ICCAT Manual
INTERNATIONAL COMMISSION FOR THE CONSERVATION OF ATLANTIC TUNAS
ICCAT CICTA CICAA

CHAPTER 3.1.8: TRAP FISHERIES	AUTHORS: N. ABID and M. IDRISSI	LAST UPDATE: Jun. 15, 2007

3.1.8 Description of the gear

1. General description of the gear and the vessels according to ISSCFG/ISSCFV classifications

Fixed, uncovered trap nets
Gear category: Traps
Standard abbreviation: FPN
ISSCFG code: 08.1.0

These are usually large sized nets, anchored or fixed to stakes, open on the surface and fitted with several devices to pull in and hold the fish. The majority are divided into compartments that are closed at the base by a layer of net. In Japan this group is usually called fixed nets (not to be confused with fixed gillnets). (Nédélec and Prado, 1990) (**Figure 1**).

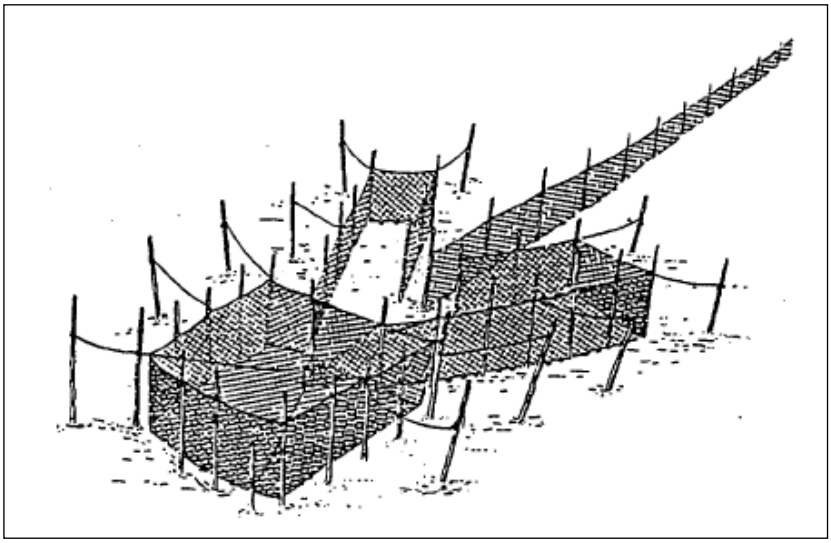

Figure 1. Diagram of an open topped trap net (Nédélec and Prado, 1990).

Trap setters

Vessel category: Trap setters
Standard abbreviation: WO
ISSCFV Code: 06.0.0

Vessel characteristics

Length: All
Power: All
Tonnage: All
Deck type: Decked and undecked vessels

These boats are used to install fish pots of trap nets to catch fish, lobster, crab and other similar species. Trap setters range from open boats operating inshore to larger decked vessels of 20-50 m operating at the edge of a continental shelf.

On small-decked trap setters the wheelhouse is located either forward or aft. On larger vessels the wheelhouse is usually located forward.

Larger trap setters are equipped with derricks or cranes for hauling pots onboard. On smaller vessels hydraulic or mechanical pot haulers are fitted.

The search for fish is rather more linked to the fisherman's knowledge of the fishing areas that to the use of special fish detection equipment. Decked ships are usually equipped with echo sounders. The more sophisticated big ships have a Loran or a GPS.

2. General description of fishing operations

When a tuna encounters the obstacle it attempts to circumnavigate it and then it enters into a series of chambers. The final aim is for the fish to end up in the death chamber or 'copo' either on its own or through the use of force, wherein the fish is caught, alive or dead (Rodríguez Roda, 1980).

Removal from the death chamber generally takes place between 6-7 am. When all the tuna are believed to be in the death chamber, the removal operation from the bottom of the basket begins by bringing the fish up to the surface to be caught subsequently. Once the fish are caught, they are killed and transported in special vessels that deliver them to port for landing and distribution-sale (Rodríguez Roda, 1980).

No bait is ever used for this type of fishing.

3. Main Atlantic trap fisheries

3.a Northeast Atlantic fishery

Specific characteristics of gear/fishing boats

Trap net fishing in the northeast Atlantic goes back some 3,000 years. It was introduced to Spain by the Phoenicians. The gear has not really changed in conceptual terms but it has been perfected over the years. (Rodriguez-Roda, 1980; dos Santos and García, 2006).

The trap net consists of a large net, called a ground net, open to the surface over several compartments or chambers, equipped with different devices to retain the fish, constituting the 'cuadro', plus a sea net (**Figure 2**).

The cuadro, installed parallel to the coast, may be composed of 3 or 4 chambers, and is about 205 m long and 50m wide. The death chamber is about 30m long. The mesh size of the cuadro is about 30 cm whilst that of the copo is between 6 and 8 cm.

The ground net is installed parallel to the coast, and is about one mile long with a mesh size of about 60 cm. The sea net is smaller than the ground net but its mesh size is similar.

The drop of the net is greater than the depth of the bottom by a certain percentage which depends on the strength of the tides and currents. This percentage may reach 30% (de la Serna *et al.* 1999b; de la Serna *et al*. 2000; de la Serna, 2001).

Table1 describes the main characteristics of trap nets by fishery.

Table 1. Main characteristics of northeast Atlantic trap nets, by fishery.

Country	*Numer of traps*	*Distance from the coast (nautical miles)*	*Depth (m)*	*Author*
Spain	4	0.5 to 5.9	45-50	de la Serna, 2001
Morocco	12	0.5 to 3	17-55	Abid and Idrissi, 2006
Portugal	1	2	20-60	dos Santos and García, 2006

SPANISH FORWARD TRAP

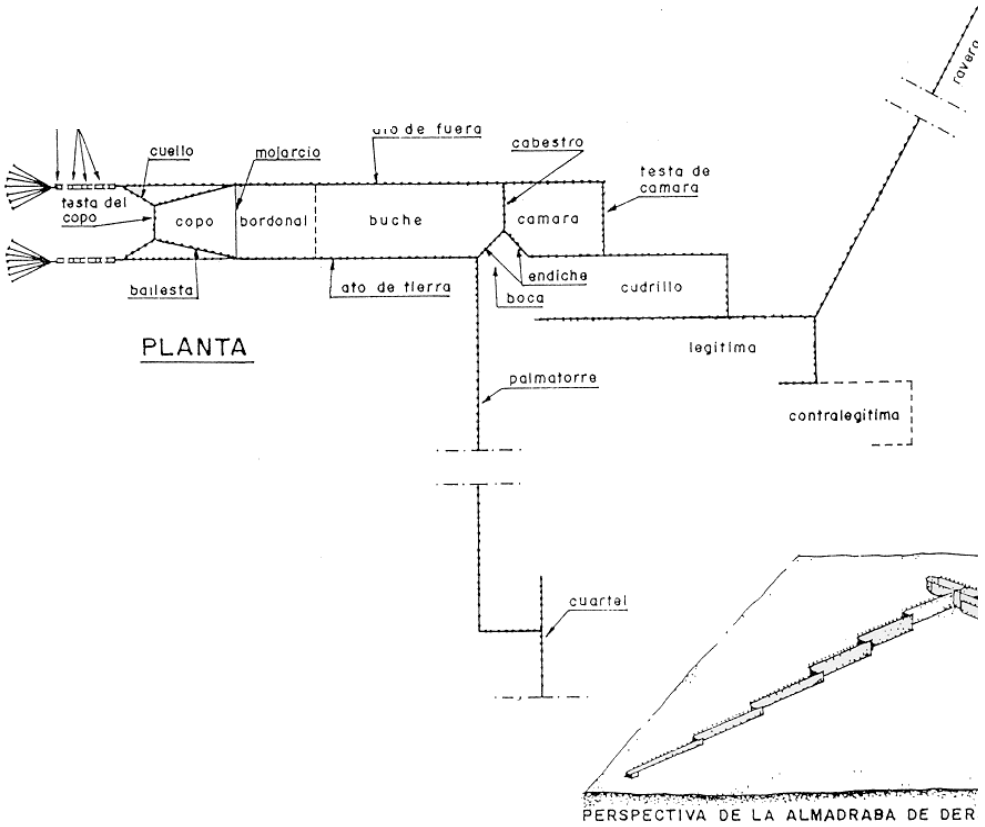

Figure 2. Diagram of a Spanish forward trap net (de la Serna *et al.* 2000).

Flag states involved

The northeast Atlantic fishery is mainly operated by EC-Spain, EC-Portugal and Morocco.

Areas of operation

The trap nets are set along the southern Atlantic coast of Spain and the north Atlantic coast of Morocco. There is another operational trap net in the south of Portugal (de la Serna *et al.* 2000; dos Santos and García, 2006; Abid and Idrissi, 2006).

Seasonality

The Spanish and Moroccan trap nets mainly target bluefin tuna (*Thunnus thynnus*) during its genetic migration period from the Atlantic towards the Mediterranean, which lasts from April to June (de la Serna *et al.* 2000; Abid and Idrissi, 2006).
The Portuguese trap nets have a relatively longer season from May to August to target bluefish tuna during their genetic and trophic migration (dos Santos *et al.* 2006).

Target species and size composition

Bluefin tuna is the main species targeted by traps. However, other species such as smaller tunas and swordfish maybe caught in fair quantities by this fishery (de la Serna *et al.* 2000).

The size of the tuna caught varies between 75 and 290 cm but most are between 165 and 240 cm. The mean size for the last three years has been 207 cm. The mode is about 205-210 cm. Similar size structures have been reported previously by several authors (Rey *et al*, 1987; de la Serna and Alot, 1990; de la Serna *et al.* 1992; de la Serna *et al.*1999a) (**Figure 3**).

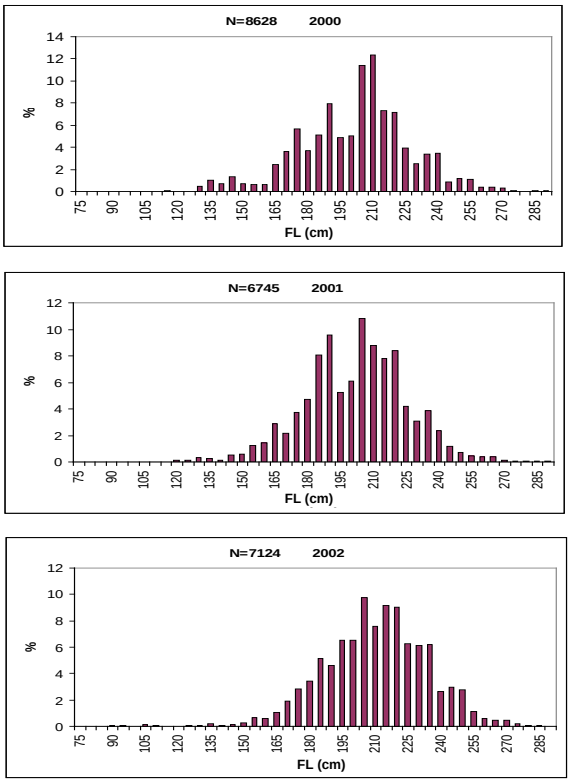

Figure 3. Distribution of size frequencies in bluefin tuna catches by Spanish and Portuguese trap netters (ICCAT, 2006b).

Fish storage/processing

Most of the bluefin tuna caught by trap nets is exported to Japan where demand for this fish has been high since the end of the 1970s. The tuna for export are headed, gutted and tailed and then frozen (Rodríguez-Roda, 1980; dos Santos and García, 2006).

Landing ports

The main landing ports for are Conil, Barbate, Zahara and Tarifa in the south of Spain and Tangiers, Larache, and Mehdia in northern Morocco.

Historic trend

Nominal effort

The global fishing effort of Spanish and Moroccan trap nets fluctuated between 1986 and 2002, although it shows a general upward trend (de la Serna *et al.* 1999b; de la Serna *et al.* 1999c; de la Serna *et al.* 2000; de la Serna *et al.* 2001; and de la Serna *et al.* 2002; Abid and Idrissi, 2006) **(Figure 4**).

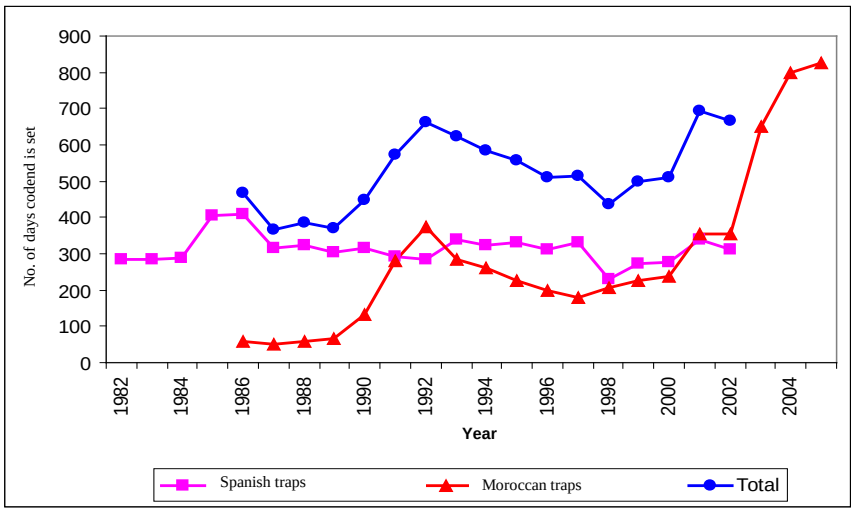

Figure 4. Trend in fishing effort by Spanish and Moroccan trap netters 1982-2005.

− Technological changes and changes to fishing gear/vessels

Trap nets have been perfected throughout the years (Rodríguez-Roda, 1980; dos Santos and García, 2006). However, none of those changes have been documented.

− Fishing zones

No changes to trap net zones in the Atlantic have been documented.

− Catches by species/area/season/year

The majority of bluefin tuna catches takes place during the second quarter of the year (April-June) given that the trap nets essentially target bluefin tuna on their genetic migration (**Figure 5**).

Total tuna catches rose to a peak of 16,000 tons in 1958 and then dropped to their lowest level (20 tons) in 1974. From 1982 onwards, the figure increased slightly but has never exceeded 2,100 tons. The main reason for this decline was the availability of tuna to the trap nets (Miyake *et al.* 2004) (**Figure 6**).

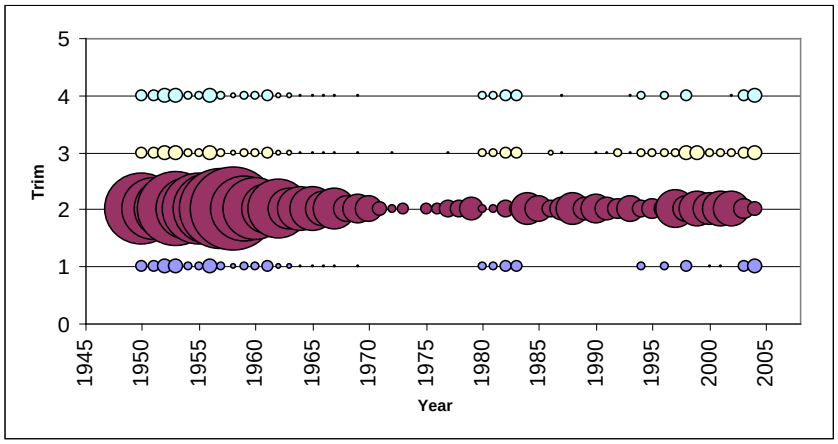

Figure 5. Quarterly bluefin tuna catches by northeast Atlantic trap nets, 1950-2004 (ICCAT, 2006b).

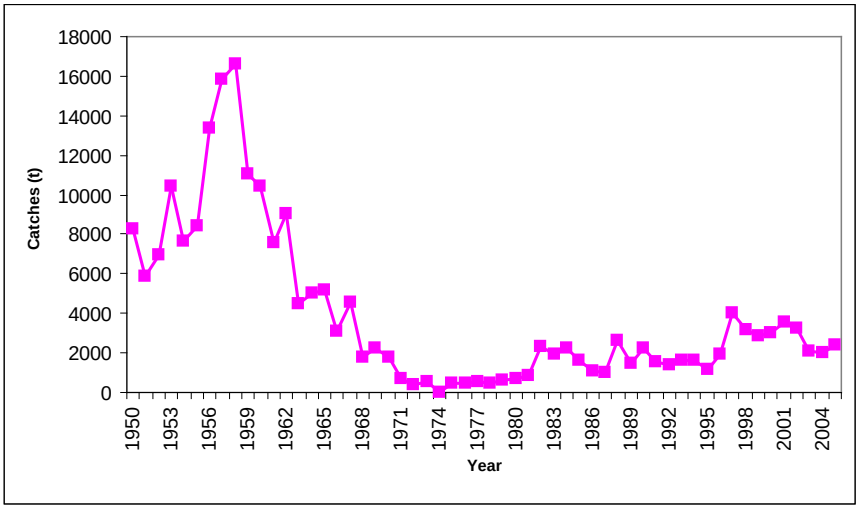

Figure 6. Annual bluefin tuna catches by northeast Atlantic trap nets 1950-2005 (ICCAT, 2006b).

Specific sampling considerations

Countries using trap nets have implemented a statistical monitoring and biological sampling programme to collect data on catches, fishing effort and size information. The information is summarized in **Table 2.**

Table 2. Information on national sampling programs.

Country	*Landing/Catches*	*Catches – fishing effort*	*Size data*	*Author*
Spain	Sampling	Trap monitoring-sales	30-45% of catches sampled	ICCAT, 2006a
Portugal	Census	---	Weekly sampling	dos Santos and García, 2006
Morocco	Census	Census	Sampling at port and at sea	ICCAT, 2006a

Potential impacts on the ecosystem, including by-catch

Trap nets are fixed, passive gear which can never cause damage to the environment or to the fishing stock they are designed to catch. Moreover, this notion of conservation and management is considered relevant for this gear given the relatively low level of catches compared to other gears that target the same species (Hattour, 2005).

Environmental impact on fishing operations

Several factors may condition trap net catches. Currents which enter the gulfs can create local or eddy currents that move the tuna towards the trap nets (Sara, 1980).

Ambient factors, notably surface water temperature, have an impact on trap net bluefin tuna catches. It is well known that reproductive migrating bluefin tuna follow a temperature of 17º-24º (Rodríguez-Roda, 1980; Azevedo and Gomes, 1985).

Water turbidity and transparency, especially between 25 and 25 metres are also factors that favour trap net bluefin tuna catches because that species prefers clear waters (Laevastu and Rosa, 1963; Rodríguez-Roda, 1980).

Wind force and direction also play a role in bluefin tuna catches. Westerly and southwesterly winds are the most favourable to genetic migrating bluefin tuna catches. East winds are more favourable to trophic migrating bluefin tuna catches (Sara, 1980; Rodríguez-Roda, 1980; de la Serna *et al.* 1992).

The phases of the moon, tides, the condition of the sea and sky are other factors which influence trap net catches (de la Serna *et al.* 1992).

Finally, the killer whale, because of its voracious nature, stops bluefin tuna from entering the trap nets (Rodríguez-Roda, 1980).

3.b Mediterranean fishery

The "thonaire" has been well known in the Mediterranean since ancient times. It appears that the Phoenicians, who had invented the earliest known system, fished in the very deep waters of the bays by guiding the tuna that arrived every spring by using palm leaves in the sand at the bottom of the sea. The tuna grouped together in the resulting narrow spaces were then killed by a stick or lance (Sara, 1980; Consolo, 1987 *In* Di Natale, 1990; Hattour *et al.* 2003; Hattour, 2005).

Specific characteristics of gear/vessels

The cuadro is usually composed of three or four chambers. The length may vary between 200 and 480 metres and is between 30 to 40 metres long. The chambers of the cuadro have a mesh size of 37 cm whilst the end chamber has a mesh size of 25 cm. The death chamber has a mesh size of 10cms **(Table 3 and Figure 7**).

Table 3. Main technical characteristics of trap nets by country.

Country	*Number of trap nets*	*Cuadro length (m)*	*Ground tail length (m)*	*Author*
Tunisia	3	200-300	4,500	Hattour, 2000
Libya	2	475-480	3,200	ICCAT, 2006c
Italy	1	300-400	900-1,200	Addis *et al*. 1997
Spain	2	-	-	de la Serna *et al.* 2002
Morocco	1	-	-	Abid and Idrissi, 2006
Algeria	1	-	-	Chalabi, 1993

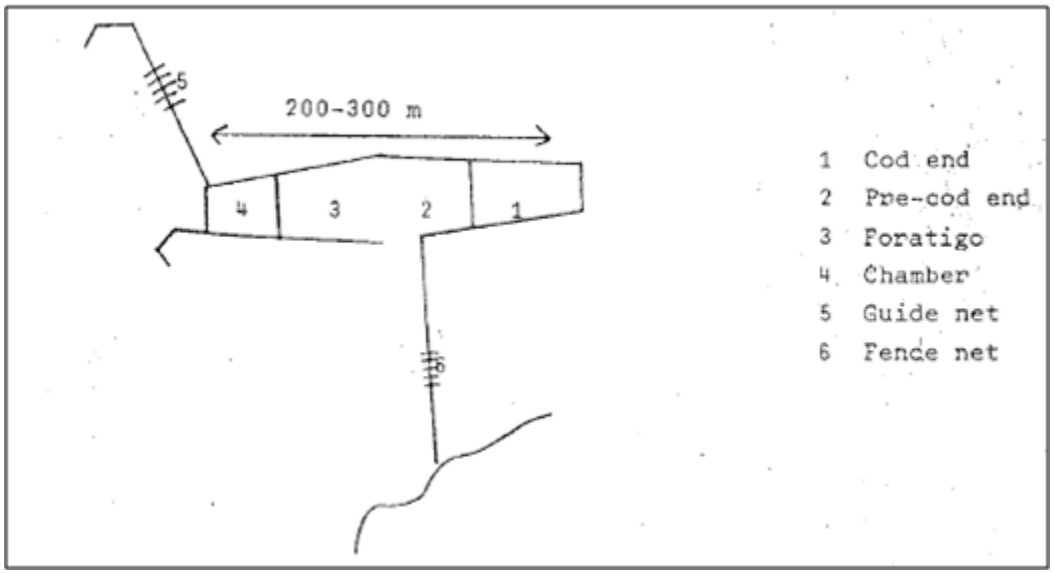

Figure 7. Diagram of a Tunisia trap net (Hattour, 2000)

Flag States involved

The countries that fish using trap nets in the Mediterranean are EC-Spain, EC-Italy, Morocco, Algeria, Tunisia and Libya. The Libyan, Tunisian and Spanish fisheries are the biggest in terms of catch (ICCAT, 2006b).

Areas of operation

The Mediterranean trap nets are set to the east of the Strait of Gibraltar, in the Gulf of Tunisia and along the western Libyan coast. The Italian trap nets are located along the southwest coast of Sardinia and in Sicily (Addis, 1997; de la Serna *et al.* 2002).

Seasonality

There are two fishing seasons, depending on the type of trap net. The forward trap nets (Italy, Tunisia and Libya) target the genetic migrating bluefin tuna. They tend to operate between April and June (Hattour, 1995; Addis *et al.* 1997; ICCAT, 2006c).

The reverse trap nets, i.e. Spain and Morocco, target trophic migrating bluefin tuna. They are active for a relatively longer period, from July to November (de la Serna *et al.* 2000; de la Serna *et al.* 2002; Srour and Abid, 2003).

Target species and size composition

The Mediterranean trap nets mainly target bluefin tuna. Other smaller tunas, such as frigate tuna, Atlantic black skipjack and Atlantic bonito, may also be caught in large quantities (de la Serna and Alot, 1991; Srour, 1993; Hattour, 1995; Addis *et al.* 1997; Hattour, 2000; dos Santos, *et al.* 2002, dos Santos and Alot, 2006).

Bluefin tuna caught are between 85 and 310 cm but the majority are between 95 and 200 cm. The mean size is 155 cm whereas the mode has oscillated between 140 and 155 cm in recent times. That size structure is similar to that reported by other Mediterranean authors (de la Serna and Alot., 1991; Hattour, 2000) (**Figure 8**).

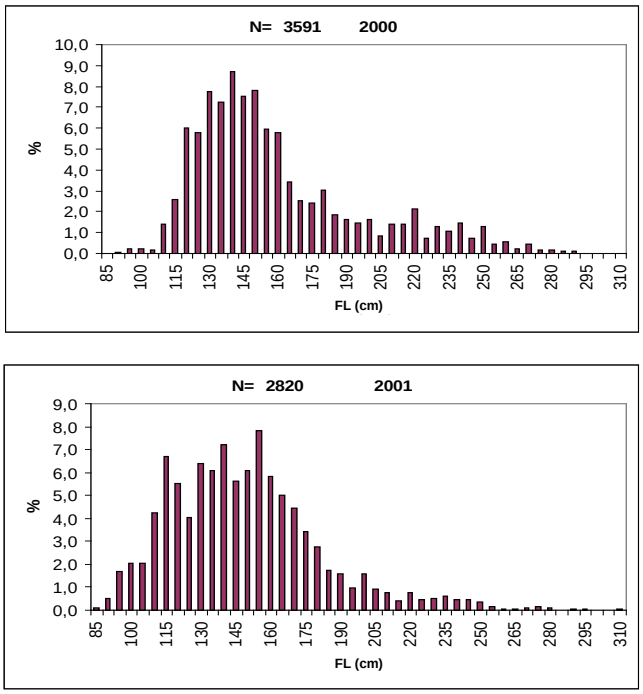

Figure 8. Distribution of bluefin tuna sizes caught by Libyan and Italian trap nets (ICCAT, 2006b).

Fish storage/processing

Almost all the bluefin tuna are frozen and exported to Japan where there is huge demand for the species. This species commands a high price and therefore the export market is given priority (Hattour, 2005; ICCAT, 2006c).

Landing ports

The main landing ports for bluefin tuna caught by Mediterranean trap nets are Ceuta in Spain, Portocusco and Carioforte in Italy, Sidi Daoud in Tunisia and Musrata in Libya.

Historic trend

− Nominal effort

Available information indicates a decline in Mediterranean trap net fishing from the beginning of the 19th century to the present (de la Serna *et al.* 1999b; ICCAT, 2001; ICCAT, 2006c; Hattour, *et al.* 2003; Hattour, *et al.* 2005).

− Technological changes/changes to fishing gear/vessels

The Mediterranean trap net has remained unchanged in conceptual terms since the dawn of time. It has remained true to its origins. (Sara, 1980).

However, this fishery has undergone some significant technological changes in recent years. Prior to 1990, only the traditional six chamber trap nets were used and they were heavy because they were made of cotton.

In 1990, the number of chambers was reduced from six to three and that cut the considerable running costs. Lighter polyester thread was also introduced. The trap net now incorporates a funnel-shaped device to prevent trapped fish from escaping and that has served to improve efficiency (Addis *et al.* 1997).

− Fishing zones

No changes to Mediterranean trap net fishing zones have been documented.

− Catches by species/zone/season/year

Catches have fluctuated throughout the historic data series with a general downward trend. Catches reached their historic peak of 4,296 tons in 1958. Since 1970, catches have fallen overall and currently do not exceed 450 tons (**Figure 9**).

The decline in catches since the 1960s is due to several factors, notably the deterioration of water ecology because of increased industrialisation. The interference of trap nets with other, more sophisticated gear such as seine and longline have also contributed to this decline (Addis, *et al.* 1997).

The biggest catches correspond to EC-Italy, followed by Libya, Tunisia, and EC-Spain (ICCAT, 2006b).

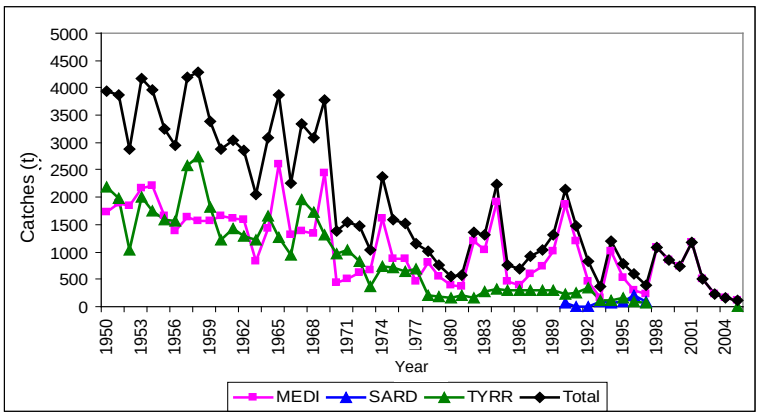

Figure 9. Annual bluefin tuna catches by Mediterranean trap nets by zone, 1950-2005 (ICCAT, 2006b).

Specific sampling considerations

Sampling is focussed on collecting catch data, fishing effort and size information. The information on sampling programmes by country is summarised in **Table 4**.

Table 4. Information on national sampling programs.

Country	*Landings/Catches*	*Catches – Fishing effort*	*Size data*	*Author*
Spain	Sampling	Trap monitoring- sales	30-45% of catches sampled	ICCAT, 2006a
Italy	Census	Proportional probability sampling (PPS)	Proportional probability sampling (PPS)	ICCAT, 2006a
Morocco	Merchant census	Census	No size measurements	ICCAT, 2006a
Algeria	Merchant census	Port sampling	No size measurements	ICCAT, 2006a
Tunisia	Census	Sampling at sea	Sampling at sea	Hattour, *et al.* 2005
Libya	Full log coverage	Full log coverage, daily sampling	80% of catches sampled	ICCAT, 2006a

Potential impacts on the ecosystem, including by-catch

This point has already been discussed above (*cf.* section 3.a and 3.b).

Environmental impact on fishing operations

This point has already been discussed above (*cf.* section 3.a and 3.b)

3.c Northwest Atlantic fishery

Specific characteristics of gear/vessels

The northwest Atlantic fishery is less important than those of the northeast Atlantic and the Mediterranean (Miyake *et al.* 2004).

There is a lack of information concerning the technical characteristics of this fishery.

Flag States involved

Traps are used in this fishery by Canada and the United States (ICCAT, 2006b).

Areas of operation

The trap nets are set in northeastern Canada (Saint Margaret's Bay) and the northeast coast of the United States (Miyake *et al.* 2004).

Seasonality

The fishing season is from July to November during bluefin tuna migration in Canadian waters (Porter *et al.* 2003).

Target species and size composition

Bluefin tuna is the main species targeted by this fishery. The Canadian catches are composed of individuals between 145 and 295 cm. The mode is about 185 cm. The mean size has decreased in recent years, going from 248 cm in 2001 to 206 cm in 2003 (**Figure 10**).

This trend may be due to several factors, notably higher water temperature that has enabled smaller fish to enter Canadian waters (Porter *et al.* 2003).

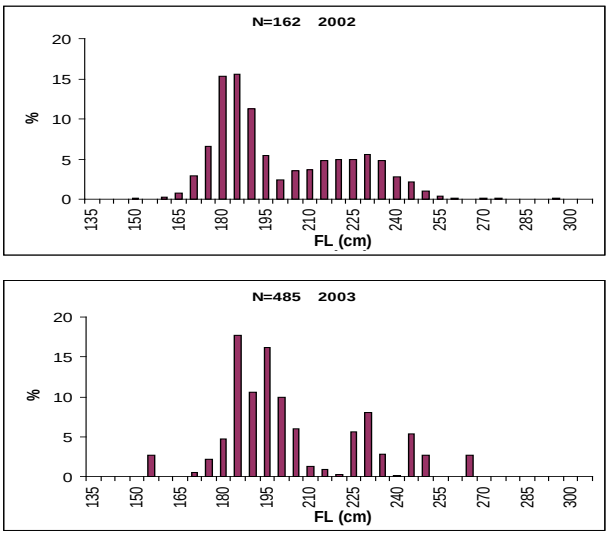

Figure10. Distribution of size frequency in Canadian trap net bluefin tuna catches (ICCAT, 2006b).

Fish storage/processing

All Canadian-caught bluefin tuna are exported to Japan (ICCAT, 2006b).

Landing ports

Bluefin tuna are landed at St. Margaret's Bay in Nova Scotia (Porter *et al.* 2003).

Historic trend

− Technological changes and changes to fishing gear/vessels

There is a lack of information on this subject.

− Fishing zones

There is a lack of information on this subject.

− Catches by species/area/season/year

Catches have shown significant annual fluctuations. They attained their peak in the 1950s (870 tons in 1958). They dropped considerably in the 1960s and increased slightly in the 1980s. Catches have since fallen again and have not exceeded 30 tons in recent times (**Figure 11**).

The collapse of this fishery, already mentioned by several authors, is caused by changes in the bluefin migratory pattern, conditioned by environmental factors (Maguire and Hurlbut, 1984; Clay *et al.* 1985).

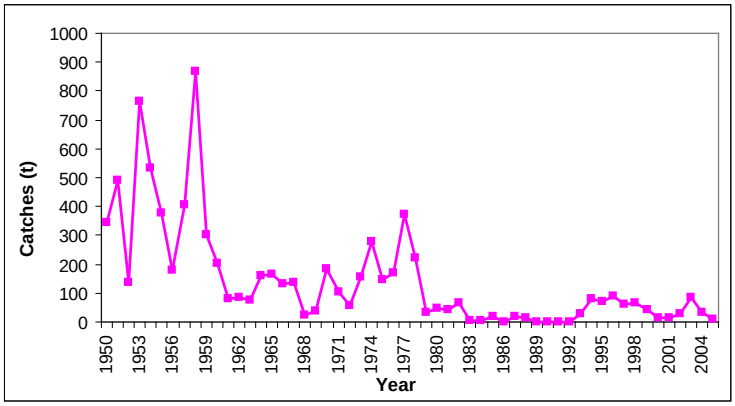

Figure11. Annual bluefin tuna catches by northwest Atlantic trap nets, 1950-2005 (ICCAT, 2006b).

Specific sampling considerations

The main facts concerning national sampling programmes for this fishery are summarised in **Table 5**.

Table 5. Main information on national sampling programs.

Country	*Landings/Catches*	*Catches/Fishing effort*	*Size data*	*Author*
Canada	Logbook, census	Log, census	All fish measured	ICCAT, 2006a
USA	Wholesaler registers, partial logbook coverage	Log, Wholesaler registers	Individual weight provided by skippers, etc	ICCAT, 2006a

Potential impacts on the ecosystem, including by-catch

This point has already been discussed above (*cf.* section 3.a, 3.b and 3.c).

Environmental impact of the environment on fishing operations

This point has already been discussed above (*cf.* section 3.a, 3.b and 3.c).

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