ISSN 1995-4875

CRFM Special Publication, No. 18
Volume II

PROJECT "FISH IN ICE"

Manual
on
Ice Box Construction for Fishing Vessels
(Removable Ice Box for Wooden Boats)

Second Edition of March 2017

Mitsuhiro Ishida
Bertley Carrette
Francis Toby Calliste
Minoru Tamura

PROJECT "FISH IN ICE"

Manual on Ice Box Construction for Fishing Vessels (Removable Ice Box for Wooden Boats)

Copyright © 2017 by Caribbean Regional Fisheries Mechanism (CRFM).

All rights reserved.
Reproduction, dissemination and use of material in this publication for educational or non-commercial purposes are authorized without prior written permission of the CRFM, provided the source is fully acknowledged. No part of this publication may be reproduced, disseminated or used for any commercial purposes or resold without the prior written permission of the CRFM.

Correct Citation:
Ishida, M., Carrette, B., Calliste, F., Tamura, M. 2017. Project "Fish in Ice": Illustrated Manual on Ice Box Construction on Fishing Vessel. *CRFM Special Publication* No. 18 – Volume II. 21p.

ISSN: 1995-4875
ISBN: 978-976-8257-61-1

Published by the Caribbean Regional Fisheries Mechanism Secretariat,
Belize and St. Vincent and the Grenadines.

www.crfm.int

www.youtube.com/TheCRFM

www.facebook.com/CarFisheries

www.twitter.com/CaribFisheries

Editor:	Mitsuhiro Ishida[1], Bertley Carrette[2], Francis Toby Calliste[3] and Minoru Tamura[1]
Technical instructor:	Bertley Carrette
Pictures and design:	Mitsuhiro Ishida
Foundation agency:	Caribbean Fisheries Co-management Project (CARFICO), Japan International Cooperation Agency (JICA)
Local government:	Grenada Fisheries Division, Ministry of Agriculture, Lands, Forestry and Fisheries and the Environment, Grenada
Supporting agency:	Dominica Fisheries Division, Ministry of Agriculture and Fisheries, Commonwealth of Dominica

[1] JICA expert
[2] Dominica Fisher and Boat Builder
[3] Grenada Fisheries Officer

CONTENTS

1. INTRODUCTION 1

2. GENERAL INFORMATION (MATERIAL AND COST) 1

3. ICE BOX MAKING PROCESS 2
- **3.1 Ice Box Planning** 3
- **3.2 Preparation of Foam Sheet.** 6
- **3.3 Assembly and Application of Fiberglass & Resin** 9

4. WORK TABLE 20

5. A WORD FROM THE AUTHORS 21

6. CONTACT INFORMATION 21

1. INTRODUCTION

The importance of the Quality Assurance of fish for consumption will start from the catch through the marketing process until it reaches to your table. “The First Illustrated Manual on Ice Box Construction on Fishing Vessels, 2012” targeted fiberglass pirogues and this new edition “The Second Illustrated Manual on Ice Box Construction for Fishing Vessels (Removable Ice Box for Wooden Boats), 2015” is specially targeting a wooden surface boat called “CIGARETTE” at Grenville fishing village, Grenada.

For general use, the wooden boat needs proper maintenance on its surface every year. Therefore a removable ice box to just fit on the boat is necessary to be designed for that purpose. The type of ice box recommended is basically rectangular, although the bottom of wooden boats (the hull) is V-shaped. The result of this ice box installation is that it fits to your boat and keeps the stability of small vessels.

As a consequence, if the ice box is V-shaped, your catch such as large yellowfin tuna will curve and its quality will be lowered. Also when you want to replace the boat, you can fit the rectangular ice box on to any vessel. The volume of space the ice box occupies does not change, neither with “V” nor rectangular shape. To make a rectangular ice box is much easier and takes less time to build. Therefore we recommend this simple ice box design for your use.

The target size and capability of an ice box for general use, is to be able to hold five to six 70-pound yellow fin tunas on one trip. You should not make an oversized ice box, it is not cost effective.

As it is an ice box, of course, the main objective is to keep the fish below 4 degrees Celsius to keep out the growth of microorganisms, slow down self-digestion, and prevent any contamination during fishing operations.

The fish caught, kept in the ice can stay in significantly good condition for a week or more. If this is not done, its quality will drop within a short amount time, e.g. one hour, in the Caribbean or such tropical weather conditions.

The ice box make for a better quality of fish and your fishing operation time will be longer. Good Luck!

2. GENERAL INFORMATION (MATERIAL AND COST)

Material list for about one ice box:

- 2 Foam sheets 2 inch per ice box. ($240 x 2 =$480)
- Resin 1/5 drum ($3,800 x 1/5 = $760)
- Hardener for resin 1/5 gallon ($139 x 1/5 = $28)
- BIAX 10kg (one box 50kg), ($2,400 x 10/50 = $480)
- Fiberglass mat 10kg ($908 x 10/50 = $181)
- Gel coat gallon ($190 x 1/2 = $95)
- Acetone 1 gallon ($60 x 1 = $60)
- PVC pipe cap ($5)

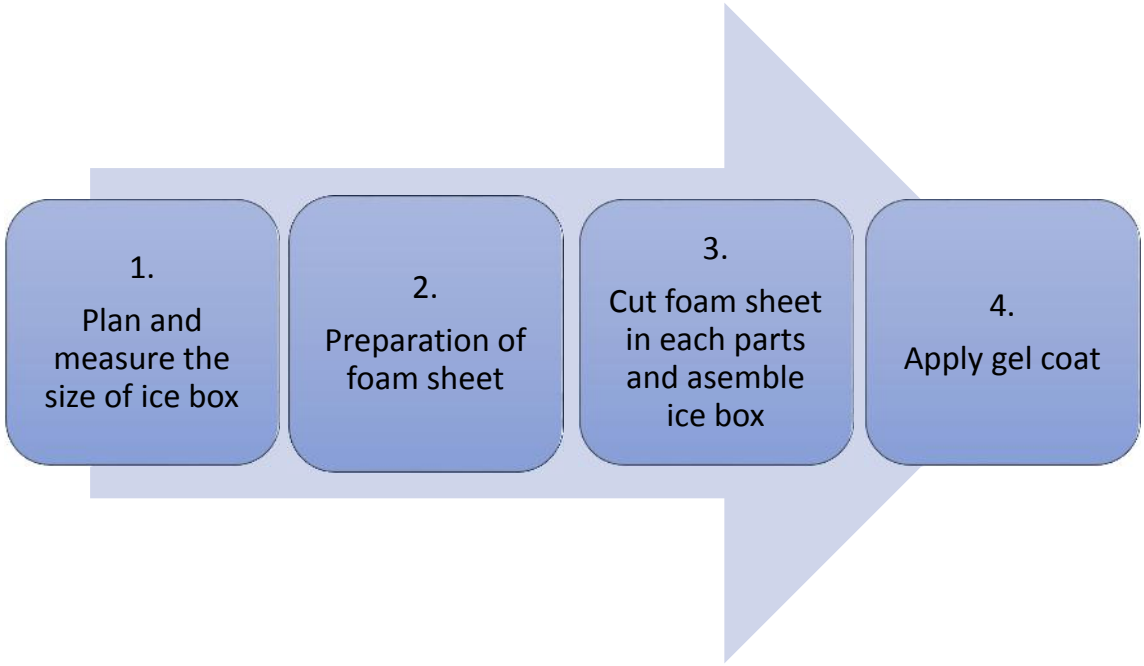
Cost for one ice box $2,089XCD or $777USD ($1USD=$2.6882XCD)

Note: If you use 1 inch or 1 1/4 inch form sheet, the price will be reduced. Since the cost of Resin is high, you should use a minimum amount. It’s best to use BIAX because it strengthens the ice box. However, if BIAX is unavailable, it is okay to only use fiberglass mat.

Necessary equipment

- Sponge Roller, small and big size
- Metal Roller, small and big size
- Brushes
- Grinder, sanding discs and cutting discs
- Power saw
- Extension cord
- Scissors
- Fiberglass suit
- Safety goggles
- Safety mask
- Gloves

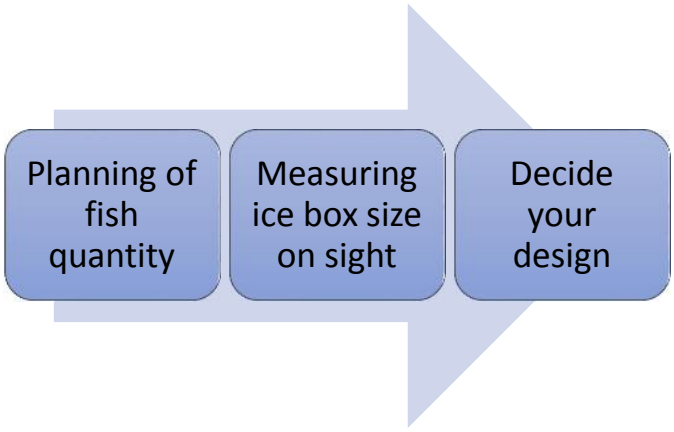
3. ICE BOX MAKING PROCESS



Remember!

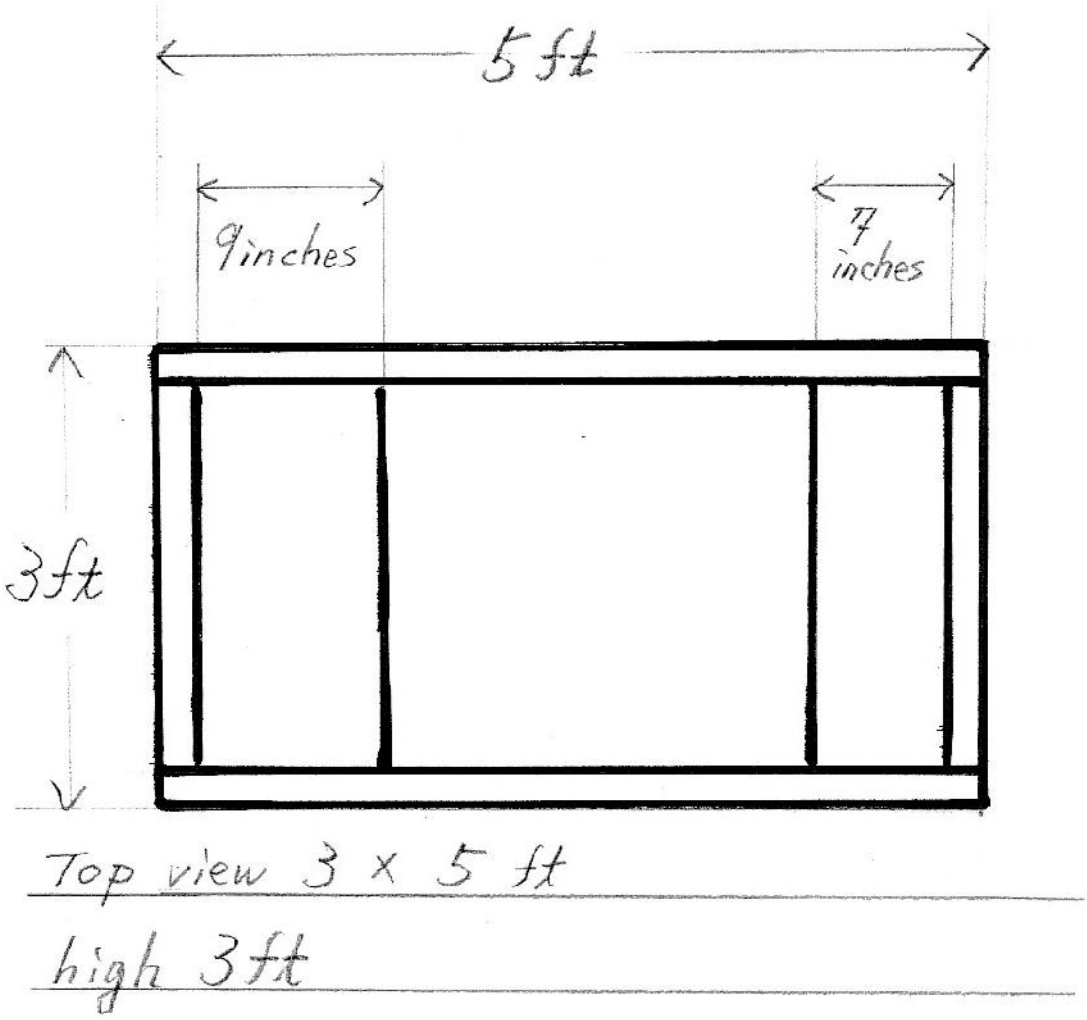
Fiberglass work is easy if you plan, prepare and cut all materials properly. Time spent in preparing all materials before the application of resin to the fiber mat will guarantee a better and safer product at the end. In doing so, you will not need to grind, cut or reshape the fiberglass after construction. Preparation is the key for a smooth operation and less waste of time and materials.

3.1 Ice Box Planning



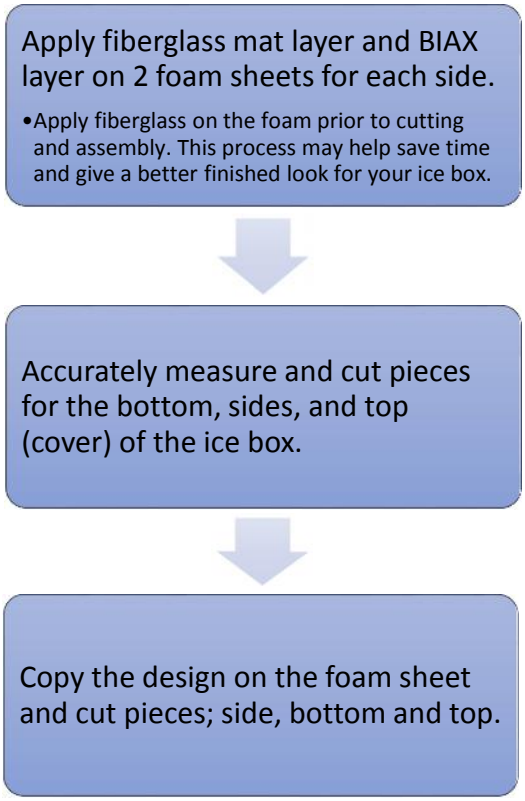
	Target: “Cigarette”. A wooden boat at Grenville Fisheries Complex, Grenada
	Decide how many pounds of fish you want to store.

	Decide the position and size of the box required. Note: The top of the ice box should be lower than the side edge of the boat to prevent any items or catch from slipping overboard while at sea.
	The size of the ice box is dependent on your storage requirements. For this manual, 2" foam sheet is used due to the availability in the local market, but 1" or 1 1/4" foam sheet is enough for construction.
	One example of the removable ice box owned by Bertley Carrette at Layou, Commonwealth of Dominica. As you can see, the ice box is well fitted into the boat and with its top lower than edge.
Again, you may choose the shape of the ice box, whether rectangle and flat bottom and square. If you make a round shape bottom or "V" shape, the fish will bend. The latter option also requires more work and higher cost.	
A standard ice box design: 3' x 5' x 3', can hold up to six 120 lbs yellowfin tuna.	

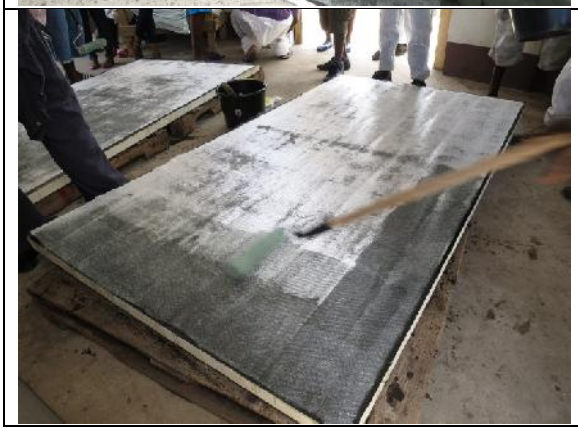


Here, 2” foam sheet was used due to the availability on the local market, but 1” or 1” ¼ may be used instead.

3.2 Preparation of Foam Sheet.

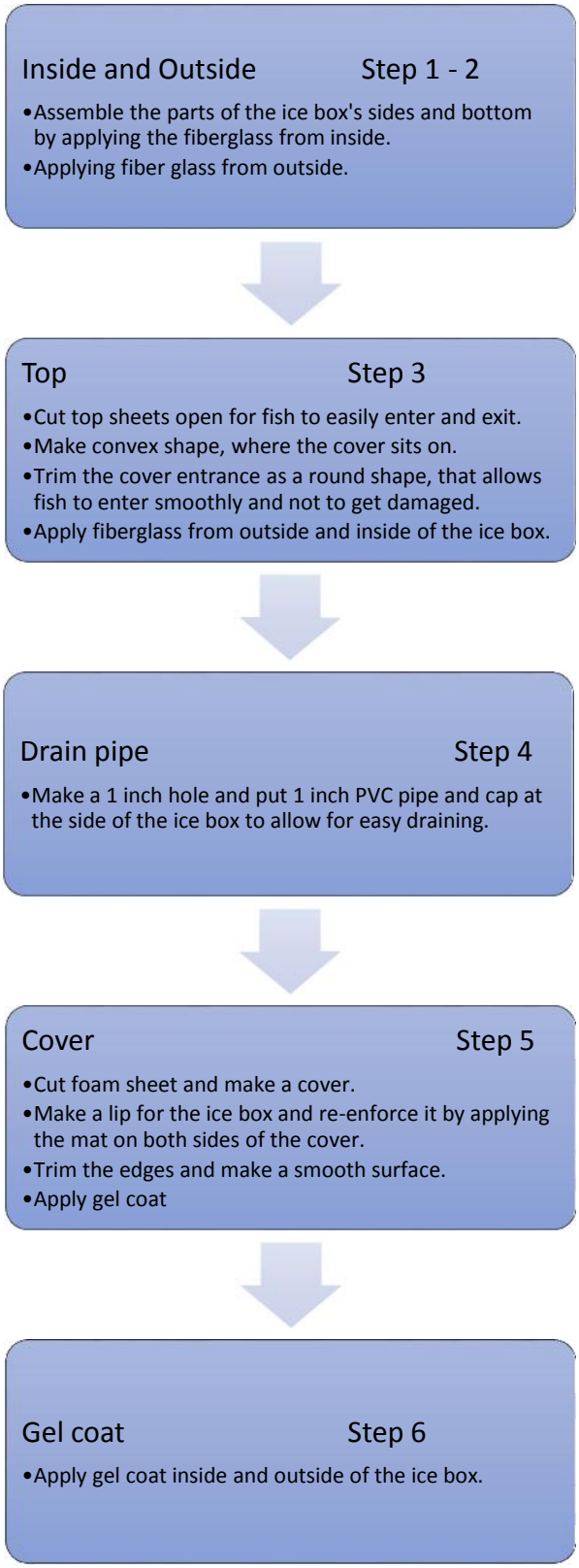


1-2. Preparation of foam sheet by applying fiberglass mat and BIAX.	
Note: Before assembly of materials, you may build your fiber glass working table (look at II. Working Table). A better workspace allows you to work smarter.	
	Cut the fiberglass mat and BIAX for the planned size of the foam sheet.

	In this picture, there is a paper on the foam sheet. Therefore apply a layer of resin on the surface prior to applying the mat then, let it dry. If you do not apply resin to the paper, air space will be created between the paper and mat. If your foam sheet does not have a paper layer, you should skip this process.
	Apply the first layer of fiberglass mat.
	Apply a layer of BIAX.
	

	This picture shows the foam sheet, with a layer of mat and a layer of BIAX applied.
	Mark the dimensions of the ice box measured onto the foam sheet.
	Cut the foam sheet to the required measurements for the ice box.
	Confirm the pieces and the position of foam sheets before assembling, with the help of colleagues.

3.3 Assembly and Application of Fiberglass & Resin



Inside and outside work	
	General use of fiberglass mat should be cut by hand, so that the mat can bond easily to the foam sheet and boat. Use a knife or scissors ONLY for BIAX.
 	A BAD example. The fiber glass edge is sharp and does not bond to the surface well.

	(Step 1) Inside work. A good example. The fiber glass edge is rough, which allows binding on the surface. Apply two layers of fiber glass mat, then one layer of BIAX and a last layer of mat for a clean finish.
	Repeat step 1.
	(Step 2) Outside work Smoothing Surfaces: Before the application of fiberglass and resin, it will be necessary to smooth out the surfaces by applying a light sanding in order to remove fiberglass needles or sharp edges and points.

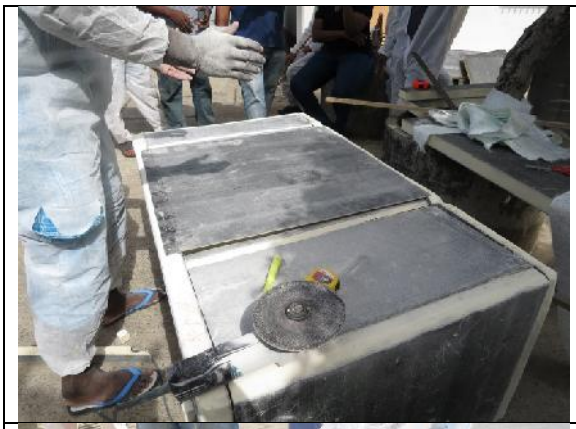
	Apply two layers of fiber glass mat, then one layer of BIAX and a last layer of mat for a clean finish. To ensure proper strength at the corners and joints, apply 2 small pieces of fiberglass mat to overlap the edges. Then apply BIAX and finally apply mat for a clean finish.
	After the application of fiberglass and resin, it will be necessary once more to smooth out the surfaces by applying a light sanding in order to remove sharp edges and points.
TOP	
	(Step 3) Preparation for the TOP of the ice box.
	The ice box cover will sit on this convex, along the inside edge.

	This picture shows how the end product looks. The cover sits comfortably on the convex.
	Use a cutting disc to make the convex and smooth the surface.
	Trimming the edge can be done before placing the TOP on the ice box.
	Attaching the Top Finish the top after three layers; two layers of fiber glass mat, then one layer of BIAX. For a clean finish, apply a final layer of mat.

	To ensure proper strength at the corners and joints, apply 2 small pieces of fiberglass mat to overlap the edges then apply BIAX, and a last layer of mat for a clean finish.
	Applying BIAX.
	End of top after the application of fiberglass and sanding.
Drain	
	(Step 4) Attaching the Drain plug Locate a side (starboard or port of boat) and drill trough the side of ice box. However, in case of a "V" shape ice box, locate the lowest point of the ice box. But for a rectangular ice box, drill a hole at the side. When you trim the boat to one side, the water will easily be drained.

	Place a 1” PVC pipe and its cap.
	To put it into the hole. You should apply resin unto a strip of BIAX, then wrap it around the pipe and place it into the hole. Note: In this picture it is dry.
	Just after the pipe is put into the hole.

	Final product.
	Final product with end cap.
Cover	
	(Step 5) Making a cover Cut the cover a little bigger than the cover hole of the ice box. Make sure the size of the cover is bigger (1") than cover hole of the ice box, and smaller than edge of ice box, between the convex places. And then, cut only one side of foam sheet. To make enough clearance for the fiberglass, the inside should be a smaller size, about a 1 1/2 inch, than the cover hole of the ice box. This will make a lip.

	This way the cover sits on the top and overwraps comfortably.
	Now you should use spacer (1/8 – 1/4 in.), any remaining fiber glass or wood and stick it on the over wrap place of ice box with masking tape. The cover should dry in place on the cooler so that it doesn't warp.
	Masking of ice box top.
	Apply 4 fiberglass mats, 1 BIAX and 1 mat again for a clean finish and thick lip for the cover.

	View after apply fiber glass for the cover.
	After it is dry, take it out and flip it over. Apply 2 fiberglass mats, 1 BIAX and 1 mat again for a clean finish. Note: If the lip is too thin, it could break easily or cause injuries.
	Trim and smooth the cover.
Apply Gel Coat	
	(Step 6) Apply gel coat Use gel coat in sufficient quantities for a complete application to the ice box. After thoroughly mixing, remove a small quantity for application within a short amount of time. Add hardener and apply with a roller.

	You must apply gel coat inside, on the top, and on the cover (both sides).
	Cover top after application of gel coat.
Removable Ice Box for your fishing vessel! The Finished Product!	

4. WORK TABLE

	A comfortable table helps you to work easily when using fiberglass mat and BIAX.
	A work table in use.
	Work table (source F. Toby Calliste)

	For Resin

5. A WORD FROM THE AUTHORS

- ✓ Mitsuhiro Ishida: "A Japanese fisher saying: When people die, we give them flowers. When fish die, we give them ice. Please keep fish in ice when caught until it reaches the consumer's hand."
- ✓ Bertley Carrette: "Longer hours at sea and better quality of fish."
- ✓ Francis Toby Calliste: "Keep the ice box clean at all times, it should be washed with soap, rinsed with fresh water and sanitized regularly"
- ✓ Minoru Tamura: "Nice cold BEER and FISH are now available in Grenville. Where next?!"

Contact Information

- CARIFICO - JICA: Mitsuhiro Ishida (paramichan@gmail.com)
  Minoru Tamura (sunnysurf44@hotmail.com)

- Grenada Fisheries Division, Melville Street Fish Market Complex, St. George's Grenada Tel: 473-440-3814 / 473-442-3831, Fax: 473-440-6613, Email: agriculture@gov.gd

- Dominica Fisheries Division, Ministry of Agriculture and Fisheries, Roseau Fisheries Complex Buildingg, Dame M. E. Charles Blvd., Roseau, Commonwealth of Dominica
  Tel: 767-266-5291 / 767-266-5292; Fax: 767-448-0140, Email:
  fisheriesdivision@dominica.gov.dm

The CRFM is an inter-governmental organization whose mission is to "Promote and facilitate the responsible utilization of the region's fisheries and other aquatic resources for the economic and social benefits of the current and future population of the region". The CRFM consists of three bodies – the Ministerial Council, the Caribbean Fisheries Forum and the CRFM Secretariat. CRFM members are Anguilla, Antigua and Barbuda, The Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, Montserrat, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago and the Turks and Caicos Islands.

CRFM
Headquarters
secretariat@crfm.int
Tel: (501) 223-4443 - Fax: (501) 223-4446
Belize City - Belize

Eastern Caribbean Office
crfmsvg@crfm.int
Tel: (784) 457-3474 - Fax: (784) 457-3475
Kingstown - St. Vincent & the Grenadines

www.crfm.int

www.youtube.com/TheCRFM
www.facebook.com/CarFisheries
www.twitter.com/CaribFisheries

Caribbean Regional Fisheries Mechanism

www.crfm.int