Impact of the Trammel Net in Martinique Fishery, F.W.I. 2010

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ABSTRACT

Small scale fisheries in Martinique are an important social and economic sector. Fisheries management is a local priority concern to limit coastal resources decline. The net fishery accounts for 20% of the fishing techniques used and causes serious ecological problems as well as for species selectivity. Among the gears used, the trammel net (bottom net) is the most problematic technique. Experimental fishing, targeting lobster (26 trials) and fish (21 trials), was conducted to determine the impact of these techniques. For the fish techniques, the trammel net caused 68% of bycatch (0.41 g.100m/h) (non commercial, undersize commercial and rotten individuals). The non-commercial species represented most of the catches (59%). The lobster fishing showed that trammel net is more selective with 22% of discards. The lobster counted for 47% (0.63 g.100m/h). The other 53% catches are crabs, finfishes and rays. To assess the impact of trammel nets on benthic communities, 4 "cleanness" classes have been determined. The benthic species and debris catches (algae, coral, rock, seagrass) in the nets have been estimated to cover 63% (mean value) of the net surface (visual estimation). Trammel nets have a significant impact on benthic coral communities. Among the major problems caused by these three layers net, bycatches of protected species is a reality difficult to assess. Fifteen marine turtles have been caught, and 73% were dead by drowning. A policy (ban, no fishing area, fishing period…) in order to limit the impact of trammel nets is required for more sustainable small scale fisheries.

KEY WORDS: Martinique, selectivity, small scale coastal fishery, sustainable fishery, trammel net

Impacto del Trasmallo en la Pesqueria de Martinique, Antillas Francesas. 2010

La pesca en Martinique esta artesanal y representa un sector economico y social muy importante. La gestion de las pesquerias esta unas de las principales preocupaciones locales frente a la decadencia de los recursos marinos costeros. La pesca al red representa 20% de la pesca y plantea serios problemas de selectividad. Entre los aparatos utilizados, la pesca con el trasmallo (red de fondo) esta ta tecnica mas problematica y polemica. Pescas experimentales, para langostas (26 pescas) y peces (21 pescas), fueran realizadas para evaluar el impacto de estas tecnicas. Durante las pescas al peces, 68% de las capturas con el trasmallo fueran rechazadas (0.41 g.100m/h) (individuales non comerciales y comerciales podridos y demasiado pequenos). Las especies no comerciales representan la mayoria de las capturas (59%). Con las pescas para las langostas, el trasmallo fuera mas selectivo, con 22% of rechazo. Las langostas han representado 47% del total de las capturas (0.63 g.100m/h). Las 53% restante estaban constituado de cangrejos, peces y rayas. Para evaluar el impacto del red sobre la comunidades bentonicas, 4 clases de « limpieza » del red fueran determinadas. El contenido en especies y restos bentonicos (alga, coral, roca, fanerogamas) arrancados con los redes fuera estimado a 63% de su superficie medio (evaluacion visual), revelando una degradacion significante de los fondos marinos coralinos. Entre las mayor problemas ocasionados con los trasmallos, la captura de especies protegidas esta una realidad dificil a evaluar. 15 tortugas marinas fueran capturado, de las cuales 73% muertas por ahogamiento. Una reglamentacion (interdiccion, zonas de pesca, perioda de pesca…) permitando de limitar el impacto de esta tecnica destructora se vuelve necesario para une pesqueria mas responsable y duradera.

PALABRA CLAVE: Martinique, pesqueria artesanal duradera, selectividad, trasmallo

Impact du Trémail dans la Pêcherie de Martinique, Antilles françaises. 2010

La pêche en Martinique est essentiellement artisanale et représente un secteur économique et social clé. La gestion des pêcheries est une des préoccupations locales majeures face au déclin des ressources marines côtières. La pêche au filet représente 20% des métiers et pose de sérieux problèmes de sélectivité. Parmi les engins utilisés, la pêche au filet trémail (filet de fond) est la technique la plus problématique et controversée. Des pêches expérimentales, ciblant les ressources langoustes (26 pêches) et poissons (21 pêches), ont été réalisées pour évaluer l'impact de ces techniques. Lors des pêches ciblant la ressource poissons, 68% des captures faites par le trémail ont été rejetés (0.41 g.100m/h) (individus non commerciaux et individus commerciaux en mauvais état et/ou trop petits). Les espèces non commerciales représentaient la majorité des captures (59%). Lors des pêches ciblant la langouste, le trémail a été plus sélectif, avec 22% de rejets. Les langoustes représentaient 47% du total des captures (0.63 g.100m/h). Les 53% restant étaient constitués de crabes, poissons et raies. Pour évaluer l'impact du filet sur les communautés benthiques, 4 classes de "propreté" du filet ont été déterminées. Le contenu en espèces et débris benthiques (algue, corail, roche, phanérogames) arrachés par les filets a été estimé à 63% de sa surface en moyenne (évaluation visuelle), révélant une dégradation significative des fonds marins coralliens. Parmi les problèmes majeurs occasionnés par les filets trémail, la capture d'espèces protégées est une réalité difficile à évaluer. Quinze tortues marines ont été capturées, dont 73% mortes par noyade. Une réglementation (interdiction, zones de pêche, période de pêche…) permettant de limiter l'impact de cette technique destructrice devient nécessaire dans l'optique d'une pêche plus responsable et durable.

MOTS CLÉS : Martinique, pêche artisanale côtière, pêche responsable, sélectivité, trémail

INTRODUCTION

In Martinique, fisheries are artisanal; 6 - 8 m boats fitted with powerful outboard motors are used for coastal (60%) and pelagic (40%) trips. The continental shelf is overexploited (Antillean traps and nets) and marine resources are decreasing (Aiken 2000, Hawkins 2004, Hardt 2008). The nets for lobsters and finfishes are known to affect marine resources through massive fish captures (Gobert 1992, Acosta et al. 1995), especially the trammel net (Chakalall et al. 1997). The long soak times of bottom nets is the most impactant. As a consequence, non-commercial and protected species like marine turtles, are caught (Pandav et al. 1997, Gearhart et al. 2003, Carreras et al. 2004, Brown et al. 2005, Bell et al. 2006, Koch et al. 2006, Louis-Jean 2006, Aucoin et al. 2007, Gearhart et al. 2007). Thus, the gill and trammel nets were tested.

Our effort sampling has been focused over the fishing (DRAM 2004, SIH IFREMER Unpubl. data) and marine turtles (marine turtle network) sites.

The aim of this work is to integrate research results in policy development to contribute to the reduction of by-catches of non commercial and protected species. Experiments have been conducted to:

i) Evaluate the catches dynamics function of the gear used,
ii) Highlight the non-selectivity of these nets, and
iii) Compare them.

This article consists of complementary results about articles already published in the 2008 and 2009 GCFI proceedings (Louis-Jean 2009, Louis-Jean 2010).

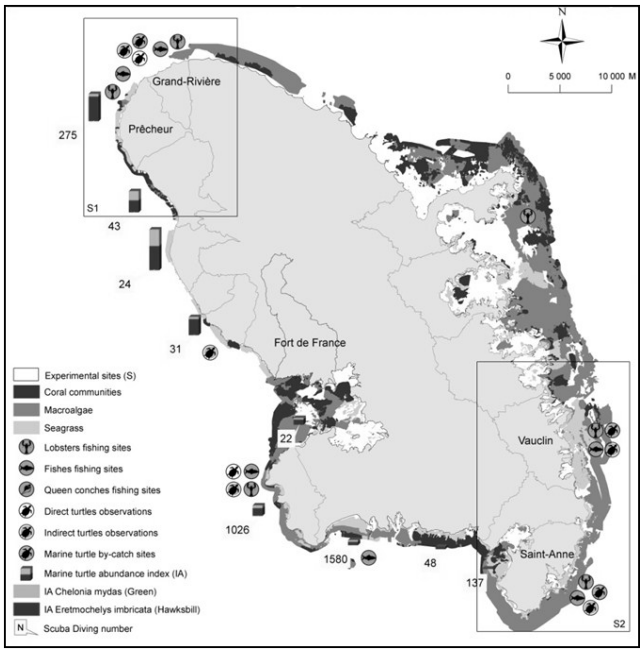

Figure 1. Experimental sites for the fish (S1) and lobster (S2) campaigns (data IFREMER, Louis-Jean, OMMM, Marine Turtle Networks). This map gives the localization of the main marine ecosystems, the most important fisheries, and the data on marine turtle observation in Martinique.

MATERIAL AND METHODS

Experimental Fishing Area Location

The fishing sites for these experiments were localized using the local fishery data (DRAM 2005, IFREMER) and GIS to produce maps of potential areas (Figures 1 and 2) and crossing fisheries' data with turtles' data. As a result, experimental fishing areas where located as shown on fig. 1. Two experimental sites where chosen, namely fish area (S1) and lobster area (S2).

Experimental Fishing Gears and Methods

Professional nets were chosen as control nets and compared to pilot ones.

The experiment targeting finfishes consist of comparing gill (one tight meshing size layer) and trammel (a tight meshing size layer surrounded by two loose meshing size (200 mm) layers) nets. The nets have a principal mesh size of 45 mm and floats every 1 m ensuring a vertical setting. The control net is a 3.40 m gill net. Several parameters were modified and combined to design pilot nets: the height (low profile: 1.60 m/high profile: 3.40 m) and the number of layer (1 for the gill net (G)/3 for the trammel net (T)). Three different nets were designed for the surveys: low and high profile trammel nets (T2 and T4) and high profile gill net (G4) (Table1).

Gill and Trammel nets were also compared for lobster fisheries. The lobster nets are 50 mm mesh with floats. The control net is a 1.40 m (high profile/low profile is 1 m) trammel net. Thus, low and high profiles trammel nets (T0 and T1) and a high profile gill net (G1) were designed (Table 2).

A total of 21 trials have been performed for fish (3 to 7 hours soak) and 26 for lobsters (1 night soak).

Lobster Fisheries

A total of 1614 individuals were captured, including 895 shellfish. These organisms belong to 59 species, of which 34 commercial species. Commercial individuals

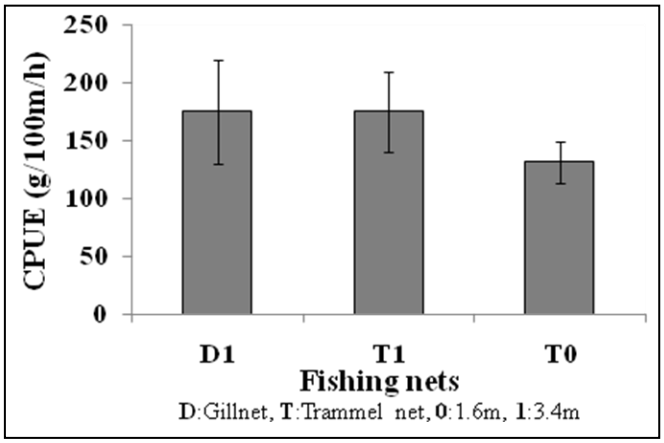

Figure 2. Average Catch Per Unit Effort in g/100m/h for each fish gear.

Table 1. Features of the experimental and control bottom nets for the small scale fish fishery.

Net	Length (m)	Angle	Height (m)	Number of layer	Mesh width (mm)
G4 Control	300	Vertical	**3.40**	**Gill net (G) 1 layer**	45
T2	300	Vertical	**1.60**	**Trammel net (T) 3 layer**	200 / 45 / 200
T2	300	Vertical	**3.40**	**Trammel net (T) 3 layer**	200 / 45 / 200

Table 2. Features of the experimental and control bottom nets for the small scale lobster fishery.

Net	Length (m)	Angle	Height (m)	Number of layer	Mesh width (mm)
G1	300	Vertical	**1.40**	**Gill net (G) 1 layer**	50
T0	300	Vertical	**1.00**	**Trammel net (T) 3 layer**	200 / 50 / 200
T1 Control	300	Vertical	**1.40**	**Trammel net (T) 3 layer**	200 / 50 / 200

represent most of (78%) the total individuals captured (Figure 3). The lobster counted for 47% (0.63 g/100 m/ hour) and the other part concerns mostly crabs, finfishes and rays.

Concerning the total biomass, the high trammel net T1 showed a higher potentiality to catch more individuals with an average CPUE of 90 g/100 m/hour, significantly more than the nets T0 (40 g/100 m/hour) and D1 (46 g/100 m/ hour) (Figure 4).

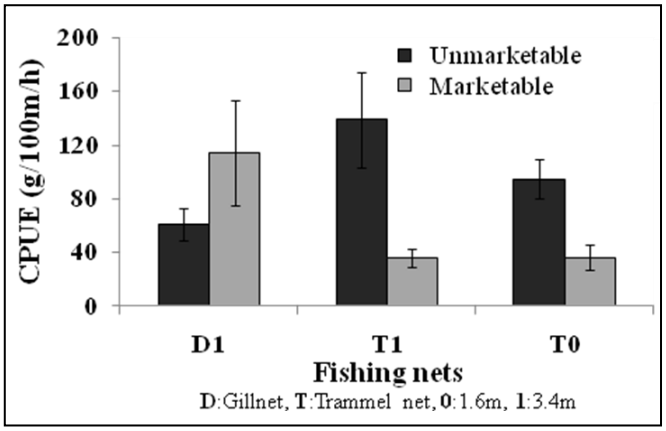

Figure 3. Average biomass in g/100m/h of marketable and unmarketable species for fish gears.

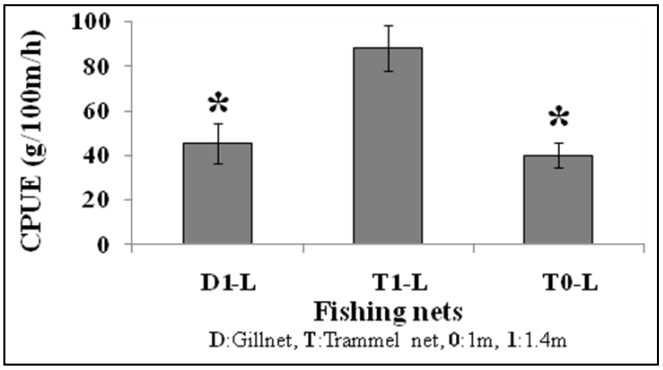

Figure 4. Average Catch of lobster Per Unit Effort in g/100m/h for each lobster gear (*: Captures different to the T1 net (control), Mann-Whitney test, $p < 0.05$).

Each net captured significantly more marketable organisms than unmarketable (Mann-Whitney test, $p < 0.05$) (Figure 5).

CONCLUSIONS

These trends drawn some preliminary results, but more trials are caring out to complete this study and have more significant results.

We observed differences in productivity and selectivity of the different nets. According to the targeted species, different places, different techniques and different net parameters are used. Gill net seems to be more appropriate for finfishes, whereas trammel nets are more interesting for lobster. The fish trials show that the gill nets give a higher productivity and less waste, above all the high-profile ones where more marketable individuals have been captured. On the contrary, lobsters are fished better with the trammel net, and this technique shows improved selectivity with few discards.

The non selectivity of the trammel net observed in these trials had already been shown before (Acosta 1995, Louis-Jean 2009, Louis-Jean 2010). The many discards and the death of protected species, like marine turtles, (Brown 2005, Carreras et al. 2004, Eckert 2005, Gearhart 2003, 2007, Pandav 1997, Louis-Jean 2009) are the best

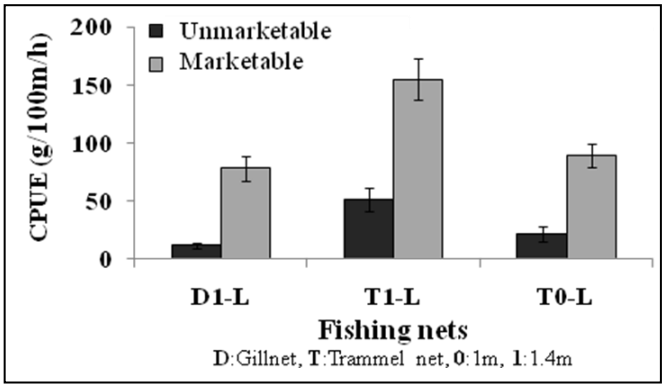

Figure 5. Average biomass in g/100m/h of marketable and unmarketable species for lobster gears.

illustrations. All these results contribute to confirm the negative effect of this three layer net on the reef biodiversity and its degradation.

As the 2010 results affirm, trammel nets can be considered as non-sustainable gear (Gobert 1992, Louis-Jean 2009, Louis-Jean 2010). Paradoxically, its use can be better in some cases. Small -fisheries are multi-specific, and various techniques are used; it highlights the difficulty to assess them within a broader fishery framework. The use of low profile nets, which offer a quite good productivity associated to a better selectivity, could be a solution (Gobert 1992, Brown 2005, Gearhart 2003, 2007, Louis-Jean 2009, Louis-Jean 2010). Fishermen have to adopt to more sustainable ways to practice if they want to decrease the overfishing, but some rules (nets parameters, marine protected areas, soak time duration) will have to be adopted for a better application in the French West Indies.

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