

Bio-degradable Escape Panel Research on Fish Pots in Dominica: A Fisheries Resources Management Tool

Estudio del Panel Bio-degradable de Escape para Trampas de Peces en Dominica: Una Herramienta de Manejo de Recursos Pesqueros

Bio-dégradables Échapper Panneau Recherche sur Pots de Poissons en Dominique : Outil de Gestion des Ressources Halieutiques

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ABSTRACT

The serious negative impact of ghost-fishing by abandoned, lost and derelict fish pots on Dominica's limited and fragile marine resources over the last ten years have been documented.

This resulted in experiments into the most appropriate type of bio-degradable escape panel and tying materials to reduce the continuous incidence of ghost fishing. For the first part of the study, ten bio-degradable fish pots were used to simulate lost pots. Experiments were conducted using three types of bio-degradable tying materials. After forty-five to fifty days the jute twine bio-degraded. This is the material that was used for the national study. Part two contained forty-five pots with bio-degradable panels and deployed by ten fishers in six communities on the East and West coasts of Dominica.

The pots were of straight funnel and gooseneck type entrance. The Jute twine was used as standard bio-degradable material for the escape panel which was constructed to the side of the pot. This part of the study observed the behavior and durability of the twine during hauling operation and response of fishers to the new idea of fitting all pots with a bio-degradable escape panel.

The Fisheries Act #11 of 1987 does not require that fish pots in Dominica be fitted with an escape panel as part of a management tool for the sector.

Most fishers agreed that the modified fish pot (with the bio-degradable escape panel) was a definite improvement and one that should be made mandatory.

KEY WORDS: Fish Pots, ghost fishing, biodegradable material, bio-degradable escape panel

INTRODUCTION

Fish pot is one of the major fishing methods along the near coastal zone of Dominica. The zone is relatively narrow with approximately 145 km of coastline, and target resources were affected by the catch effort by fish pots. Recently, the resource has been affected not only by catch but also *ghost fishing*. Fisheries Division and the Japan International Cooperation Agency (JICA) conducted research on the *ghost fishing* by derelict fish pot to determine the adequate method for its prevention.

Moreover, after hurricane Lenny in 1999, 275 Dominican fishers lost over 1,800 fish pots (conservative estimates), 498 or 27% of those pots came from one small fishing village on the West Coast. The Fisheries Division was very much concerned about this large volume of pots on our reefs continuously harvesting marine organisms with no control by humans. The same situation occurred in 2007 post hurricane Dean, with a loss of 1,450 fish pots by more than 120 fishers, affecting mostly our inshore demersal fishery.

In this regard, the Fisheries Division in collaboration with the Japan International Cooperation Agency (JICA) through the Regional Technical Expert based in Antigua, agreed as part of its agenda of activities for 2008 to conduct a "Fish Pot and Ghost Fishing Survey" in Dominica as a component of its Community Based Fisheries Resource Management (CB-FRM) Programme.

Ghost fishing is defined as *derelict fishing gear either lost or abandoned which retains its capture function in water and continues inducing mortality of aquatic organisms without human control* (Matsuoka 2005). A problem analysis on *ghost fishing* by derelict fish pots in Dominica was done during the second visit of the JICA Expert. A study team and matrix was developed.

A previous survey, conducted during 2008 – 2009 (Norris et al. 2010), was expected to continue until the pots had been deteriorated and could no longer perform their capture function. During 218 days, the cumulative total entrapped organisms was 2,110, escaped was 1,891, and dead fish was 81 from 10 pots. Forty-one finfish and eight other organisms were observed. Grunt, snapper, and jacks were sometimes difficult identify to species, so these were used as group names. The most common fish observed were Goatfish (*Mullidae*), flying gurnard (*Dactylopterus volitans*), doctor fish (*Acanthuridae*), jacks (*Carangidae*), and snappers (*Lutjanidae*). The first dead fish was observed within six days. After 22 days, there was evidence of weak, injured, and dead fish in some pots. For example, the injured fish were blackbar soldier fish (*Myripristis jacobus*), bar jack (*Caranx ruber*) and southern sting ray (*Dasyatis Americana*). Dead fish included the greater soap fish

(*Rypticus maculatus*), flying gurnard (*Dactylopterus volitans*), and the Atlantic guitarfish (*Rhinobatidae*). After half a year the wood frame started to deteriorate, but chicken gages remained intact keeping its capture function. After 218 elapsed days, total observed entrapped finfish per 10 pots was 1,827 and total observed dead finfish per 10 pots was 79. After 242 days, and Hurricane Omar (October 2008), all remaining eight fish pots still kept their capture function until mid-February 2009 when a fisherman informed the research team that he pulled the pots by accident. The team confirmed that all fish pots were stretched and concluded that this type of pots keep the capture function for more than one year. The chicken gage material was still intact by diving observation on 24th June 2009. There was a total 109 dead organisms after 242 days by 10 pots, and we don't know what happened to the injured fish after escaping. We should continue research using another common entrance called *gooseneck type*, which does not allow fish to easily exit pots.

This survey in 2010 and 2011, introduced biodegradable material for fishing operations and determined that the *Jute Twine* was most appropriate material, which was locally available, for tying the escape panel. These positive responses came from fishers after being introduced to the biodegradable material for their routine fishing operations.

Biodegradable material as escaped panel should be introduced in each fish pot. Each fisheries sector should conduct research on which local materials are appropriate and introduce it for pot fisheries management.

PURPOSE

The purpose of the survey was to be able to:

- i) Introduce alternative approaches to reduce pot loss and in so doing, ghost fishing.
- ii) Identify which biodegradable material, as locally available, and is appropriate for Dominica fisheries.
- iii) Determine how long the biodegradable material will last and if the material negatively affects fishing activities, and
- iv) Get the response of fishers to fitting all pots with a bio-panel.

METHODS AND RESULTS

Selection of the Tying Materials for Biodegradable Panel

Fish Pots/Traps — two Antillean Z-type pots of 0.9144m H x 1.288m W x 3.3528 m L were constructed from 18 gauge 3.81 cm (1.5 inch) (Figures 1 and 2), chicken wire mesh and the frame from 2/3inch PVC pipe were set at the depth 10 m. The mesh and wood were tied together using binding wire. Entrance type was chosen Strait funnel entrance (Figure 3) as most commonly utilized around Dominica.

Experiments were conducted using three types of biodegradable materials, which are available locally and believed to be biodegraded during experimental stage (Figure 4). Each fish pot has six escape panels and total 12 panels were set (Figure 5). Each material was used for four panels. Panels were observed twice a week over a three month period.

After 45 to 50 days material #2 (jute twine) disintegrated allowing the escape panel to open (Figure 6).

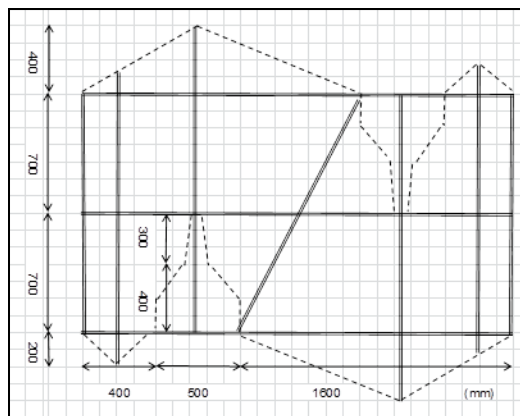


Figure 1. The Z pot design.



Figure 2. The Z fish pot.

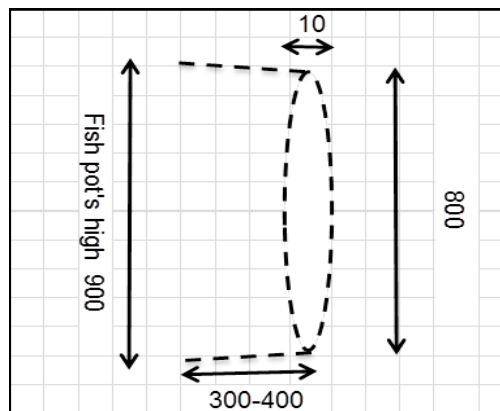


Figure 3. Strait funnel entrance of the pot (mm).

Material #3 (2-ply rope) took over three months and #1 even after six months still held the escape panel shut. Material #2 (jute twine) is recommended for the fishing operation. Seven days soaking time is the maximum allowable by the law fisheries act # 11 of 1987.



Figure 4. Three materials for tying.



Figure 5. Tying escape panel.



Figure 6. Opened escape panel.

Research on Fishing Function Using Chosen Biodegradable Material

Forty-three fish pots were newly made and deployed in a total of six fishing villages namely, San Sauveur, Anse-de-Mai, Fond St. Jean, Marigot on the East Coast, and Bioche and Roseau on the West Coast (Figure 7).

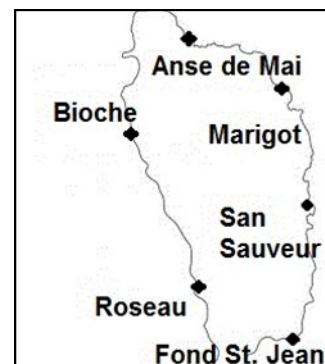


Figure 7. Biodegradable escape panel pot research site in Dominica.

The chosen biodegradable material #2 (jute twine) was used to tie the escape panel. Under the fishing operation the soak time was 2 to 15 days, depending on the fisher; legal soak time for pots in Dominica is 7 days. In interviews with researchers, fishers generally explained that *the material degraded after 20 days and could not re-use*, and *the material also did not negatively affect fishing operations*. However, during the research a new pot with biodegradable panel was lost after a week and was never recovered. We believe that the panel would have opened and the catch effort became negligible.

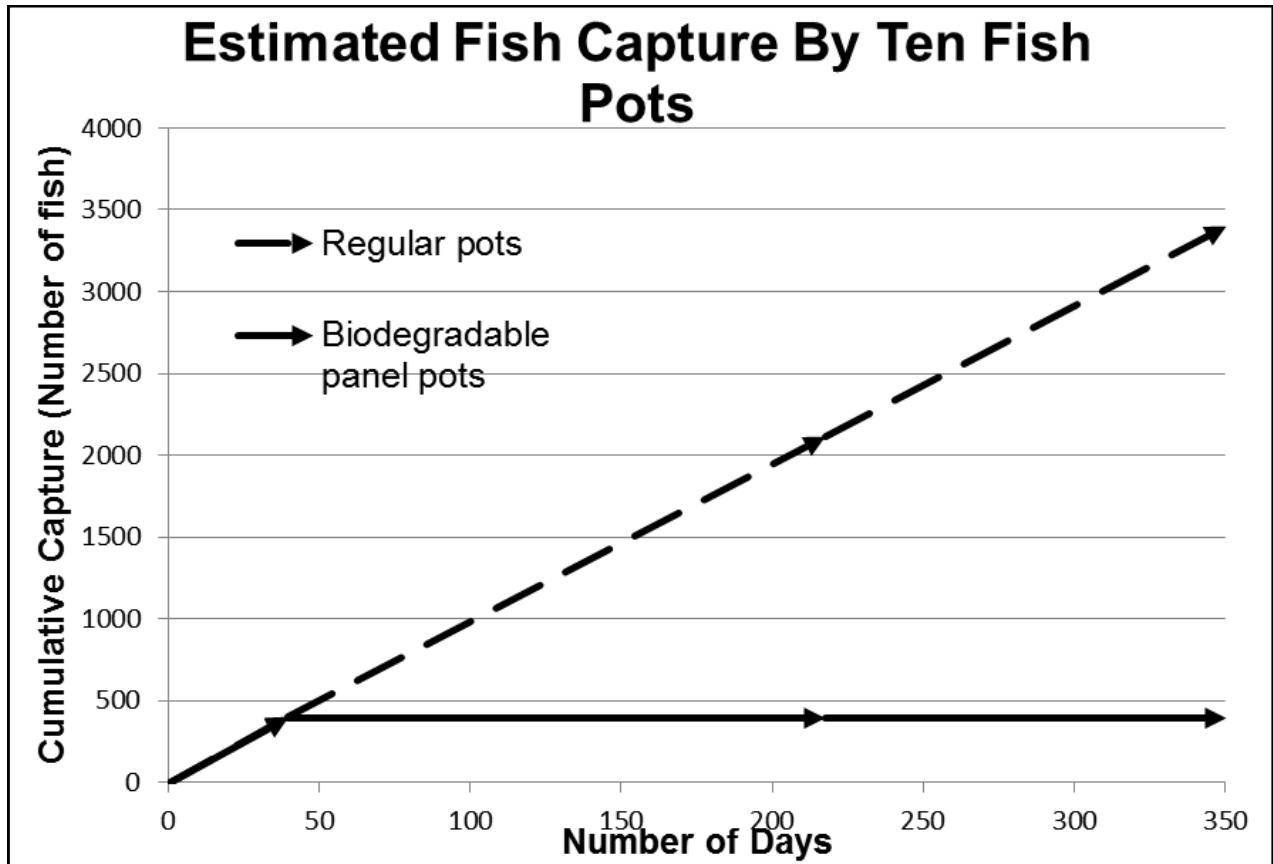
DISCUSSION

In conclusion, the #2 (jute twine) was the most appropriate material to prevent *ghost fishing* by derelict and lost fish pots in Dominica. And this material was biodegraded within 45 to 50 days under experimental operation, without retrieving, and could hold the panel up to 20 days during the fishing operation.

If Dominica fishermen use the #2 (jute twine) for their fish pot operation, the unexpected and bitter experience of loss will be eliminated. For example, Norris et al. 2011, estimated finfish mortality of 1,565 derelict pots resulting from Hurricane Omar (2008) would be 13,046 in 200 days, 19,569 in 300 days, and 26,092 in 400 days. If all finfish prices were applied at \$7XCD (Eastern Caribbean Dollar)/pound, the Dominica street price, the resulting value of fish lost from these derelict pots would be XCD 22,830, XCD 34,245, and XCD 45,661, respectively. Estimation of entrapped finfish by these 1,565 derelict pots resulting

from Hurricane Omar (2008) would be 5,093,070 in 200 days, 7,639,605 in 300 days, and 10,186,140 in 400 days . These will never be repeated (Graph 1).

Therefore, the research team recommends using biodegradable panel in fish pots in Dominica and other Caribbean countries.



Graph. 1. Estimated fish capture by ten fish pots.