of which was sardines. In the period 2000-2009, sardines represented 96% of all catches, at an average 507 000 tonnes/year; mackerel was almost 3% (14 000 tonnes/year on average) and anchovies 1% (around 6 000 tonnes/year on average). Atlantic horse mackerel catches were generally only in the hundreds of tonnes/year.

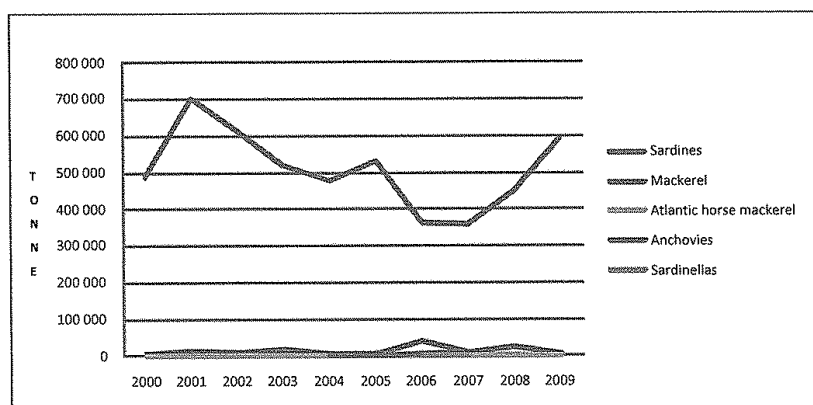


Figure 17: Change in per-species production for small pelagic species in zone B between 2000 and 2009. Source: INRH

The lesser availability of sardines in the northern zone and Zone A and the corresponding increase in that of other small pelagic species – mackerel, Atlantic horse mackerel and anchovies – would seem to be a decade-long cyclical phenomenon, as shown by the analysis of the change in catches of those species since 1990 (FAO, 2008), and could be linked to a large extent to variations in the intensity of the seasonal spring/summer upwelling, two of the main sites of which north of Cape Boujdor are to be found precisely to the south of Cape Spartel in the northern zone, and between Cape Cantin and Cape Ghir in zone A (see Figure 7, page 20).

In more specific terms, zone A would only seem to contain a marginal proportion of the central zone's sardine stocks, which are mainly located in zone B. It is also possible that any reduction in the intensity of the upwelling affecting productivity in that zone would also affect seasonal trophic sardine migrations from zone B to the zone to the north, thus resulting in a contraction of the area over which the central sardine stock is distributed (source: INRH).

Moreover, between 2000 and 2009, sardine catches in zones A and B have varied almost synchronously (Figures 16 and 17), which underscores the close connection between sardine resources in the two zones and lends further credence to the notion of a single central stock. The spectacular change in sardine production in zone B began in the 1980s following the entry into service of the ports of Tan-tan and Laayoune, with a rapid increase in the number of coastal seiners, some of which originated from zone A, and an accompanying increase in the fishing effort.

### 5.1.5 Zone C fisheries

Zone C is of particular interest for this assessment as it is to this zone that EU vessels in category 6 under the Agreement have access. The European fleet shares the zone C waters with several national and foreign fleets also fishing for small pelagic species. In 2008, the breakdown was as follows:

- Moroccan vessels:
  - coastal seiners (22 in 2008);
  - RSW seiners and pelagic trawlers (7 in 2008);
- Chartered vessels:
  - RSW seiner (1 in 2008);
  - pelagic freezer trawlers (13 in 2008);
  - RSW pelagic trawlers (10 in 2008);
- vessels operating under fisheries agreements:
  - Russian pelagic freezer trawlers (12 maximum, 7 operating in 2008);
  - European pelagic freezer trawlers (18 maximum, from 2007).

The European fleets operating under the Agreement account for a maximum of 11% of the total catch (Table 19, page 33).

In 2009, the small pelagic catches taken by the various fleets totalled 518 300 tonnes. The sardine was the main target, at almost 39% of the total catch, followed by the mackerel (27%), the European horse mackerel and Cunene horse mackerel (26%), round and short-body sardinellas (8%) and anchovies (almost 0.2 %). At the start of the period 2000-2009, catches stood at around 200 000 tonnes/year, before collapsing in 2002, after pelagic trawlers – mainly from Ukraine – fishing for mackerel and horse mackerel left the zone. From 2004 to 2006 there was an increase in production, following *i)* the stepping-up of the national fishing effort, *ii)* the chartering of vessels under a programme offering assistance for conversion to small pelagic processing, owing to processing overcapacity in the octopus processing and freezing sector, and *iii)* the return of Russian pelagic trawlers under fisheries agreements. After 2006, annual catches stabilised at between 400 000 and 520 000 tonnes/year.

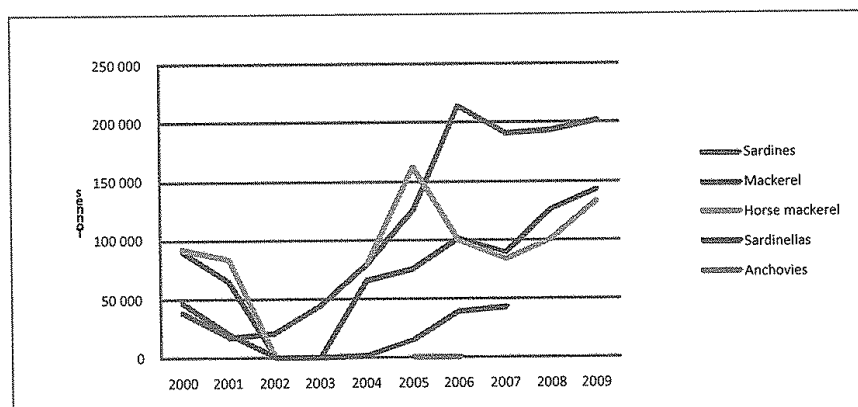


Figure 18: Change in per-species production for small pelagic species in zone C between 2000 and 2009. Source: INRH

The way in which the overall catches for zone C break down is closely linked to the species that are fished by each of the fleets and the fishing strategies adopted on the basis of the bathymetric

distribution of those species. Vessels can target one group of species or another, on the basis of their commercial value, by changing the zone in which they operate and the depth at which they fish. Sardine and sardinellas are more densely concentrated just off the Moroccan coast than horse mackerel and mackerel. Moreover, the large specimens of the latter species are generally to be found further out to sea, just above the 100 m isobath (source: INRH).

**[DATA ON NON-EU VESSEL FISHING STRATEGIES DELETED]**

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### 5.1.6 State of small pelagic stocks

Most of the pelagic stocks in the North-West Africa sub-region are trans-border stocks, especially in zone C, joint processing of national statistics is needed to assess the exploitation levels thereof. This is done regularly in the FAO's 'working group on the assessment of small pelagic fish off the coast of North-West Africa' under the auspices of CECAF's Scientific Sub-Committee.

The latest assessment of the state of small pelagic stocks was performed in May 2010. A dynamic Schaefer production model was used for most of the stocks, with the exception of anchovies, and exploitation levels were estimated in relation to the reference points  $F_{0.1}$  and  $B_{0.1}$ , with these being, respectively, the fishing mortality level and the biomass enabling sustainable long-term exploitation of the stock at an optimum yield. The statistics available on anchovy did not allow the use of the Schaefer model, and the LCA (*Length cohort analysis*) model was applied in the processing of statistics from the Moroccan fisheries (northern zones and zones A and B).

The results of the assessment, represented by the values of the ratios  $F_{cur}/F_{0.1}$  (relationship between the actual fishing mortality coefficient in the last year covered by the set of statistics and  $F_{0.1}$ ) and  $B_{cur} / B_{0.1}$  (relationship between the estimated biomass for the most recent year and the  $F_{0.1}$  biomass) enabled the state of exploitation of the stocks to be ascertained, with recommendations for adjustments being made by the working group. The results are given in the table below.

Table 36: State of exploitation of small pelagic species in the North-West Africa sub-region and recommendations for adjustments. Source: CEEAF

Stock	Catch in 2009 (2005-2009 average) in thousands of tonnes	Bcur / B0.1	Fcur / F0.1	State of exploitation	Recommendations for adjustments
<b>Sardine</b> ( <i>S. pilchardus</i> )  Zone A+B	600 (478)	117%	87%	Stock fully exploited	As a precautionary measure and bearing in mind the stock fluctuations observed, the WG repeats the 2008 and 2009 recommendations that the catch should not exceed 400 000 tonnes.
<b>Sardine</b> ( <i>S. pilchardus</i> )  Zone C	318 (277)	160%	15%	Stock not fully exploited (moderate exploitation)	Catch levels may temporarily be increased, but must be adjusted in line with natural changes. Constant monitoring of the structure and abundance of the stock should be performed independently of the data on commercial catches.
<b>Round sardinella</b> ( <i>S. aurita</i> )  <b>Short-body Sardinella</b> ( <i>S. maderensis</i> )  <b>Sardinellas</b> Across the sub-region	521 (457)  113 (124)  634 (581)	112%  -  94%	223%  -  195%	Stock of <i>S. aurita</i> Over-exploited   Sardinella catches should be reduced in order to avoid a collapse of the stock	The WG repeats the 2008 and 2009 recommendations: - reduce the fishing effort for the two stocks; - the catch should not exceed 220 000 tonnes for <i>S. aurita</i> in 2010 and 2011;
<b>Atlantic horse mackerel</b> ( <i>T. trachurus</i> )  <b>Cunene horse mackerel</b> ( <i>T. trecae</i> )  <b>Horse mackerel</b>  Across the sub-region	120 (107)  347 (308)	72%  53%	164%  197%	Stocks of <i>T. trachurus</i> and <i>T. trecae</i> over-exploited	Owing to the mixed nature of the horse mackerel fishery: - 20% reduction in the fishing effort; - overall catch level of the two species should not exceed the average for the last 5 years (330 000 tonnes).
<b>Mackerel</b> ( <i>Scomber japonicus</i> )  Across the sub-region	244 (231)	130%	77%	Stock fully exploited	Catch should not exceed the average for the last 5 years (2005-2009): 230 000 t.
<b>Anchovy</b> ( <i>Engraulis encrasicolus</i> )	116 (116)	NA	97% (LCA)	Stock fully exploited	As a precautionary measure, the catch should not exceed the current level of 116 000 tonnes.



Atlantic horse mackerel, Cunene horse mackerel and sardinella stocks were over-exploited in 2010. Sardine stocks in zones A and B, chub mackerel and anchovy stocks are being fully exploited.

Currently, only the zone C sardine stock, which is shared with Mauritania, is subject to moderate, rather than full, exploitation ( $B_{cur}/B_{0,1}$  indicator of 160% and  $F_{cur}/F_{0,1}$  indicator of 15%). In principle, that stock should therefore be able to sustain increased fishing effort to offset the production surplus and achieve full exploitation. It should, however, be emphasised that small pelagic catches in the sub-region are not monospecific, but cover several species, even if the sardine is by far the most dominant, and that any increase in the fishing effort in relation to the sardine stock will inevitably increase the fishing pressure on the stocks of horse mackerel and sardinella, which are already over-exploited, or of mackerel, which is fully exploited. This encapsulates the difficulty of managing this stock efficiently. There is no single small pelagic stock in zone C, but several different stocks subject to varying degrees of exploitation, most of which are excessive. The management of those stocks requires sub-regional consultations, notably with Mauritania, which it has not been possible to hold to date.

With regard to anchovy, the FAO/CECAF working group only takes into account one stock for the whole of the sub-region, in the absence of individual stock surveys for that species. It should, however, be emphasised that the assessment performed in 2010 is based on the processing of the statistics for the northern zone and zones A and B, and that the full exploitation diagnosis directly concerns the portion of the stock partially exploited since 2007 by European seiners in the northern zone. Bearing in mind the geographical proximity of the anchovy in Morocco's northern zone with the ICES division IXa (Gulf of Cadiz), one could advance the hypothesis that they form part of the same stock in the Ibero-Moroccan Gulf. With regard to the state of anchovy resources in division IXa, the ICES opinion is that catches should be restricted to 4 800 tonnes for 2010, or in other words to the average for the past 20 years (1988-2006), with the exception of years of strong recruitment. That recommendation takes into account the fall in abundance recorded during the surveys, and the fact that an analytical assessment cannot be performed. The same difficulties arise with the analytical assessment of anchovy resources off the coast of Morocco, given the absence of any statistics on their demographic structure. Hence, the Joint Scientific Committee's working group on anchovy, set up by the joint committee responsible for monitoring the fisheries agreement between the Kingdom of Morocco and the EU, recommended at its meeting in October 2008 in Nantes (France) that measures swiftly be taken to map the demographic structure of anchovy off the Moroccan coast. More specifically, this involves sampling and otolith readings to establish the age of the specimens caught.

## 5.2 Demersal resources

In recent years, around 185 000 tonnes of demersal species (fish, cephalopods and crustaceans) caught in Morocco's Atlantic waters have been landed each year. These represent 20% of all landings from Atlantic waters (13% fish, 6% cephalopods, 1% crustaceans), which is far less than landings of coastal small pelagic species (78%).

The main issues surrounding demersal resources are presented more concisely than for small pelagic species since European fleets have limited access to those resources.

### 5.2.1 Hake

Hake is a very important species as it can be exploited by category 4 vessels under the agreement. Three species of hake are fished off the Atlantic coast of Morocco:

- European hake (*Merluccius merluccius*), which can be found from Cape Spartel to Cape Blanc, over all types of sea bed, generally at depths of 70 to 370 metres, but is also present

anywhere from coastal waters (25 m) up to depths of 1 000 metres, with its bathymetric distribution being closely linked to its biological cycle;

- Black hake – Senegal hake (*M. senegalensis*) and Benguela hake (*Merluccius polli*):
  - the Senegal hake can be found in Moroccan waters to the south of 33°00 N, on the edge of the continental shelf and on the upper part of the continental slope (between depths of 150 and 450 metres). It is not present further south than 10° 00 N;
  - the Benguela hake is the southernmost species and, in Moroccan waters, is only caught to the south of 25°00 N. The Benguela hake can be found up to 18°50 south and lives above the continental slope at depths of between 400 and 1 000 metres.

Around 450 Moroccan coastal trawlers fish for the European hake, and generally operate to the north of Cape Juby.

The most recent survey of the state of exploitation of European hake stocks off the Atlantic coast of Morocco was conducted in February 2010 by the FAO/CECAF working group on the assessment of demersal resources in the northern zone, which met in Agadir (Morocco).

The diagnosis was one of stock over-exploitation, regardless of the model used. The fishing mortality coefficient for the most recent year covered by statistics ( $F_{cur}$ ) is almost 4 times (production model) or over 8 times (LCA model) higher than the fishing mortality coefficient ( $F_{0.1}$ ) that would guarantee an optimum and sustainable exploitation of the stock. This correlates with an estimated biomass for the last year for which statistics are available ( $B_{cur}$ ) that is roughly equal to half that corresponding to  $F_{0.1}$  ( $B_{0.1}$ ).

Consequently, the recommendations of the FAO/CECAF working group are as follows:

- reduction of the fishing effort;
- seasonal closure of fishing activities to protect juveniles;
- increase in trawler selectivity;
- closer monitoring of the implementation of management measures.

The current statistics on the exploitation of black hake in Moroccan waters do not enable an assessment of that resource. The working group recommends that catch and fishing effort statistics be collected for black hake fishery, with a breakdown by type of vessel (trawlers, longliners and artisanal vessels).

It should be noted that the working party considered the black hake stocks of Mauritania and Senegal to be fully exploited, taking into account the uncertainties surrounding the assessment.

Table 37: State of exploitation of hake stocks in Morocco's Atlantic waters. Source: FAO/CECAF

Species	Catch in 2006 (average for the 5 previous years)	Production model		LCA model	State of exploitation	Recommendations for adjustments
		$B_{cur} / B_{0.1}$	$F_{cur} / F_{0.1}$	$F_{cur} / F_{0.1}$		
<i>Merluccius merluccius</i>	4 209 t (6 919 t)	57 %	371 %	833 %	Over-exploited	- Reduce the current fishing effort (2008). - Close fisheries for the months of June and July to protect juveniles. - Increase the mesh size of trawler nets. - Apply and monitor existing regulations.
<i>Merluccius senegalensis</i> & <i>Merluccius polli</i>						Produce a breakdown of catches and fishing effort for black hake by type of vessel (trawlers, longliners and artisanal vessels).

In view of the lack of information on black and Benguela hake, the joint scientific committee set up by the joint committee responsible for monitoring the fisheries agreement between the Kingdom of Morocco and the EU recommended in March 2009 setting up an ad hoc working party on black hake (*Merluccius senegalensis* and *Merluccius polli*), whose main task would be to define the terms of reference of a future direct survey of this resource, via trawling, off the coasts of all the countries in the North-West Africa sub-region (Morocco, Mauritania, Senegal and Gambia).

### 5.2.2 Scabbardfish

Scabbardfish are among the ten main species (or groups of species) caught in the Atlantic waters off Morocco. In 2009, they constituted 0.5% of all coastal and artisanal fishery landings. They are also one of the main species fished by European longliners operating under the Agreement with Morocco.

Three species of scabbardfish are to be found off the coast of Morocco:

- the Black scabbardfish (*Aphanopus carbo*) is a continental slope species living at depths of between 20 and 1 600 metres, but most commonly found between 180 and 650 metres. It is the species most fished by European fleets under the Agreement;
- the Silver scabbardfish (*Lepidopus caudatus*) is a continental shelf and continental slope species, and is found at depths of up to 600 metres, but generally on sandy seabeds at depths of 100 to 300 metres and sometimes in coastal areas with deepwater upwelling. This species is the most valuable in commercial terms ;
- the Largehead hairtail (*Trichiurus lepturus*) is a continental shelf and continental slope species found at depths of up to 350 metres, but sometimes in shallow coastal areas, on muddy seabeds.

Scant scientific data is currently available on these species. An exploratory survey conducted by the INRH in association with Spanish Oceanographic Institute (IEO) in 2005 enabled some information to be collected on the distribution of these species off the Atlantic coast of Morocco: the main concentration of *A. carbo* is between the latitudes of Casablanca and Agadir and it becomes less abundant to the south of Cape Juby. *L. caudatus* and *T. lepturus* are most abundant in the south of the area.

No diagnosis of the state of this resource has been made. Since there is very little information on this longline fishery and the resources it exploits, the Joint Scientific Committee set up by the joint committee responsible for monitoring the fisheries agreement between the Kingdom of Morocco and the EU felt it necessary to create a working group on longline fishery, especially as European longliners were authorised to operate in Moroccan waters. That working party, consisting of 9 experts, met in June 2008 at the IEO laboratory in Fuengirola (Malaga, Spain) and addressed the following issues:

- current knowledge of the state of longline fishery in Morocco's Atlantic EEZ;
- designing of a sampling protocol for the monitoring of longline fishery;
- definition of the terms of reference of an ad hoc scientific survey of non-trawlable zones.

### 5.2.3 Other species of demersal fish

The most recent assessments of demersal stocks were conducted in February 2010 by the FAO/CECAF working group on the assessment of demersal resources in the northern zone, meeting in Agadir (Morocco), by applying the Schaefer dynamic production model. The statistics used were the chronological sets of catch data and abundance indexes from scientific surveys up

to the year 2008. Not all the species exploited in Moroccan waters were covered, but it was supposed those chosen would provide indicators as to the overall state of exploitation of stocks.

The results of the assessment clearly indicate an over-exploitation of the axillary seabream stock: the current biomass (B<sub>cur</sub>) is one third of the target biomass (B<sub>0.1</sub>) and the current fishing mortality (F<sub>cur</sub>) is 2.5 times the target fishing mortality (F<sub>0.1</sub>). This over-exploitation was first diagnosed in 2007. The working group's recommendations for adjustments are to reduce the fishing effort and monitor the application of management measures, meaning those in force in the various fisheries in which this species is fished.

The processing of the data on the other stocks assessed (*Pagellus spp.*, *D. macrophthalmus*, *Sparus spp.* and *P. mediterraneus*) did not enable conclusive results to be obtained on the levels of exploitation of those stocks. The working group nevertheless considered them to be fully exploited, and recommended that the fishing effort be kept at its current level. That recommendation applied to all the fleets catching these species, both as target species and as by-catch.

Table 38 : State of exploitation of demersal fish stocks in Morocco's Atlantic waters. Source: FAO/CECAF, 2010)

Species (country)	Catch in 2008 (average for the 5 previous years)	B <sub>cur</sub> / B <sub>0.1</sub>	F <sub>cur</sub> / F <sub>0.1</sub>	State of exploitation	Recommendations for adjustments
<i>Pagellus acarne</i> (Morocco)	2 664 t (2 471 t)	32 %	252 %	Over-exploited	- reduce the fishing effort - monitor application of existing management measures
<i>Pagellus spp.</i> (Morocco)	621 t (1 307 t)			Fully exploited (uncertainty surrounding assessments)	Fishing effort should not exceed the current level
<i>Dentex macrophthalmus</i> (Morocco, Mauritania, Senegal)	2 202 t (3 766 t)			Fully exploited (uncertainty surrounding assessments) Survey finding for Mauritania show a decline in stocks	Fishing effort should not exceed the current level
<i>Sparus spp.</i> (Morocco)	3 569 t (2 843 t)			Fully exploited (uncertainty surrounding assessments)	Fishing effort should not exceed the current level (2008)
<i>Plectorhynchus mediterraneus</i> (Morocco)	4 741 (4 315)			Fully exploited (uncertainty surrounding assessments)	Fishing effort should not exceed the current level

#### 5.2.4 Cephalopods

While EU fleets are not authorised to fish for these species, they are nonetheless a major constituent of Morocco's fish stocks.

The latest assessment of the state of exploitation of cephalopod stocks in the North-West Africa sub-region was conducted in February 2010 under the auspices of the FAO/CECAF working group on the assessment of demersal resources in the northern zone, meeting in Agadir (Morocco). The model used was the Schaefer dynamic production model. The chronological series of statistics processed stops in 2006.

In the zone between Cape Boujdor and Cape Blanc, octopus and cuttlefish stocks are over-exploited. The fishing mortality coefficient for these two species and group of species for the last year in the set of statistics ( $F_{cur}$ ) is far above the fishing mortality level that would enable an optimum exploitation of the stock sustainable in the long term ( $F_{0.1}$ ), and the estimated biomass for that year ( $B_{cur}$ ) is far below that corresponding to  $F_{0.1}$  ( $B_{0.1}$ ). The working group therefore recommended measures to reduce the fishing effort, along with the monitoring of octopus fishery management measures. While the results of the assessment were inconclusive in respect of squid, the working party nevertheless recommended a reduction in the fishing effort as a precautionary measure.

Table 39 : State of exploitation of cephalopod stocks between Cape Boujdor and Cape Blanc. Source: FAO, 2010

Species	Catch in 2006 (average for the 5 previous years)	$B_{cur} / B_{0.1}$	$F_{cur} / F_{0.1}$	State of exploitation	Recommendations for adjustments
<i>Octopus vulgaris</i> Stock Dakhla (26° N-20°50 N)	43 491 t (30941 t)	56 %	181 %	Over-exploited	-Reduce the fishing effort of all fleets fishing for octopus. - Step up monitoring of management measures.
<i>Sepia spp.</i> Dakhla (26° N-20°50 N)	14 819 t (13 642 t)	25 %	298 %	Over-exploited	-Reduce the fishing effort. - Monitor cuttlefish catches in the octopus fishery in order to prevent the fishing effort targeting octopus being diverted to cuttlefish.
<i>Loligo vulgaris</i> Dakhla (26° N-20°50 N)	3 652 t (2 690 t)			Results of the assessment inconclusive. Survey findings show an increase in 2008.	Reduce the fishing effort.

### 5.2.5 Shrimps and prawns

While European vessels cannot fish for shrimps and prawns (or for cephalopods), these are nonetheless of major value for the national fleets. Several species of shrimp and prawn inhabit the waters off Morocco, with those of the highest commercial value being:

- coastal shrimps and prawns:
  - *Penaeus kerathurus* (caramote prawn); and
- deepwater shrimps:
  - *Parapenaeus longirostris* (rose shrimp);
  - *Aristeus antennatus* (red shrimp);
  - *Aristeomorpha foliacea* (giant red shrimp);
  - *Plesioopenaeus edwardsianus* (scarlet prawn).

The rose shrimp, *P. longirostris*, is the most abundant of these species. It represents over 98% of coastal trawler shrimp landings and around 90% of freezer trawlers. The scarlet prawn, *Plesioopenaeus edwardsianus*, is the second most commonly-landed species.

The assessment only covered the rose shrimp, and showed the stock of rose shrimps off the Atlantic coast of Morocco to be over-exploited. The current biomass ( $B_{cur}$ ) is only one third of the target biomass ( $B_{0.1}$ ) and the current fishing mortality ( $F_{cur}$ ) is 2.5 times higher than the target fishing mortality ( $F_{0.1}$ ). The working group recommends a major reduction in the current fishing effort (2008) to arrive at a sustainable catch level enabling stock recovery.

Table 40: State of exploitation of the rose shrimp, *Parapenaeus longirostris*, off the Atlantic coast of Morocco. Source: FAO/CECAF, 2010

Species (country)	Catch in 2008 (average for the 5 previous years)	Bcur / B <sub>0.1</sub>	Fcur / F <sub>0.1</sub>	State of exploitation	Recommendations for adjustments
<i>Parapenaeus longirostris</i> (Morocco)	8 682 t (8 564 t)	34 %	255 %	Over-exploited	Significantly reduce the current fishing effort (2008) to attain sustainable catch levels enabling stock recovery.

### 5.2.6 General conclusions

Of the 11 stocks of demersal fish to be found in Morocco's Atlantic waters and assessed in February 2010 by the FAO/CECAF working group,

- 5 stocks would appear to be over-exploited:
  - European hake, *M. merluccius*;
  - axillary seabream, *P. acarne*;
  - octopus, *O. vulgaris*;
  - cuttlefish, *Sepia spp*; and
  - rose shrimp, *P. longirostris*.
- 4 stocks are considered to be fully exploited:
  - pandoras, *Pagellus spp.* (*P. bellottii* and *P. erythrinus*);
  - large-eye dentex (*D. macrophthalmus*);
  - seabream, *Sparus spp.* (*S. aurata* and *S. auriga*); and
  - rubberlip grunt (*P. mediterraneus*).
- 2 stocks could not be assessed owing to insufficient data:
  - black hake, *M. senegalensis* and *M. polli*; and
  - squid, *L. vulgaris*.

In view of these results, the working group's recommendations were:

- for over-exploited stocks: a reduction in the fishing effort and, as a corollary, a reduction in fishing mortality, and hence an increase in the biomass;
- for fully-exploited stocks: maintenance of the fishing effort at its current level; and
- for the stocks that it was not possible to assess: gathering of the statistics needed for a future assessment.

It is important to emphasise the important work done by the INRH in monitoring the state of demersal resources by way of 6 scientific surveys each year:

- 4 dedicated to cephalopod resources, conducted in spring and autumn between Boujdor and Lagouira ;
- 2 dedicated to European hake and rose shrimp resources, conducted between Tangiers and Tan-tan.

Nevertheless, it is regrettable that, owing to insufficient funds, research efforts centre mainly on the monitoring and direct assessment of resources considered to be 'strategic' (octopus, European hake and rose shrimp) and that some species, and especially those fished by longliners (hard-bottom fish and scabbardfish) are not the subject of regular biological monitoring. The action plan of the Joint Scientific Committee's working group on longline fishery is a step in that direction.

### 5.3 Large pelagic species

The large pelagic species consist of the tunas and associated species fished in Moroccan waters by category 5 vessels. These resources are assessed by ICCAT's scientific committee, with ICCAT being the RFO responsible for the management of these species in the Atlantic Ocean.

Fishing for these species in Morocco's EEZ takes place under a very different governance framework from that for small pelagic species and demersal species. Conservation and management rules are adopted in the multilateral framework of ICCAT. They apply in a general manner to any flagged vessels regardless of the zone in which they are operating. Hence, tuna fishing by European pole-and-line vessels in Morocco's EEZ is governed by the rules applicable to the Member State concerned. It follows that catches taken by Spanish vessels in Morocco's EEZ are deducted from any quotas allocated to the EU, and the capacity limits are those set for EU vessels. This is quite a different framework than for the other – small pelagic and demersal – species fished in the EEZ, which come under the exclusive jurisdiction of Morocco.

Given the modest total amounts involved in the case of the Agreement with Morocco (catches of just hundreds of tonnes per year for each category in the agreement), we can move swiftly on to the details of the assessments.

Two of the large pelagic high seas species found in Morocco's Atlantic waters are over-exploited: the bluefin tuna (*T. thynnus*) and the albacore (*T. alalunga*). They show high exploitation rates and low abundance. The other species would appear to be fully exploited (bigeye tuna, yellowfin tuna, swordfish) and have moderate exploitation rates, or a very likely under-exploited (skipjack tuna) and have a low exploitation rate. Their levels of abundance are viewed as intermediate (above low, but less than the pre-exploitation level).

Table 41: Indicators for the state of stocks of large pelagic species found in Morocco's Atlantic Ocean EEZ. Source: ICCAT, 2010

Stock	Relative fishing mortality	Relative biomass	Rate of exploitation	Level of abundance
Albacore	$F_{2007}/F_{PME} = 1.04$ (0.85-1.23)	$B_{2007}/B_{PME} = 0.62$ (0.45-0.79)	High	Low
Bigeye tuna	$F_{2005}/F_{PME} = 0.87$ (0.70-1.24)	$B_{2006}/B_{PME} = 0.92$ (0.85-1.07)	Moderate	Intermediate
Yellowfin tuna	$F_{2006}/F_{PME} = 0.86$ (0.71-1.05)	$B_{2006}/B_{PME} = 0.96$ (0.72-1.22)	Moderate	Intermediate
Skipjack tuna	$F_{2008}/F_{PME} = \text{very probably } <1$	$B_{2008}/B_{PME} = \text{very probably } >1$	Low	Intermediate
Bluefin tuna	$F_{2007}/F_{Max} = 3.04-3.42$	$B_{2007}/B_{PMax} = 0.35-0.14$	High	Exhausted
Swordfish	$F_{2008}/F_{PME} = 0.76$ (0.67 - .96)	$B_{2009}/B_{PME} = 1.05$ (0.94 - 1.24)	Moderate	Intermediate

The two species fished by European fleets in Moroccan waters (skipjack tuna and yellowfin tuna) are considered probably to be under-exploited and fully exploited, respectively.

## 5.4 Impact of fishing on the environment

### 5.4.1 Bycatch and discards

In Moroccan fisheries, as in all the world's sea fisheries, bycatch and the discards associated with them are a major problem. In most cases, the animals (fish, crustaceans and molluscs) caught and then discarded are already dead or have very little chance of surviving in the sea. The major upshots of this are:

- a wastage of resources by society that is incompatible with responsible fisheries management;
- a reduction in future catch possibilities when juveniles specimens are caught;
- an immediate reduction in the reproductive biomass when mature specimens are caught; and
- adverse effects on ecosystems and biodiversity.

The type of bycatch and discards depends on the fishery in question and, more precisely, on: i) the type of species being fished; ii) the type of fishing vessel; and iii) the fishing zone.

The volume of discards in any one fishery depends first and foremost on the fishing strategy for each fishing operation and varies from one season to another and according to the biological cycle and availability of the species, the size/age of the specimens caught, the catch composition, market prices, the length of voyage, fishing quotas and the rules on minimum sizes and composition for the quantities landed.

It was not possible, during the assessment, to gather information on any statistics on bycatch and discards in Morocco's Atlantic waters synthesised from reports by on-board observers on fishing vessels operating under the fisheries agreements, or any information on the existence of systematic surveying to determine bycatch, and estimate discards, for each fishery.

However, information on the probable reject rates for the various fisheries can be found in a recent survey (FAO, 2008), which sets out to update the information on discard volumes for fisheries across the world, and fishery by fishery.

Table 42: Weighted discard rates for the various fisheries. Source: FAO

Type of fishery	Weighted reject rates (%)
Deep-water shrimp trawling	27.8
Demersal fish trawling	19.6
Small pelagic trawling	3.5
Cephalopod trawling	22.8
Small pelagic seining	1.6
Gillnetting	0.5
Bottom-set longlining	7.5
Line fishing	2.0
Squid jigging	0.1
Tuna pole-and-line or trolling	0.4



Demersal trawling fisheries show the highest discard rate. The discard rate for the fishing of the rose shrimp, *Parapenaeus longirostris*, would seem to be close to 28%, while those for cephalopods are approaching 23%. The reject rate for the fishing of demersal species is around 20%. In these fisheries, the bycatch lives in the same biotope as the target species. Discards mainly comprise non-commercial fish belonging to small-sized species, juveniles of commercial species (hake, sparidae) and less-sought-after commercial species (horse mackerel, mackerel, elasmobranch species).

Discard rates are lower for demersal, coastal and artisanal fishing using passive gear. The highest rates in this category are for bottom-set longlining (7.5 %).

The discard rates for pelagic trawlers fishing for small pelagic species would appear to be low and are estimated at 3.5%. Small pelagic fishery is generally very precisely targeted and generates little bycatch. Discards generally consist of small and damaged specimens of the target species, non-target small pelagics, and probably also pelagic sharks and dolphins.

Further details on bycatch and discards for European pelagic trawlers operating to the south of 29° N under the fisheries agreement are given below.

**> Bycatch and discards for European pelagic trawlers in the south of Morocco's Atlantic waters**

The following information was obtained by analysing the reports of 23 on-board observers between January 2008 and December 2009. During that two-year period, European pelagic trawlers declared catch totalling 100 578 tonnes. Since the 23 on-board observers reported on a total catch of 66 091 tonnes, coverage of that fleet was almost 66%. Bycatch represented 1 225 tonnes, or 1.85%, and discards slightly more than that, at 1 283 tonnes, or 1.94 %. It should be noted that the average discard rate for European pelagic trawlers fishing in Morocco's Atlantic waters is slightly lower than the weighted average rate of 3.5% estimated in numerous other fisheries of the same type.

The table below gives a list of the main bycatch species, without specifying their relative volumes. Demersal species are more commonly found in bycatch than pelagic species, with the commonest family of fish being the sparidae.

The high relative volume of demersal species in the bycatch of pelagic trawlers fishing for small pelagic species could be viewed as surprising. It should, however, be noted that the continental shelf is very broad in the zone in which these vessels operate, and that beyond the 15 mile limit, where they are permitted to fish, the depth of the sea bed is still only 40-50 metres. At the same time, with trawl nets opening vertically at around 30 metres, the slightest reduction in the speed of the vessel can cause sinkage of the fishing gear and result in trawling very close to the sea bed.

It should also be emphasised that under the terms of the fisheries agreement 'The catch of cephalopods, crustaceans and other demersal and benthic species is strictly prohibited' for category 6 and that these species must therefore be returned to the sea if caught accidentally.

Table 43: Main bycatch species in the catches of European pelagic trawlers operating in Moroccan waters south of 29°00 N

Species	Scientific name	Family	Category of species
Dentexes	<i>Dentex spp.</i>	Sparidae	Demersal
Morocco dentex	<i>Dentex Moroccanus</i>	Sparidae	Demersal
Sargo breams	<i>Diplodus spp.</i>	Sparidae	Demersal
Common two-banded seabream	<i>Diplodus vulgaris</i>	Sparidae	Demersal
Senegal seabream	<i>Diplodus bellottii</i>	Sparidae	Demersal
Black seabream	<i>Spondyliosoma cantharus</i>	Sparidae	Demersal
Gilthead seabream	<i>Sparus aurata</i>	Sparidae	Demersal
Axillary seabream	<i>Pagellus acame</i>	Sparidae	Demersal
Red pandora	<i>Pagellus bellottii</i>	Sparidae	Demersal
Common pandora	<i>Pagellus erythrinus</i>	Sparidae	Demersal
Rubberlip grunt	<i>Plectorhynchus mediterraneus</i>	Haemulidae	Demersal
Meagre / red drum		Sciaenidae	Demersal
Alfonsino	<i>Beryx sp.</i>	Berycidae	Demersal
Longspine snipefish	<i>Macroramphosus scolopax</i>	Macroramphosidae	Demersal
Scabbard fish		Trichiuridae	Benthopelagic
Atlantic pomfret	<i>Brama brama</i>	Bramidae	Epipelagic
Leerfish	<i>Lichia amia</i>	Carangidae	Pelagic
Mullet		Mugilidae	Pelagic
Atlantic bonito	<i>Sarda sarda</i>	Scombridae	Pelagic
Little tunny	<i>Euthynnus alletteratus</i>	Scombridae	Pelagic
Frigate and bullet tuna	<i>Auxis spp.</i>	Scombridae	Pelagic

Discards from European pelagic trawlers mainly consist of small pelagic fish (sardine, sardinella, mackerel, horse mackerel) that are damaged or too small, and of demersal species that are of no commercial value (snipefish) or too small (juveniles). In any event, the majority of the demersal by-catch are kept and not returned to the sea. In the period 2008-2009, almost 1 290 tonnes of sparidae, representing 3% of the total catch, were declared by European pelagic trawlers.

#### 5.4.2 Impact of fishing on protected species

##### > Sharks and rays

Sharks and rays have biological characteristics (slow rate of growth, longevity, late sexual maturity, low fertility rate) which are reflected in poor reproductive potential and the inability of populations to reconstitute themselves quickly. These characteristics make them highly vulnerable to all forms of fishing and expose populations to over-exploitation and the risk of extinction. The protection of elasmobranch species (sharks and rays) has been a matter of international concern for some years. An International Action Plan for the Conservation and Management of Sharks has therefore been drawn up by the FAO as part of the Code of Conduct on Responsible Fishing. This plan, which is a non-binding instrument, applies to all States, entities and fishermen. It was adopted by the FAO Fisheries Committee at its 33rd session in February 1999 and approved by the FAO Council at its November 2000 session.

In the north-west Africa sub-region, many countries have drawn up national action plans on the conservation and management of sharks. In the case of Morocco, Decision No RE2/09 of 26 June 2009 concerning the conservation of sharks introduced the following measures designed to reduce the impact of fishing on these species:

- bottom-feeding shark species must on no account exceed 5% of the total catch of each individual vessel;
- vessels must as far as possible not engage in targeted fishing of surface-feeding shark species;