

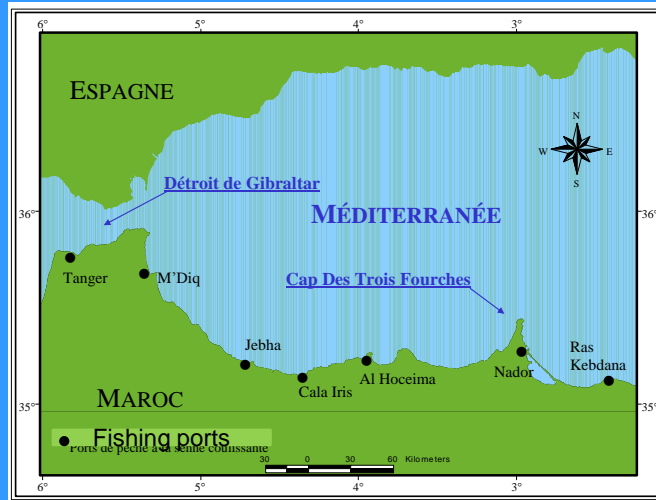
## **By-catch Attenuation With Acoustics**

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**Most important  
fisheries/cetacean  
interaction in Morocco**

## CHARACTERISTICS OF THE AREA



- 512 km of coast;
- Narrow continental shelf;
- transition zone with the Atlantic;

## FISHERIES INTERACTION WITH CETACEANS

### Handline fishery :

- Nearly 140 boats operating in the Strait of Gibraltar (Ksar Sghir, Diky, ...)
- Target bluefin tuna

### Purse seine fishery :

- Fleet of 120 boats (Nador, Al Hoceima, M'Diq, ...)
- Target small pelagics (sardina, horse mackerel,....)

### Driftnet fishery :

- Fleet of more than 300 units (Tanger, Nador, Al Hoceima, ....)
- Mainly targets swordfish

### Interaction between driftnets fishery and Marine Mammals

Bycatch of marine mammals by driftnets has attracted a serious attention of regional organisations.

This problem is still poorly understood (the observations made so far are insufficient to draw conclusions).

INRH in 2004 was developing a program of evaluation and use of acoustics to reduce by-catch.

In 2005, the GFCM, has recommended to the Contracting Parties the prohibition of the use of driftnets.

Thus, the Government of Morocco introduced legislation which prohibits the use of this fishing technique from 1st January 2012.

Currently, the DPM has a program to encourage shipowners to the abandonment of driftnets, and work with the INRH and other partners to develop alternative fishing techniques (engin with hooks ).

### Interaction between the killer whale, and the bluefin tuna fishery

Interaction existing in the Strait of Gibraltar, during the months of July and August.

The interaction occurs by attack of the killer whale on tuna catches.

This is one of the major challenges confronted to the fishermen (significant reductions in income).

The attacks can cause a total loss of the catch, or a partial loss of the piece of tuna.

Initial observations indicate a percentage of killer whale attacks by nearly 11%.

INRH intends to launch a study for the economic evaluation of the negative impact of this interaction on the fishery.



*Tuna attacked by killer whales*

Interaction between the purse seine fishery and the bottlenose dolphin *Tursiops truncatus*.

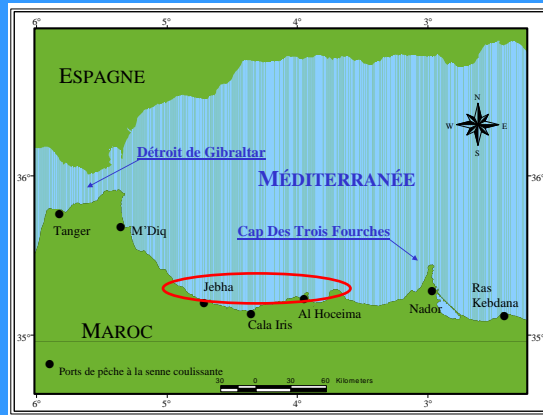
- Frequency of attacks estimated at 16% (2004);
- Problem that exists only in the Moroccan Mediterranean;
- This causes economic and financial losses (damage to fishing gear, partial loss of the catch and cancellation of fishing operations);
- Reduction of income for fishermen and shipowners (up to 36%);
- Estimated losses in value added (entire fleet) of nearly 2,2 million Euros.



The INRH has begun a program of study and monitoring of this phenomenon: It includes the use of *pingers* to reduce the interaction (2 trials, initiated in 2003 and 2005, a third recently completed with the contribution of ACCOBAMS: the results were not conclusive.

## Trials approach

### Study area



### Period

novembre 2009 / novembre 2010

## Trials approach

### Devices used in trials

#### Dolphin Sphere



- Waves effect at 250 m
- 150 dB
- Frequency not constant

#### Dolphin Saver

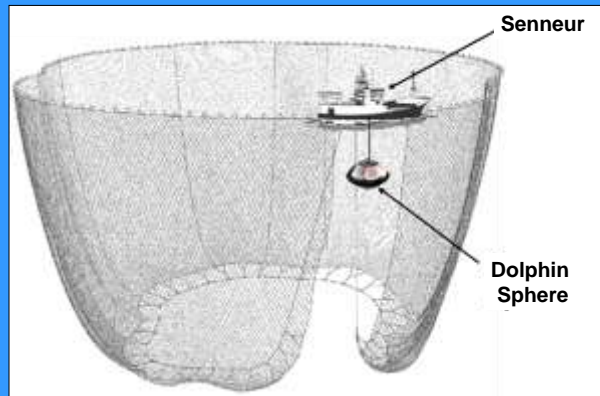


- Waves effect at 150 m
- 140 dB
- Frequency not constant

## Trials approach

### Trails protocoles

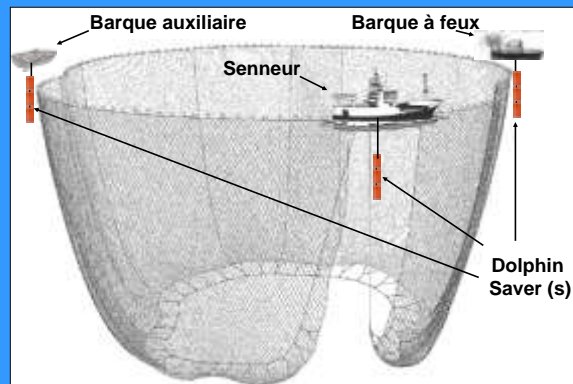
Protocole A : equipement of 3 senners with one *Dolphin Sphere* each



## Trials approach

### Trails protocols

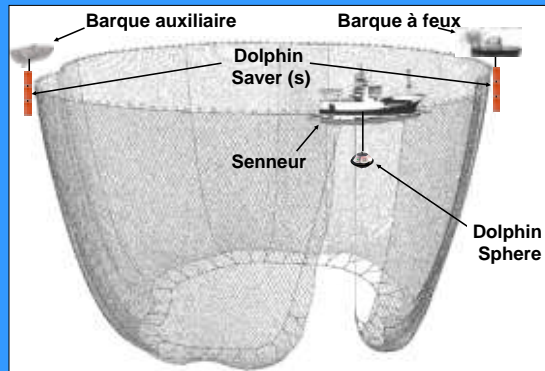
Protocol B : 3 boats are equipped with 9 *Dolphin Saver (s)*



## Trials approach

### Trails protocols

Protocol C : 3 boats with one *Dolphin Sphere* putting on the seiner and 3 *Dolphin Saver (s)* on each two small boats



*Tears nets*

## main indicators monitored

Frequency of attacks: Percentage of fishing operations attack against total positive

Intensity of the attacks: Number of employees mender to repair the torn nets following the attacks of the Grand Dauphin

## Trial Results

| Résultats pour le protocole N (situation de base) | Novembre, décembre 2009 | mai, juin, juillet, septembre, octobre, novembre 2010 |
|---|-------------------------|---|
| Opérations de pêche positives (estimées)          | 968                     | 2795  |
| Opérations de pêche attaquées                     | 100                     | 278   |
| Fréquence des opérations attaquées                | 10,3 %                  | 9,9 %   |

| Résultats pour le protocole A      | Novembre, décembre 2009 | mai, juin, juillet, septembre, octobre, novembre 2010 |
|------------------------------------|-------------------------|---|
| Opérations de pêche positives      | 45                      | 101   |
| Opérations de pêche attaquées      | 0                       | 20  |
| Fréquence des opérations attaquées | 0,0 %                   | 19,8 %  |

| Résultats pour le protocole B      | Novembre, décembre 2009 | mai, juin, juillet, septembre, octobre, novembre 2010 |
|------------------------------------|-------------------------|---|
| Opérations de pêche positives      | 35                      | -   |
| Opérations de pêche attaquées      | 4                       | -   |
| Fréquence des opérations attaquées | 11,4 %                  | -   |

| Résultats pour le protocole C      | Novembre, décembre 2009 | mai, juin, juillet, septembre, octobre, novembre 2010 |
|------------------------------------|-------------------------|---|
| Opérations de pêche positives      | 21                      | 104   |
| Opérations de pêche attaquées      | 0                       | 20  |
| Fréquence des opérations attaquées | 0,0 %                   | 19,2 %  |



## **Conclusion**

**The experimentation shows :**

**Good result in short time**

**Long time : the devices are not efficient**

**Dolphin Spheres are more efficient than Dolphin savers**

**Most effort must be taken**

## **Recommendations**

**Monitoring of this phenomenon**

**Developing studies to better understand this phenomenon and identify the causes and the influence**

**Continuing the research in acoustics and testing other devices**

**Founding other solutions to this interaction**

*Thank you*