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REPORT OF

CRFM - JICA CARIFICO / WECAFC - IFREMER MAGDELESA WORKSHOP

ON

FAD FISHERY MANAGEMENT

09 – 11 December 2013
St. Vincent and the Grenadines

CRFM Secretariat
Belize 2013

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LIST OF ACRONYMS AND ABBREVIATIONS

ABC (islands)	-	Aruba, Bonaire and Curaço
ACP	-	African, Caribbean and Pacific
BES (islands)	-	Bonaire, St. Eustatius, Saba
CANARI	-	Caribbean Natural Resources Institute
CARICOM	-	Caribbean Community
CARIFICO	-	Caribbean Fisheries Co-management Project
CARIFIS	-	Caribbean Fisheries Information System
CCCCC	-	Caribbean Community Climate Change Centre
CCCFP	-	Caribbean Community Common Fisheries Policy
CFMC	-	Caribbean Fishery Management Council
CFP	-	Common Fisheries Policy
CDEMA	-	Caribbean Disaster Emergency Management Agency
CITES	-	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CLME	-	Caribbean Large Marine Ecosystem
CNFO	-	Caribbean Network of Fisherfolk Organizations
CPUE	-	Catch Per Unit of Effort
CRFM	-	Caribbean Regional Fisheries Mechanism
CRPM	-	Comité Régional des Péches Maritimes / Regional Committee for Marine Fisheries
EAF	-	Ecosystem Approach to Fisheries
EEZ	-	Exclusive Economic Zone
FAD	-	Fish Aggregating Device
FAO	-	Food and Agriculture Organization of the United Nations
FORCE	-	Future of Reefs in a Changing Environment
GEF	-	Global Environmental Facility
GOSL	-	Government of Saint Lucia
GPS	-	Global Positioning System
GSI	-	Gonadosomatic Index
IATTC	-	Inter-American Tropical Tuna Commission
ICCAT	-	International Commission for the Conservation of Atlantic Tunas
ICT	-	Information and Communications Technology
IFREMER	-	L'Institut Français de Recherche pour l'Exploitation de la Mer/ French Research Institute for Exploitation of the Sea
INTERREG	-	Inter-regional
IUU	-	Illegal, Unreported and Unregulated fishing
JICA	-	Japan International Cooperation Agency
LAC	-	Legal Affairs Committee
MAGDELESA	-	Moored Fish Aggregating Device in the Lesser Antilles
MCS	-	Monitoring, Control and Surveillance
MOU	-	Memorandum of Understanding
NBSLME	-	North Brazil Shelf Large Marine Ecosystem
NGO	-	Non Governmental Organization
NJCC	-	National Joint Coordinating Committee
OECS	-	Organization of Eastern Caribbean States
OSPESCA	-	Organización del Sector Pesquero y Acuícola del Istmo Centroamericano / Central American Fisheries and Aquaculture Organization
PARM	-	Pôle Agroalimentaire Régional de Martinique
PCU	-	Programme Coordinating Unit
PIF	-	Project Identification Form
PPG	-	Project Preparation Grant

RFB	-	Regional Fisheries Body
RFMO	-	Regional Fisheries Management Organization
SAG	-	Scientific Advisory Group
SAP	-	Strategic Action Programme
SSF	-	Small-Scale Fisheries
UF	-	University of Florida
UNEP	-	United Nations Environmental Programme
UWI-CERMES	-	University of the West Indies – Centre for
WECAFC	-	Western Central Atlantic Fisheries Commission

1.0 BACKGROUND

The CRFM - JICA CARIFICO / WECAFC - IFREMER MAGDELESA Workshop on FAD Fishery Management built on work completed under the FAD pilot component of the CARICOM / CRFM / JICA project: Study on a Formulation of a Master Plan on the Sustainable Use of Fisheries Resources for Coastal Community Development in the Caribbean. The study commenced in 2009 and was completed in 2012. Baseline surveys were conducted in thirteen (13) target countries from May to December, 2009 to understand the current situation and issues that the fisheries sector faced. Based on the analysis of the data and information collected during the baseline surveys, a preliminary master plan was produced and potential pilot projects were identified in 2010.

The CRFM, with funds from CARIFICO, organised and convened the CRFM-JICA CARIFICO / WECAFC-IFREMER MAGDELESA Regional Workshop on 9 – 11 December 2013 in St. Vincent and the Grenadines. In light of the overlapping aims of the MAGDELESA project and its termination at the end of October / November, 2013, the proposed joint workshop provided an opportunity to transfer knowledge and experiences, consolidate linkages among existing networks for FAD fishery management, and also importantly, discuss the future of the IFREMER/WECAFC Working Group on Development of Sustainable Moored Fish Aggregating Device (FAD) Fishing in the Lesser Antilles. Ms. Alaika Jones and Ms. Lucille Grant served as the rapporteurs for the Workshop, and prepared this report.

1.1 Meeting Objective

The objectives of this workshop in FAD Fishery Management were to review and share research results and best practices in the construction, use and management of FADs as tools for sustainable development, management and conservation of large pelagic resources in the region; to discuss future work plans and action plans for countries directly involved in the implementation of field activities under the CARIFICO Project; to present the findings and recommendations from the EU-funded MAGDELESA project, and to prepare recommendations for WECAFC and CRFM on FAD use in fisheries and the management of FAD fisheries.

1.2 Approach

The workshop comprised of reports from CRFM member countries, which reviewed the history and current status of FAD development in the context of co-management; presentations from project partners on varying aspects of their commitment and financial and technical support to FAD development; results from studies and experiences obtained in the areas of resource status, co-management, quality and marketing. Discussions followed each presentation and out of these, some meeting conclusions and recommendations were elaborated, further discussed and finally agreed upon.

2.0 OPENING CEREMONY

A brief Opening Ceremony was held. The Chairperson for this session, Mrs. Jennifer Cruickshank-Howard, Chief Fisheries Officer, Fisheries Division, St. Vincent and the Grenadines opened the ceremony with some short remarks after a word of prayer by CRFM Statistics and Information Analyst, Mrs. June Masters and the singing of the host country's national anthem. Short remarks were given in the following order: Mr. Milton Haughton, Executive Director, CRFM Secretariat; Mr. Emmanuel Thouard, Director of IFREMER for the Antilles and Ms. Akiko Oda Minami, JICA Chief Representative, Caribbean Regional Office in Santo Domingo. A feature address was delivered by Permanent Secretary in the Ministry of Agriculture, Industry, Forestry, Fisheries and Rural Transformation, Mr. Raymond Ryan. Dr. Susan Singh-Renton, Deputy Executive Director, CRFM Secretariat delivered the Vote of Thanks. The main speeches are included as ***Appendix 1***.

2.1 Introduction of Participants

The Chairman of the Workshop Mr. Milton Haughton, Executive Director of the CRFM invited participants to introduce themselves to the meeting. The workshop boasted participation from thirteen (13) CRFM member countries, as well as experts and partners from CRFM, JICA, UN-FAO / WECAFC, IFREMER, MAGDELESA Project, CLME, UWI-CERMES, PARM, University of Florida Sea Grant, CNFO and one private export company, Spice Isle Fish House Limited. Mr. Haughton recognised the new staff of the CRFM, Ms. Elizabeth Mohammed, Programme Manager, Research and Resource Assessment; Mr. Peter Murray, Programme Manager, Fisheries Management and Development, Ms. Sherrill Barnwell, consultant with the JICA CARIFICO project and Mr. Mikhail Francis, Administrative Assistant. A list of the workshop's participants is included as ***Appendix 2***.

2.2 Adoption of Agenda and Workshop Arrangements

The Draft Workshop Agenda was reviewed and changes made to accommodate those presenters who had not yet arrived. The presentations of some French-speaking participants were rescheduled to the second day of the workshop as they required the assistance of interpreters who were without some audio equipment. The meeting agreed to adopt the changes as suggested by the Chair. The adopted workshop agenda is included as ***Appendix 3***.

3.0 HISTORY AND PRESENT SITUATION OF FAD FISHERIES AND THEIR MANAGEMENT: COUNTRY REPORTS

Presenters were allotted a time of fifteen (15) minutes in which to make their presentations, followed by a five (5) - minute period for discussion of the presentation content.

Summaries of these presentations and the ensuing discussions are presented below. The presentations are included as ***Appendix 4***.

3.1 Antigua and Barbuda

3.1.1 Presentation Summary

The country report was presented by Mr. Hilroy Simon.

Since the last FAD management workshop in Dominica in March of this year, the CARIFICO Project and its related activities were progressing at a steady pace. There had been success in getting fisher-folk to commit to the project and the first consultation was held on July 25th 2013. The National Joint Coordinating Committee (NJCC) also met a month later where updates on the outcome of the fishers' consultation were given along with other presentations. The annual work plan was also presented.

The licensing process to facilitate the new Fisheries Regulations had progressed smoothly and almost all of the fishers who had committed to the CARIFICO project, had so far received their licences. The project manager participated in a "Training Course for Fisheries Extension Officers in Island Countries" in Okinawa Japan and Fiji during September and October of this year. This training afforded participants the opportunity to share the experiences of Fisheries Extension Officers in Okinawa, Fiji and four other Pacific countries that were represented and to witness Fisheries Co-management and Community Based Fisheries Management in motion. There were also some practical experiences in FAD construction, deployment and fishing. An Action Plan related to the CARIFICO Project was also developed.

The process of procuring equipment for the project had begun and the country had since received some sand bags to be used and moorings for the FADs along with an ID card printer to facilitate the

issuing of licences. The fishers in Antigua were very optimistic about the project and were currently waiting to deploy two FADs within the next few weeks.

3.1.2 Discussion

The presenter, Mr. Simon, was asked about the number of fishers currently engaged in FAD fishing and their organization in terms of the co-management of the FAD fishery, to which he responded that the number now stood at approximately twenty six (26) and that the fishers were placed in zones. Although the fishers were able to fish on any of the FADS around the country, small groups within each of the zones were responsible for monitoring the FADs. Notably, this management measure was proposed by the fishers.

The question of the sufficiency of one data collector for both Antigua and Barbuda was contested. In response the presenter highlighted the fact that the operation was being carried out under financial constraints. In addition there was currently no assigned Data Collectors in Antigua and Barbuda; data was collected by Fisheries Division staff in addition to their other duties. As such, the addition of the Data Collector was considered an asset to the Division.

The importance of classifying the FAD fishery as a limited entry fishery early in the planning stage was expressed. The reason given was that, as the benefits of engaging in the FAD fishery would became more obvious, a greater number of persons would wish to engage in it and excessive numbers of persons fishing the FAD will not be feasible. Attempts to put a limit at that stage could become controversial and would be better handled by setting some basic rules of engagement from the start.

Recognising the challenges surrounding data collection, it was stated that the training of fishers to enter accurate, reliable data in their logbooks, was seen as a step towards improving the overall data system.

It was noted that Antigua and Barbuda was in a very early stage of development of the FAD fishery, when compared with countries like Dominica.

3.2 Belize

3.2.1 Presentation Summary

The country report was presented by Ms. Marsha Vargas.

Historically, the major exports in Belize were lobsters and conch. Recently, steps had been taken to include fish on the list of exports. FAD construction commenced in November 2004. The Fisheries Department was charged with the mandate of constructing and monitoring the FADs.

FADs were made of low cost materials such as bamboo, drums filled with cement, tyres, metal wires, etc. The poor quality of materials used to construct the FADs resulted in the FADs' short lifespan, lasting less than two (2) years. GPS was not used on FADs.

During the time of operation of the FADs, fishers were asked to provide the Fisheries Department with information regarding their FAD fishery operations, while the Fisheries Department would conduct its own monitoring of the FAD at a frequency of once per month.

Currently there were no FADs in Belize.

3.2.2 Discussion

An enquiry was made about the objectives for the introduction of FADs to Belize. The meeting was reminded that in Belize, the target species were conch and lobsters and, to a lesser extent, snappers

and groupers, with fishing taking place mostly in lagoons. Belize hoped that with the introduction of the FAD fishery, its fishers would fish a greater part of its EEZ and the catch would be diversified.

3.3 Caribbean Netherlands

3.3.1 Presentation Summary

The country report was presented by Mr. Roberto Hensen.

The Dutch Caribbean consists of six (6) islands, the former islands of the Netherlands Antilles. Aruba, Bonaire, Curacao in the South and St Maarten, St Eustatius and Saba in the North. Aruba, Curacao and St Maarten are countries within the kingdom of the Netherlands. Bonaire, St. Eustatius and Saba (BES islands) are special municipalities of the Netherlands and together comprise the Caribbean Netherlands.

Marine Governance

The islands have a territorial sea that extends to 12 miles offshore, the EEZ (exclusive economic zone) was co-managed by the six islands and the Netherlands.

The Kingdom Ministry of Transport in the Netherlands regulated surface waters of the BES. This ministry was the permitting agency for placement of the FAD.

The Kingdom Ministry of Economic Affairs in the Netherlands, assisted by a fishery committee with members from the three islands, regulated fishery in the EEZ of the BES islands and within the territorial waters of each island fishery was regulated by island ordinance.

Aruba, Bonaire and Curacao

In the Dutch Caribbean FADs were placed around Aruba, Bonaire and Curacao (the ABC islands) from 1993 onwards. Financing for most of these FADs was done through public funds. The FADs around the ABC's were not regulated, there was no fishery data and biggest complaint from the fishermen was, and is, that they were mostly for the benefit of the charter boats.

Saba

Fishermen privately placed self-constructed FADs around Saba in the 90's. Little information was known about the use and there was no data available. These FAD's were not regulated.

St. Eustatius

The Fisheries Department placed a FAD 8 miles offshore at a depth of 650m.The FAD around St Eustatius was constructed using technology from the Eastern Caribbean and with assistance from experts from Dominica. This FAD was made in close cooperation with fishermen. Management of the FAD fishery was a joint affair between the Fishery Department and the fishermen. All fishermen were registered and paid an annual user fee to use the FAD and abided by the rules set up to jointly manage its use. An issue with FAD placement around St Eustatius was the amount of tanker and other boat traffic around the island. In the future, the Fishries Department wish to place at least two (2) or three (3) more FADs in St Eustatius territorial waters and explore different fishing techniques.

3.3.2 Discussion

The presenter, Mr. Hensen, was asked whether the agreed FAD management rules were formal rules or rules agreed amongst the fishers. It was explained that the authorities were instrumental in drafting the rules, which were then jointly discussed and agreed amongst the fishers, but these were not legislated.

3.4 Dominica

3.4.1 Presentation Summary

The country report was presented by Mr. Jullan DeFoe.

Dominican fishers have been utilizing FAD technology for more than a decade. Fishers were appreciative of the benefits of this technology as it provided increased fish production, a sustainable livelihood, increased savings on fuel cost and increased probability for catching fish and reduction in search time, when compared with other methods of targeting offshore pelagic species.

Significant increases in landings of migratory pelagic species were recorded since the increase in use of FADs. Having achieved its objective of the successful transfer of FAD technology to fishers, the Fisheries Division was now placing greater emphasis on FAD Fishery Management through co-management arrangements; improvement of the licensing and registration system; data collection; research and development with partners / initiatives such as Texas A & M University, University of Florida (UF), (IFREMER) MAGDELESA Project and the JICA CARIFICO Project; and fish quality and marketing, of which notable mention was made of the completion of an illustrative "Project Fish on Ice" manual, which was shared and was now being used in Antigua and Barbuda, St. Kitts and Nevis, St. Lucia and St. Vincent and the Grenadines.

Dominica, though considered to be in a relatively advanced stage of FAD development, was not without problems. These problems could be attributed, in part, to the failure to set clear guidelines for the management of the FADS since their inception.

3.4.2 Discussion

An explanation for a noted spike in production of the ocean pelagics in 2002 was sought. It was suggested that the spike could have been caused by a reason as mundane as an unusually quiet hurricane season or lack of major storms. The meeting was reminded that species migration was affected by ocean current dynamics and that a 'busy' hurricane season was usually accompanied by a reduction in the migration of the ocean pelagics. Participants were urged not to be too quick to attribute decreases in catch, to over-fishing at the FAD sites.

It was established through the discussion that Dominica had approximately forty (40) FADs deployed and they were constantly being replaced or repaired. It was also noted that a FAD can last for a period of one (1) day to seven (7) years, but on average FADs lasted two (2) to three (3) years.

The limited entry of vessels and / or fishers into the Dominican FAD fishery as a FAD fishing management measure was reportedly not implemented with the introduction of the fishery. The meeting discussed the time and circumstances surrounding the eventual implementation of 'limited entry' and learnt that it was introduced after two issues arose, these being: 1) the lack of seaworthiness of some vessels which engaged in FAD fishing; and 2) the conflict which arose among fishers upon realizing that heavy exploitation of the FADs was beginning to jeopardize the viability of the fishery. After the introduction of the limited entry of vessels and/or fishers, the fishers themselves were empowered through co-management arrangements to enforce and monitor each other's compliance with established protocol.

An enquiry was made into the possible cause of Dominica's apparent lack of emphasis on exportation, as it seemed that there was a general sense of contentment with local distribution of the fish. Discussion on this topic revealed that although the need for export was recognised, Dominica was resolved to meet local demand and, to provide the required variety, would go to the extent of developing value added products such as smoked marlin, fish sausages, etc. In this way, local consumers' needs were satisfied and fishers' livelihoods were sustained without the pressure to meet export standard requirements for product sale. Considering the size of the countries in the region, and

the apparent declining state of global fisheries, small countries were encouraged to embrace this policy as a move in the right direction and to adopt strategies that were best suited to their needs.

3.5 Grenada

3.5.1 Presentation Summary

The country report was presented by Mr. Francis Calliste.

Grenada had been experimenting with FADs since the 1990s in a manner which had proven to be effective and successful. Several FAD Programmes were funded by donor agencies through the Fisheries Division. Over the years, donor agencies included FAO, OECS, JICA, the Government of Grenada and most recently the MAGDELESA Project. Fishers also deployed FADs which were short lived.

The fishing fleet in Grenada consisted of longliners trawlers and pirogues. Some vessels were engaged in FAD fishing while some exploited the demersal fishery. Approximately fifty (50) boats, representing 7% of Grenada's fishing fleet, utilized the FAD; out of these, twenty (20) engaged in commercial FAD fishing while the remaining thirty (30) boats fished for bait.

FAD data collection was initiated in August 2013, after deployment of the MAGDELESA FAD in June of the same year. Blackfin tuna and Yellowfin tuna were the two most abundantly caught species associated with the FAD fishery. 22,641.5 kg (49,916 lbs), 1.2% of the national catch, were recorded as landings from the FAD fishery. Catching of juveniles was under review as there was no specific law prohibiting this. In addition to the MAGDELESA FAD, which was managed by the Fisheries Division, two other FADs were privately deployed.

FAD management remained a challenge, as current fisheries laws did not make provision for the management of FADs. Fisheries laws required vessels registration numbers to be written or placed on the vessel, however this was not enforced. Poor quality FADs, inappropriate site selection, lack of establishment of FAD ownership, lack of maintenance, lack of monitoring, and theft of FAD buoys reflected the need for the establishment of a FAD management system, which was currently considered as non-existent. FAD management should begin with strengthening of the consultation and communication with the fishers, as this was seen as the cause of past miscalculations concerning FADs and have resulted in ill-informed decisions and loss of investment.

FAD fishing had tremendous potential and must be encouraged at the policy level by putting legislation in place to minimize irregularities and conflicts. A mechanism should be established for monitoring, maintenance and co-management of the FAD fishery. Sub-surface FADs must be encouraged to reduce vandalism and cutting by vessels. Use of dropline technology should also be encouraged. The data collection system needed to be enhanced to conduct analysis for decision-making regarding FAD fishing. Fisherfolk must be properly trained before being allowed to engage in FAD fishing; this could be facilitated by the organization of workshops geared towards building the capacity needed among the fisherfolk.

Two meetings were held so far under the CARIFICO project, engaging fishers, fisheries personnel and Japanese experts. It was expected that a number of FADs would be deployed under the CARIFICO Project.

3.5.2 Discussion

There was concern about the apparent low level of interest in the FADs shown by the Grenadian fishers. This was explained by the fact that adequate consultations were not held with the fishers before the deployment of the FADs; fishers basically stumbled onto the last FAD which was deployed by the MAGDELESA project 'in the wild'. Fishers were slowly increasing their knowledge of FADs

and now, with the current specimens in a state of disrepair, they had demonstrated interest by their strong presence at CARIFICO meetings where issues of FAD management were discussed. It was also noted that fishers strongly supported the principles of co-management, even to the point of self-imposing user fees. It was noted that much interest was being shown in the FADs on an individual level but, at present, fishers lacked the necessary institutional framework that will foster their collective involvement in FAD management. Currently approximately fifty (50) boats fished around the MAGDELESA FAD.

For the purpose of analysing the data collected at the FAD, it was questioned whether the apparent fluctuation (peaks and troughs) of reported landings, specifically noted in September, 2012 and January of 2013 could be attributed to a seasonal usage of the FAD; that is, use of the FAD only when there was an abundance of ocean pelagics. This reasoning seemed to carry some merit, as it was pointed out that fishers would fish for bait at the FAD and leave the FAD to pursue Mahi-mahi (Dolphinfish), Wahoo and Barracuda species at other fishing grounds. It was possible, too, that the state of disrepair of the FADs could account for their low usage and the associated decline in the landing of FAD species. It was argued that the data collection period of only one (1) year was not sufficient to make an accurate assessment of the production of the FAD.

3.6 Guadeloupe

3.6.1 Presentation Summary

The country report was presented by Mr. Nicolas Diaz.

In Guadeloupe the deployment of FADs started in the 1980's on an experimental basis, by the authorities. By the end of the1980's the initial sceptical attitude of fishers towards this new activity disappeared rapidly due to the successful results obtained.

Use of FADs spread fast to all parts of the archipelago, by the 1990's, on the basis of light artisanal private and "low-cost" FADs. Individual fishers were the main propagators of this new fishing technology, as only small amounts of funding were available for public FADs.

From 2001 to 2008, efforts were focused on the improvement of the FAD technology to optimize lifespan, resistance to marine currents and costs, with public funding. Based on these initiatives, fishermen's associations and other associations turned their efforts towards collective investments and management. During the period 2005 to 2008 alone, forty (40) collective innovative single-buoy FADs were moored around the archipelago. Unfortunately, due to a cut in public funding by the European Union in 2008, those initiatives soon dissipated. Of the 40 collective FADs, only a few remain.

In 2008, of the 767 small scale active vessels in Guadeloupe, 282 units, representing a total crew of 560 crew members, were involved in FAD fishing. The average length of vessels was around 7.6 meters. Most of the vessels using FADs were multipurpose vessels and combined FAD fishing with coastal fishing using gears such as fish pots, nets, etc. In 2008, the FAD activity represented around 12 000 day at sea or 19% of the total number of days at sea for the whole fleet. Trolling (6500 days) was a seasonal activity targeting Mahi-mahi (Dolphinfish) from December to May and was carried out for 6500 days. However, it was sometimes difficult to distinguish FAD activity from trolling activity because trolling was also practised on FADs. According to Guyader *et al.*[1] (2011) Moored FAD fishing accounted for 28% and 25% of landings in quantity and value respectively ([2]1100 tons

[1] Guyader, Olivier, Manual Bellanger, Lionel Reynal, Sébastian Demanèche and Patrick Berthou. 2011. Fishing Strategies, economic performance and management of moored fishing aggregating devices in Guadeloupe.

[2] Only mean estimated figures are provided here. Confidence intervals are available for the different set of indicators

for €8×10^6). The percentage increased to 40% when trolling line was included (1700 tons for €13×10^6)[3].

Fishermen were spread over the entire Guadeloupe archipelago with strongest communities based in the three main islands belonging to Guadeloupe, some of them like "La Désirade" was very dependent on fishing activity. Except in some locations (south of Basse-Terre), local fishermen associations were not involved in collective FAD management.

3.6.2 Discussion

The likelihood that a significant part of Guadeloupe's FAD catch data was harvested from outside of Guadeloupe's EEZ, was expressed. If this was true, then in essence, it could be inferred that Guadeloupe reported data from significantly more than its three hundred (300) FADs. This being the case, the question of whether there was a monitoring system in place which could separate the data in terms of fish caught inside the EEZ and fish caught outside of the same. The Guadeloupe presenter affirmed the legitimacy of the FAD data, stating that the reported yields were caught within the EEZ of Guadeloupe. The fact that fishing was conducted by Guadeloupe fishers outside of the EEZ in times past was, however, not challenged. He attributed the cessation of this practice to the success of the implementation of FADs. It may not be too far-fetched to associate fishing outside of the EEZ with the trolling fishers, who may from time to time cross the borders during their fishing expeditions. A participant from Dominica highlighted that the Dominica- Martinique and Dominica- Guadeloupe situation as unique in terms of their mutual sharing of marine space for the placing of FADs. This relationship reportedly existed because of friendships among the fishers. In this light, it could be said that Guadeloupe's FAD yield was indeed reporting catches from in excess of three hundred (300) FADs.

A concern was raised about the noted increase in the number of muscle lesions on the FAD fish in general and related effect on the fish quality. The lesions were suspected to have arisen from increased fighting at the FADs. To counteract this, attention was being directed towards the on-board handling practices, with emphasis on proper icing. Additionally, care was taken to monitor the maintenance of the cold chain at the processing facilities, as these did not always present the best facilities for ensuring product quality control.

In Guadeloupe, the Yellowfin tuna were landed with very high quality because of the applied selective technique. However, this high quality was not necessarily maintained all the way to the consumer and attention needed to be paid to this.

It was mentioned that it was becoming easier for most countries to meet their quotas for Blue marlin. Given that the French quota was higher than most other countries in the region, the presenter was asked to share his views on the possible future need for other countries to negotiate an increased quota for Blue marlin, Yellowfin tuna and other such species. In his response, the presenter reminded the meeting that quotas for these species were decided following ICCAT protocol and proposed that countries work towards advocating for higher quotas during ICCAT meetings. He later admitted that the question was a difficult one and sought assistance from IFREMER for a response. It was argued that if consistently high landings of Blue marlin were being recorded, then the observation can be interpreted to indicate an abundance of the species. To further support this, it was highlighted that the estimation of Maximum Sustainable Yields (MSY) may not be very precise as this did not take into account all of the artisanal catch since these were not always declared.

[3] Total landings in Guadeloupe were estimated at 3900 tons in 2008 for a total value of €33×10^6

3.7 Haiti

3.7.1 Presentation Summary

The country report was presented by Mr. Bernard Chauvet.

The concept of FADs was first introduced in Haiti in 1985 and the first deployment was witnessed in 1988. In 2001, FADs were introduced across multiple regions in Haiti. Some have since been lost due to weather conditions, boat traffic and other means. FADs were deployed using the typical Haitian sailboat, a practice which was seen as a considerably dangerous one.

Problems surrounding the deployment and use of FADs were many. Poor site choices for FAD deployment resulted in FADs being deployed too close to the shore or in waters that were too deep. Landmarks were still used instead of GPS to locate FADs. Fishers vandalized the FADs to acquire ropes for personal use, although this practice was diminishing as fishers learned more about the importance of FADs. Currently, the major cause of FAD loss was marine traffic.

FADs were considered the hope of any fishing village in Haiti due to the decreased abundance of reef fish. This decrease was blamed, in part, to the growing population of the Lionfish. Due to the fishers' dependence on the FADs for their livelihoods, non-governmental organizations have stepped in and assisted with the deployment of some FADs. These cost about US$25,000 – $30,000 per FAD and have an average lifespan of 4 – 5 years. Despite the high cost of the FAD, and catches of up to 4,536 (10,000 lbs) per day, the price obtained for the catch could be as low as US$1.00 per pound. This situation did little to alleviate the overall poverty in the fishing villages but made it affordable to the whole community which can then benefit from the high nutritional value of the product.

Constraints of the FAD fishery included high cost of FAD materials and fuel, lack of cooperation among fishers and little solidarity among fishers from different regions, no existing arrangements for FAD management, overfishing, harvesting of juveniles and fishers' lack of catch documentation.

Some rudimentary and dangerous FAD fishing and deployment methods still existed. Fishers left their homes at midnight, paddled to the FAD sites in dug-out boats and fished using the hand-line method. FADs were deployed from pirogues at a distance of 12 – 13 Km from shore, with a piece of PVC pipe placed between them to avoid entanglement of the FAD ropes.

While the FAD fishery was a significant one, there was no official documentation of the species caught. Estimates were based on the monitoring and sampling of Fisheries Department personnel.

3.7.2 Discussion

Given the relative difficulty of conducting a fishing business with old technology, the JICA delegate enquired whether there had been any attempt to provide assistance to fishers in the areas of skills training and technology transfer.

The workshop was informed that Haiti had received donations from several entities in the past, including the Spanish government, which provided funding for the purchase of fishing vessels, but these monies were not effectively used, having been spent on objectives other than those for which it was agreed. Coupled with this, projects were implemented and monies spent without proper stakeholder consultation. One example of this was the unrealistic fitting of storage facilities for fish with solar-powered refrigerators, which was not adequate for the preservation of the product.

Since FADs were designed to aggregate fish closer to shore, it was not understood how the placement of FADs relatively close to the shore was not seen in a positive light. The presenter, Mr. Chauvet, clarified the issue by stating that it was a question of Haiti's particular topography. Due to Haiti's unique U-shape, most of the species pass by Haiti at a distance outside of the 'U', with the Wahoo

species seemingly the only exception. The sharing of the sea space with the Dominican Republic also influenced FAD placement. It was suggested that FADs should be placed at a minimum distance of three (3) miles offshore to access the migratory species. FADs targeting the migratory species were usually deployed on the Windward side of the island but in the case of Haiti, strong currents make this a difficult task. Good results had not been garnered from the trials on the Windward side with respect to FAD deployment.

3.8 Martinique

3.8.1 Presentation Summary

The country report was presented by Ms. Katia Frangoudes.

FAD development in Martinique was similar to that of Guadeloupe, with FAD development commencing in the islands in the mid-1980s. Public authorities contributed directly to such development by financing the first experiences undertaken by scientists. In Martinique the deployment of FADs was under the responsibility of Regional authorities which decided to set up public FADs. (In Guadeloupe fishers decided to do differently and developed individual private FADs.)

In France, the fisheries law defined the assignments of Regional Committees for Marine Fisheries (CRPM). Resource management was one such assignment since 1991 and the law of 2010 reinforced this. CRPMs defined the main rules for FAD fisheries during mid-1990s. For them the objective was to regulate the access to fisheries and also to get information about the number of FADs. Since then the number of FADs in Martinique increased and this called for modification of the regulations.

The right to fish commercially was granted through different types of license such as the certificate of navigation given by the security centre and the fishing permit related to the European Union regulation of fishing effort. The possession of a fishing permit was required before the construction of a fishing boat to which the licence was then assigned. This applied to both Martinique and Guadeloupe fisheries.

IFREMER, the French Research Institute for the Exploitation of the Sea, collected and produced a yearly report on catches and economic data on FAD fisheries but also for all other types of fisheries. From these statistics it appeared that FAD fisheries provided a big part of fishers' income.

Harbors, fish markets and others facilities were not provided by fisheries organization but by other institutions, departments, municipalities or maritime cooperatives.

3.8.2 Discussion

The workshop established that on an average fishing trip in Martinique, a fisher potentially visited between one (1) and three (3) FADs as there were currently no limits set on the amount of FADs that could be visited during a single fishing trip. Additionally, it was established that the data presented was not specific to FADs but included all fisheries.

The potential for conflict between fishers and tourists in the fishing communities was questioned by JICA expert Mr. Mikuni. It was however reported that in Martinique, these were not significant. The fishers were adequately represented on these types of issues by Fishers' Committees.

An intervention was made by a Dominican participant to clarify the misconception that FAD fishing dictated that a fisher must take whatever species were found at the FADs. He pointed out that fishers using the FADs can enjoy varying levels of catch selectivity by deploying fishing gear in a manner that would selectively harvest the species of interest.

It was interesting to note that the European Union countries established their FAD fishery on the basis of a FAD management framework.

3.9 St. Kitts and Nevis

3.9.1 Presentation Summary

The country report was presented by Mr. Samuel Heyliger.

The Department of Marine Resources of St. Kitts and the Fisheries Department on Nevis over the last six (6) months had been implementing certain components of the CARIFICO Project. These included stakeholders meetings on both St. Kitts and Nevis. These meetings were well attended and the interaction and participation of the fishers was quite heartening. Fishers gave their commitment to the implementation of the project and were demonstrating their interest and commitment in tangible ways including reporting, repairing and replacing FADs. The data collection was ongoing but needed to be strengthened.

Other actions taken during the last six months included the designing of FAD Licence, interviewing and selecting potential Liaison Officer (Officer still has to be approved and contracted) and participation in Extension Officers Training in Okinawa and Fiji.

The Okinawa and Fiji experience had some very good examples of both what to do and what not to do in the context of the FAD fishery and would be useful to help chart the way towards co-management in the Caribbean region. The highlights were the distinct cultural differences between the Caribbean islands and the Pacific islands visited. The involvement of the Government in the management of the Resources through Fishers Associations (as in the case of Okinawa, Japan,) and the influence of the Village Council (as in the case of Fiji) was very enlightening. Additionally, the variety of products and services provided by the Fishers Associations was very instructive. On the other hand the lack of or disregard for safety at sea was quite disturbing. This was also magnified with the obvious poor planning and executing of the activities in Fiji.

The major activities planned for the next six months include the demonstration of the use of the "chum bag" in fishing around FADs, the contracting of Liaison Officers, the preparation and submission of a project to improve the marketing of large pelagic and the continued meeting of the FAD Fisher Group.

3.9.2 Discussion

The meeting accepted the St. Kitts and Nevis presentation without any discussion.

3.10 St. Lucia

3.10.1 Presentation Summary

The country report was presented by Mr. Seon Ferrari.

FADs, Fish Aggregating Devices, occur naturally with floating objects in the marine environment. Humans took it one stage further and built and anchored such devices, so that fishers can locate them and catch fish near them, reduce operating cost, earn more revenue and hopefully better livelihoods.

Saint Lucia started its FAD programme in the late 80s / early 90s with help from friendly governments including; Japanese, French, EU and others. Fishers have realized the benefits of the FAD programme with help from the Government of Saint Lucia [GOSL], fisher cooperatives and fishers themselves.

The design of FADs was constantly being upgraded to realize a cost-efficient, durable FAD to translate to sustainable co-managed FAD Fisheries as CARIFICO's mandate sought to achieve in the long-run. The way forward for Saint Lucia is listed below:

Research and Development/ Assessment of new fisheries including the Diamondback squid fishery/ Sharing technologies through co-management participatory approach/ Utilise the 'Boat to Throat' concept relative to quality assurance and exploring the mother-ship fishing operations to reduce costs/ Sharing information amongst countries and data collection to inform future decision for the sustainability of it all.

In the first year of CARIFICO [May 2013 to March 2014] outputs to include a comprehensive list of fishers willing to participate in the project. The development of new FAD designs for the west coast of Saint Lucia [target area] and procurement of material to construct 5 FADs [one deployed off each community] and also a MOU with Saint Lucia Fisherfolk Cooperative for the long-term funding for the FAD Programme.

For more information please feel free to contact: Seon Duncan Ferrari, Fisheries Officer, Department of Fisheries, Saint Lucia. Email: seon.ferrari@govt.lc, deptfish@govt.lc, 1-758-468-4143.

3.10.2 Discussion

The question about the relative cost of sub-surface FADs was raised, these being assumed to cost more than their surface-buoy type counterparts. It was, however, expressed that while the sub-surface FADs can be more expensive due to the need for bigger anchors and greater buoyancy, the major cost factor was related to the design of the FAD. The main goal in any FAD design was to protect the main line, which ensured the permanence of the FAD. There were innovative ways of reducing cost associated with the design, while maintaining a durable product. The new FAD design, it was hoped, will have a lifespan of about 5 years, which was an improvement on the current average useful life of 2 – 3 years. The attainment of such a lifespan would afford the St. Lucian authorities more time to acquire the necessary funds for their replacement.

Enquiry into the possible competition for FAD used between communities and/or between part-time and full-time fishers revealed that the only real controversial issue was game fishing. Game fishers did not fish as a means of livelihood; their practice of catch and release of commercial fish species, to fishers, was bothersome. Worrying, too, was the current unknown status of the survival rate of the released fish and, as such, fishers consider the relinquishment of the fish to them for use as food, as a more sensible practice.

A discussion ensued about who was responsible for the labelling of FADs and who should accept responsibility for the damage incurred to ships by FAD chains and other parts.

It was established that the St. Lucia Air and Sea Ports Authority was responsible for informing the marine traffic of the FAD locations.

In terms of FAD deployments it was recommended that all FADs were equipped with radar reflectors and instruments for identification.

An alert was raised on the possible dangers associated with entanglement of a FAD's chains in the propellers of a ship. To reduce the incidence of this, the use of radar reflectors and other identifiers was recommended. It was imperative that sea operators exercise vigilance as users of the marine space while utilising available navigational aids.

In terms of liability for damage incurred, mixed views were expressed. On the one hand, it was felt that damage due to FAD chains should be borne by the FAD deployers, while on the other hand it was

acknowledged that FADs suffer many malicious attacks at the hands of perpetrators who were never charged.

One participant used logic to explain that it was almost impossible for a boat to sustain damage by a FAD chain; if damage was sustained then it may only be to the propeller. The chain could not be expected to cause major damage unless it was heavier than the commonly used chain types and if this were the case, then the possibility of the heavier chain hooking onto a vessel's propeller was even more remote. Perspective was given to the discussion with the reminder that international practice stipulates that a marine user operates within the radius of a FAD at his/her own risk.

The discussion concluded with the reiteration that issues related to responsibility for these types of damages should be taken into account as we moved forward with the development of FAD fishing. The need for the establishment of clear rules and regulations that addressed the issues on all sides was underlined.

3.11 St. Vincent and the Grenadines

3.11.1 Presentation Summary

The country report was presented by Mr. Hyrone Johnson.

St. Vincent and the Grenadines did not have a long history in the development of FADs. One of the earliest known FAD activities was conducted in 1997 with the deployment of one bamboo-raft FAD off the south eastern coast of the island. Four modern FADs were deployed from 2010 to present; two (2) on the east (Atlantic Ocean) and two (2) on the west (Caribbean Sea) coast of the island.

The FAD management policy of the Fisheries Division was to work in partnership with industry stakeholders to construct, deploy and maintain the FADs. Individual ownership of FADs was not encouraged. Currently no permission or licences were needed to fish on FADs and there were no applied fees. It was hoped that under the CARIFICO project, some of the afore-mentioned management conditions would be changed as part of a pilot plan to introduce co-management practices.

Activities carried out by the Fisheries Division to develop FAD fishing included consultations, creation and redesign of data forms to capture FAD data, strengthening of fishers' cooperatives, vessel registration, conducting of a baseline study, preparation of the 2014 Annual Work-plan and Fishers' Cooperative Action Plan and the sourcing and purchase of material for the construction of fishing boats.

3.11.2 Discussion

Notably the FADs deployed in St. Vincent and the Grenadines were equipped with GPS. The workshop was interested in finding out the mechanisms used to transmit the GPS FAD data and whether the GPS on the FAD allowed for night location, in an effort to capture species that were not readily available in the day. It was indicated that the information would be conveyed in the presentation by IFERMER as the workshop progressed. It was stated, however, that approximately sixty percent (60%) of the fishers in St. Vincent and the Grenadines used handheld GPS.

The use of the GPS was discussed by the workshop. The participant from Haiti purported that the use of GPS was not necessary as, depending on the depth of the FAD and FAD rope length, the FAD would not move more than half mile from its initial location. It was contended that the possibility existed for a FAD to be displaced at a distance of up to four (4) miles, depending on its latitude. Even with the use of GPS, fishers may still experience delays locating FADs.

3.12 Suriname

3.12.1 Presentation Summary

The country report was presented by Ms. Muriel Wirjodirjo.

FAD fishing had not yet become established in Suriname. Fishing vessels operating in Suriname waters were multi-species and multi-gear, with trawlers, snapper boats, open or decked wooden vessels and canoes.

Suriname had three main types of fisheries: trawling used to target shrimp and different types of finfish, demersal and pelagic species; the artisanal fishing fleet divided into coastal and inland fleets and utilized mainly gillnet fishing gear.

The current laws which governed fisheries in Suriname were: The Fish Stock Protection Act: effective 1961 and last revised in 1981, which regulates inland fisheries; and the Sea Fisheries Act: effective 980 and last revised in 1981, which regulates coastal and pelagic fisheries. However, Suriname currently possessed very little capability for the enforcement of its legislation.

Suriname was attempting to charter the way forward for its fisheries. A Fisheries Management Plan had been drafted after consultation with fishermen.

3.12.2 Discussion

Suriname never deployed FADs in their waters, mostly because of their distance from the ocean. As such, no discussion or comments were made by the workshop on the presentation.

3.13 Trinidad and Tobago

3.13.1 Presentation Summary

The country report was presented by Ms. Ruth Redman.

There was no existing FAD Fishery on mainland Trinidad, while FADs in Tobago were privately owned and operated. FADs were cheaply constructed from mangrove, wood or bamboo, different sizes of rope, buoys and nets. They were about 6-8 sq. ft. in size and were anchored to the ocean floor by a cemented engine block or steel anchor. In some instances, a flag was tied at the top of the FAD to show ownership. FADs were located all around Tobago; they were set by fishers in Mt. Irvine, Pigeon Point, Plymouth, Buccoo, Studley Park, Castara, Belle Garden and Delaford.

The Tobago FAD fishery was associated with the Flyingfish fishery. Approximately 25% of the nearly four hundred (400) fishers used FADs during the drift season or the Flyingfish season. The Flyingfish season spans from October of one year to June of the following year. Mahi mahi was the main targeted species, while Flyingfish comprised a significant part of the by-catch. Other species caught at the FADs were Wahoo, and Tuna species. Daily catches ranged from 113 - 181 kg (250 - 400 lbs) of Mahi mahi and Flyingfish averaged 454 kg (1000 lbs) per day.

Current legislation did not address FADs but there was a Draft Fisheries Management Bill which proposed that FAD owners register and license their FADs. The Draft Fisheries Management Bill did not explicitly mention the management of FAD fisheries, as this was to be covered in a separate Fisheries Management Plan. While there was some measure of self-regulation, there were many incidents of unscrupulous behavior where fishers deliberately anchored and fished at FADs which they had not set. There was need for much work to be done in the area of FAD management.

3.13.2 Discussion

The meeting expressed curiosity in knowing whether the possibility of the FAD fishery becoming the main supplier of Flyingfish, existed. The presenter, Ms. Redman, responded that since fishers had been witnessing the good results of the FAD Flyingfish fishery, more fishers were seen fishing the FADs for the commodity. This was noted island-wide, except in Charlottesville where the Flyingfish was not traditionally a targeted species.

There was a brief discussion about the possible tendency to move away from the traditional drift and towards FAD fishing for Flyingfish. It was highlighted that the post-harvest handling and processing of the Flyingfish presented some challenges such as the need for many processors or deboners. This limited the exploitation of the Flyingfish fishery, as these processors were not always available. Mahi mahi was identified as a much more economical FAD fishery in this respect.

The meeting questioned whether Tobagonian fishers had ever deployed FADs close enough to mainland Trinidad that could spark the interest of Trinidadian fishers and entice them to engage in FAD fishing. This was seen as unlikely, as the FADs were deployed only 2 – 3 miles off Tobago which was still a considerable distance from Trinidad and from the area normally fished by Trinidadian fishers.

4.0 SUPPORTING ACTIVITIES OF ORGANIZATIONS

Presentations were made by representatives from various organizations producing and or performing supporting activities towards the development of FAD fisheries in the Caribbean region. Presenters were given varying times between thirty (30) minutes and five (5) minutes, with time allotted after each presentation for discussion. The presentations are included as Appendix 5.

4.1 CRFM – Recent policy developments of relevance to FADs

4.1.1 Presentation Summary

A powerpoint presentation titled ‘CRFM – Recent policy developments of relevance to FADs’, was presented by Dr. Susan Singh-Renton.

The presentation highlighted recent policy developments within the CRFM related to FAD Fisheries. The presentation noted that in response to a directive from the Heads of Government in 2003, CRFM had assumed responsibility for developing a CARICOM Common Fisheries Policy (CCCFP). Following several years of consultations at various levels, the CRFM Ministerial Council adopted the CCCFP in 2011, after which the document was also subsequently adopted by Attorneys General in November 2013. At present, the CCCFP was being prepared for signature by the Heads of Government in February 2014.

In recent times, CRFM had also worked on issues related to Illegal, Unreported and Unregulated (IUU) Fishing, which created challenges for most member states using the FAD fishery. Regional reviews of the IUU fishing situation were conducted in 2005 and again in 2012. In the course of these efforts also, the CRFM began to formally document its position on IUU fishing and, in 2010, the CRFM Ministerial Council made the Castries (St. Lucia) Declaration on Illegal, Unreported and Unregulated (IUU) Fishing. Additionally, in view of the extent of the IUU fishing problem within the region and globally, the CRFM-OSPESCA Joint Declaration and Action Plan 2012 identified the need for cooperative action on IUU and MCS, and CRFM’s Caribbean Fisheries Forum established a Working Group on IUU Fishing.

In 2012, CRFM’s performance as a regional fisheries body was formally reviewied by FAO, and this also informed a new CRFM Strategic Plan for 2013 - 2021. Also in 2012, CRFM finalized its

Regional Strategy, Action Plan and Proposal for Climate Change Adaptation and Disaster Risk Management in Fisheries, which drew on the work of CDEMA and issues highlighted in the CCCFP, and gave special attention to the small-scale sector.

A Policy Statement on Use of Ecosystem Approach to Fisheries (EAF) was issued in 2013 by the Caribbean Fisheries Forum. This served to formally document CRFM's commitment to the implementation, application of EAF, which was reaffirmed by CRFM's Ministerial Council, declaring EAF as a key guiding principle for the CRFM.

In view of the important role of communication and information and a need to strengthen CRFM's systems supporting this, a Communication and Information Technology Strategy and ICT Action Plan was completed in 2013.

4.1.2 Discussion

There was no discussion after this presentation. Comments on this were taken jointly with those on the following presentation.

4.2 Introduction to the CRFM website and collaboration tools

4.2.1 Presentation Summary

A powerpoint presentation titled 'CRFM website and collaboration tools', was presented by Mr. Peter A. Murray.

In an effort to improve the quality of communication and information sharing the CRFM improved the organisation's website. The new website address was www.crfm.int.

The website homepage was divided into sections: General Information, About Us, News, Events, and Documents, Projects, Contact Us.

The Events Section was highlighted as very important as it communicated the activities of the CRFM, which had always been an issue in the past, so this tool brings all the information to one location where it can be easily accessed by stakeholders. The Documents section allowed for time sharing of the information shared at Workshops and about Workshops.

What had been essential over the years was the necessity to share information. The Contact Us section allowed for direct interaction with members of the CRFM Secretariat, as opposed to a general Contact Us forum.

An essential consideration that was taken was that of Discussion Groups, to foster conversation on a forum to maintain dialogue. https://dgroups.org : CRFM Secretariat group, there are fifteen (15) sub-communities on specific targets of the CRFM where members can engage in conversation, documents can also be uploaded to the forum to be shared between participants. It was suggested that the D-groups can be instrumental in setting up the actual Working groups.

Other methods of social media can be utilised, Facebook, Youtube, Twitter connections were linked on the CRFM website.

Utilising these methods provided the avenue for the website to be seen as a portal to a number of web-based tools for communication in the development of FAD technology.

4.2.2 Discussion

It was noted that there had been substantial work and investment in the website, it increased the possibility of interaction and information sharing as countries and participants would be able to access a plethora of information compiled by CRFM and partners, certain tools including web-conferencing had been made available to users who subscribed with the website. It was noted that the D-groups would assist in the efforts toward co-management and it was suggested that each D-group should have a coordinator, it was further noted that each group had an assigned CRFM staff coordinator. It was highlighted that the D-group was an excellent tool for working together and the CRFM executive had been using the tool for interaction and interfacing. Additionally, any member of a D-group could upload documents which could be accessed by all members of the D-group at any time.

It was also contended that there should be standing D-groups for every program area of the CFRM, as it allowed for interaction between members from each country. A query of how access to D-groups was gained was raised. It was established that to get access to the D-groups one had to sign up for the forum and a sign up for each D-group was required, although, members can be invited to join the D-group. There were fifteen (15) standing D-groups, which did not cover all program areas, however, it was recognized that additional groups can be created if there was a demand or necessity for themt. It was also noted that most D-groups matched the established working groups of the forum, other D-groups for other related issues e.g. a D-group for upgrading CARIFIS.

It was further purported that as the D-groups was a tool for communication of CRFM, there should be a D-group for each program area to facilitate constant interaction and information sharing on that area. It was explained that working groups were area or issue specific so there may be a number of D-groups dedicated to one area. The D-groups were designed for persons to receive information on areas of interest but working groups coud be linked to program areas. It was noted that the effectiveness of the tool was based on how the tool was used.

The CRFM was commended on the new website as it was an improvement on the previous website, while it was suggested that the facilitation of a linkage of statistics to the website i.e. provisions for online regional fisheries statistics, would potentially make the site, one of the best websites for any RFMO in the World.

4.3 JICA Activities for the profitability and sustainability of FAD fisheries

4.3.1 Presentation Summary

A powerpoint presentation titled ‘JICA activities towards co-manangement’, was presented by Mr. Mitsuhiro Ishida.

The presentation focused on five main activities conducted by JICA within the Caribbean region related to FAD fisheries. The FAD Co-management Projects in the case of St. Kitts and Nevis and Antigua and Barbuda were in the process of being implemented. Deep water FADs and the Drop Line fishing method were relatively new activities. Both methods had been accepted by local fishers and had proven to be profitable. The discussion on co-management for the utilization of FADs was ongoing, as several factors had to be taken into consideration, including, licensing and user fee of FADs, regulation of use of FADs, amendments of Fisheries Act.

The “Fish in Ice” program, that is, ice box building on small vessels was aimed at improving the quality of fish harvested. Ice boxes built on small scale boats was started at Marigot in Dominica around 10 years ago and now the use of ice was common practice in Dominica. The ice box construction manual was developed and the ice box making program “Fish in Ice” was ongoing in St. Lucia and St. Vincent and the Grenadines. Fishers liked the ice box because of the significant increase in operation hours derived and quick sales to consumers as a result of the improved quality of fish. The “Fish in Ice” program was to be implemented in St. Kitts and Nevis.

The Fisheries Censuses were conducted in St. Lucia in 2012 and in Dominica in 2008 and 2011. Following the census in St. Lucia, the next step was the collection of active vessel data. The number of active fishers and active vessels was most important for stock assessment and day-to-day fisheries management. Without the number of active vessels it was difficult to determine the actual fishing effort; registered vessels were only an indicator of potential fishing effort.

Since the census in Dominica, the enhancement of fisher and vessel registration, which improved the accuracy and statistics using the essential tool of a Fisher's Identification Card system, had been further developed. Additionally, the Dominican Fisheries Division created a boat owner list and map which aided in the data collection process. Fisher ID, Vessel registration map and lists were useful tools to keep updating active vessels and active fishers.

The standardized CPUE used by JICA in the region was a useful tool for stock assessment and was highlighted on the paper "Spawning and Gonadal Maturity, Sustainable Resource Use of Queen Snapper, *Etelis oculatus*, in Dominica (Miyahara Tetsuya 2013); as fishing results may be affected by fishing area, fishing gear, fishing season or moon phase.

CPUE showed resource tendency, which was an essential method of data collection. The CPUE highlighted the possible closed season; the use of the CPUE for stock assessment and that there was no need for a special data collection or system for results.

The final activity highlighted was the Market Research and Fish Outlets Program. It was established that for the enhancement of the distribution process; accessibility, availability and affordability of fish was vital; an assessment of how the consumers chose markets must be performed. From the research in Dominica, it was discovered that accessibility was key, particularly accessibility in relation to the operational hours and the availability of quality fish rather than proximity.

In the case of St. Lucia, it was recognized that the island had tremendous capacity for frozen fish; approximately 70 % of the fish was frozen as established by the frozen fish market developed over a fifteen year period. The possibility for the promotion of frozen fish in other countries was highlighted particularly where an abundance of fish can be caught around the FADs. In relation to accessibility, it was purported that frozen fish had the potential to provide enhanced ease of access for the consumer.

4.3.2 Discussion

It was discussed that in relation to stages of data collection for FAD fishery, it was very important to connect the dots not just at the national level but it was especially important at the regional level in relation to migratory fish resources, given the paucity of statistics presented at the CRFM Annual Scientific Meeting and the continued discussion on the standardized CPUE. While it was important for the work to be completed at the national level it was essential that the information was fed to regional bodies especially in light of the region's involvement in CLME+.

4.4 WECAFC – Latest developments and the fifteenth session

4.4.1 Presentation Summary

A powerpoint presentation titled 'WECAFC – Latest developments and the 15th Session', was presented by Dr. Raymon van Anrooy.

The presentation highlighted the composition of WECAFC, a forty year old Advisory Commission, comprised of thirty-two (32) states. The objective was to promote the effective conservation, and management and development of the living marine resources of the area. The area of competence for the Commission was Area 31 and part of Area 41 on the Map of the World. 51% of the area was high seas, over 86% of the area was Deep Sea.

The Structure of WECAFC comprised the Commission, the Secretariat, Working Groups and the Scientific Advisory Groups. The 14th session of WECAFC was held in Panama; one result of the session was the adoption of a resolution on strengthening the implementation of international fisheries instruments, relating to binding and non-binding arrangements.

Additionally, the 14th session established seven (7) working groups: OSPESCA / WECAFC / CRFM / CFMC Working Group on Spiny Lobster; WECAFC / OSPESCA / CRFM / CFMC Working Group on Recreational Fisheries; CFMC / OSPESCA / WECAFC / CRFM Queen Conch Working Group; IFREMER / WECAFC Working Group on Development of Sustainable Moored Fish Aggregating Device (FAD) Fishing in the Lesser Antilles; CRFM / WECAFC Flyingfish in the Eastern Caribbean Working Group; WECAFC Working Group on the management of deep-sea fisheries; and CFMC / WECAFC Spawning Aggregations Working Group.

The 15th session will be held 26 -28 March 2014 in Trinidad and Tobago, invitations had been sent to all 32 member states and observers.

For 2014, WECAFC intended to continue joint efforts with FAO, CLME and CRFM. A number of meetings and workshops will be held across the Caribbean on several aspects of fisheries.

4.4.2 Discussion

There was no discussion.

4.5 Objectives and stakes of the MAGDELESA Project

4.5.1 Presentation Summary

A powerpoint presentation titled 'Anchored FADs Fishery Sustainable Development Working Group & MAGDELESA Project: Objectives and Challenges', was presented by Mr. Lionel Reynal.

The INTERREG MAGDELESA project was launched with the agreement of the countries participating in the 12th WECAFC meeting in Trinidad, because anchored FADs were considered as a new fishing activity, with a potentially high social and economic impact as well as impacts on the resources such as blue marlin, blackfin tuna or dolphinfish. A multidisciplinary approach was proposed for this project in support to the "Lesser Antilles anchored FAD fishing sustainable development working group". The main objectives of this working group were to federate the means needed to give the frame favourable to the sustainability of this emergent fishery and to facilitate exchanges of data, knowledge and experiences between countries. The most important challenge was how to bring the information to managers and to the final beneficiaries: the fishers.

4.5.2 Discussion

No discussion was generated

4.6 CLME+ project update: Next steps

4.6.1 Presentation Summary

A powerpoint presentation titled ' CLME+ Project: Update', was presented by Ms. Laverne Walker.

The CLME Project consisted of two (2) large marine ecosystems: the Caribbean Large Marine Ecosystem (CLME) as well as the North Brazil Shelf Large Marine Ecosystem (NBSLME). One of the more important outputs of the CLME Project was a 10-year Strategic Action Programme, which outlined priority areas of focus for the management and governance of shared living marine resources. To date, thirty (30) ministers from twenty-one (21) countries had endorsed the CLME SAP.

A Project Identification Form (PIF), consisting of five components, to catalyse the implementation of the CLME SAP had been submitted to the Global Environment Facility (GEF) Secretariat. Twenty-one (21) GEF eligible countries had endorsed the CLME$^+$ Project PIF titled "*Catalysing Implementation of the Strategic Action Programme for the Sustainable Management of shared Living Marine Resources in the Caribbean and North Brazil Shelf Large Marine Ecosystems*." The CLME$^+$ Project PIF was approved by the GEF Council in October; funds to assist the region with the development of the Project Document for the Full Sized Project during the Project Preparation Grant (PPG) Phase was also approved.

The CLME PCU was in the process of developing the Project Document in association with a number of regional and sub-regional agencies. One of the activities to be undertaken as part of the PPG Phase was a Baseline analysis of all existing projects, programmes and initiatives being implemented in the region that were linked to the CLME SAP Objectives.

4.6.2 Discussion

No discussion generated.

4.7 UWI research and training activities relevant to FADs

4.7.1 Presentation Summary

A PowerPoint presentation titled "Conservation, Sustainable Use & Management of Pelagic Fisheries: Research and capacity building at CERMES", was presented by Dr. Hazel Oxenford.

The Centre for Resource Management and Environmental Studies (CERMES), University of the West Indies continued to support the work of the CRFM through its MOU and its work in capacity building, outreach and research in all areas of fisheries including biology and ecology of fishery species, social and cultural importance of fisheries to coastal Caribbean communities, economic valuation of fishery resources and the fishing industries, contribution and role of small-scale fisheries, ecosystem approach to fisheries management and co-management opportunities, and fisheries networks and governance mechanisms.

CERMES was helping to build capacity within the region through its interdisciplinary course-based Masters (MSc) programme in Natural Resource Management with emphasis on management of coastal and marine resources, water resources and climate change - all areas of significant importance to the region's fisheries. The Centre also developed and implemented a number of short-courses for professionals and practitioners and hosted or co-hosted training workshops in areas of great relevance to fisheries including the impacts of climate change on coastal and fishery resources and coastal community livelihoods; disaster preparedness and adaptation; implementation of the ecosystem-approach to management of natural resources; small business management; grant and report writing *inter alia*.

CERMES also had MPhil and PhD degree programmes with students conducting researching in many areas of relevance to fisheries. CERMES had significant involvement in many large regional and international projects such as the GEF-funded Caribbean Large Marine Ecosystem (CLME) project, the EU-funded Future of Reefs in a Changing Environment (FORCE) project, the Global Partnership for Small-Scale Fisheries Research 'Too Big to Ignore project', the GEF funded International Waters project etc. CERMES faculty also served on a number of advisory boards in the areas of fisheries, biodiversity and climate change.

4.7.2 Discussion

On the issue of FAD fishery taking the pressure off reefs; thereby moving the fisheries operations from coastal activities to offshore, it was established that in Dominica this was indeed the case as

demonstrated by the fact that more than 70% of the country's fishery was FAD based, beach seine operations had moved from about thirty-eight (38) to about four (4) or five (5) at the present time. The statistics showed that the efforts to refocus fishing activity from coastal to offshore had been realized and it was necessary to look at other countries to determine if the efforts had resulted in a similar change.

Additionally, in relation to the notion of coastal fishing as the key factor affecting the decline in coastal reefs, it was purported that some research should be conducted to determine the effects on land based sources and other sources of impact on the integrity of the environment that reduces the sustainability of coastal reef structures. It was purported that the impact of the degradation of the coastal habitat was more severe than coastal fishing activities.

An explanation was sought as to how fixed FADs made fish more vulnerable; it was discussed that as the fish were aggregating, it made them more vulnerable to capture and FAD fishing tended to aggregate more juveniles and females, particularly the female dolphinfish.

It was purported that fishing with a large vessel resulted in more damage and disrupted the renewal process much more than FAD fishing. It was contended that the aim was not to compare the effects of different types of fisheries. Additionally fishing using FADs was more efficient than searching an entire area for fish.

The workshop was informed that in the development of the SAP for CLME+, one of the areas researched was a linkage of the environment and the fisheries components; in partnership with WECAFC, UNEP, the fisheries organisations and environment organisations. This was highlighted in strategy numbers four (4) and six (6).

It was also contended that with regard to the suppositions of FADs as a potential vulnerability for the catch of juveniles; to the contrary, prior to the existence of FADs much greater stress was on juvenile fish; FADs allowed for the direction of fishing protocols to target for example, larger fish, which in turn allowed for better management and control of the catch.

It was contended that the fraction of the total catch of large pelagic species taken by CARICOM countries was minuscule. However, the need to ensure that fishing was conducted in a responsible manner and established rules were adhered to while harvesting accessible resources, was highlighted.

4.8 Testing an engagement strategy to support co-management of the Caribbean FAD Fishery

4.8.1 Presentation Summary

A powerpoint presentation titled 'Testing an engagement strategy to support co-management of the Caribbean FAD Fishery', was presented by Dr. Charles Sidman.

Florida Sea Grant, the Caribbean Regional Fisheries Mechanism and the Dominica and St. Vincent and the Grenadines Fisheries Divisions partnered to implement an integrated data collection, analysis, and engagement process in Dominica. The aim was to support the co-management of Caribbean FAD fishery resources.

A rapid appraisal identified three basic forms of FAD governance arrangements: private, small group, and public. Catch and effort data were collected from two hundred and seventy-five (275) FAD fishing trips at three landing sites in Dominica to determine which governance arrangement produced the best FAD fishing results. A measure of profitability was developed that compared catch relative to costs associated with FAD fishing trips, and relative to the number of vessels that congregated around private, small group, and public FADs at any given time. The results indicated that the productivity of a FAD for an individual fisher was dependent on how many boats of fishers used it at any given time;

for best results FADs should be used by no more than 2-3 boats of fishers at one time on average; public FADs attract too many boats of fishers and the ability to use multiple FADs on one fishing trip may result in more stable catches for fishers.

Results from the analysis formed the basis for workshops with FAD fishers on Dominica, to discuss options to reduce competition around public FADs and the role of fishers and government in supporting co-management of the FAD fishery. An Activity Planner was developed as a tool to address a primary co-management need, expressed by FAD fishers at the workshops, for greater information sharing and cooperation, viewed as necessary precursors for organizing and supporting co-management.

Several factors contributed to the success of the pilot stakeholder engagement strategy; data collection and analysis formed an integral element of the stakeholder engagement process. Information provided by the FAD fishers was analysed and presented in a way that was meaningful to them. This laid the groundwork for productive meeting discussions.

Secondly, project partners each played an active role in the planning and implementation of the stakeholder meetings. This allowed for the transfer of meeting facilitation strategies to local partners. In addition, the workshops provided a venue for local partners to practice strategies for implementing participatory decision processes.

Finally, a helpful tool namely an Activity Planner was introduced to support longer-term information sharing and cooperation among stakeholders.

4.8.2 Discussion

There was a query about whether the distance from shore to the FADs was measured and if the distance was the same for all FADs. It was explained that the FADs distance from shore was part of the data collection protocol, as each of the FADs were mapped and the distance from the shoreline was measured; the second part was a description of the FAD, while the third was a data entry form used to identify the catch and weight of the various types of fish caught by specific fishers. Additionally, all of the FADs differed in distance from the shore ranging from three (3) to upwards of thirty-five miles (35) from the shoreline. It was established that typically the private FADs were further away from the shoreline. The study did examine the relationship between distance from the shoreline and profitability.

The issue of income decline as more fishers used the FAD raised questions of the distribution of the catches and whether records of the quantity of fish caught by all boats were kept. It was discussed that from the records, it was unclear what the boats not used in the study caught, since an analysis of all vessels was not part of the process. It was contended that there should be a record of the catch of all the boats fishing the FAD to establish the total production of the FAD. In addition, it was suggested that standardized catch rates be used to examine the real changes in catch rates associated with the various factors.

The relationship of the fishers who created the FADs in small groups was questioned. It was established that no clear distinction was made but there were two (2) groups of fishers; those using the public FADs and small groups of ‘Kalinago’ which may have close family ties. Additionally, it was purported that in Dominica the fishers tended to associate according to business ethics. Those who wanted to derive large profits put major effort in and grouped together, whereas the others behaved like pirates not wanting to make a huge effort.

Regarding the data collected, there were questions about whether the records indicated the number of fishers at the FADs at a particular time and if the frequency of the use of the FAD was taken into consideration. It was recognized that this information was not established in the data collected but

anecdotal evidence from the fishers stated that the public FADs were being overused whereas the private FAD owners would allow their FADs to rest.

4.9 CNFO's Activities relevant to FADs

4.9.1 Presentation Summary

A powerpoint presentation titled 'Caribbean Network of Fisherfolk Organizations', was presented by Mr. Mitchell Lay.

The presentation began with an overview of the composition of the Caribbean Network of Fisherfolk Organization, which comprised of National Fisherfolk Organizations from the Caribbean region to develop participation from CRFM member states; in 2013 participation from new territories including Turks and Caicos, Anguilla, Montserrat, in partnership with CERMES and CANARI. The Dominican Republic, the Dutch and French Caribbean territories had also expressed interest in the organization and participated in a number of activities.

The vision of the organization was to develop knowledgeable fisherfolk operating in industries, enjoying good quality of lives; achieved through the ecosystem based management of our resources. The mission was to network, build capacity and engage in advocacy and offer representation for fishers.

In relation to the information and networking component; the CNFO had partnered with UWI to develop a specific communication tool, a phone application for data and information sharing, meeting facilities and marketing. Specific emphasis was on marketing and data components and the developers had indicated that the application was ready for testing.

The capacity development component sought to improve knowledge and techniques, gears, harvesting technology and management. The CNFO maintained the status of CRFM observer and contended that the organization wished to have a more vital role. Previous interactions between JICA and CNFO had included the workshop for the Dissemination of JICA Master Plan in 2012, the Development of Good Practices for Fisheries Management and Development Workshop in 2012 and FAD Management in 2013.

CARIFICO, in the CNFO's view, was a sub-regional project; the CNFO had not contributed at the decision-making level, their contribution was limited to the participatory and information giving level, although national fishers were engaged at different levels of participation locally. The organization viewed the co-management model as a consultative model and noted that CNFO was not a part of the decision making process. In its view, for the model to be collaborative, participation had to be from conception to conclusion.

The CNFO also looked at the discussion on the issue of Rights including human rights, rights of association, tenure and food; the organisation contended that great emphasis should be on fishers rights to access resources, as FADs limited the access of other fishers who didn't have FAD licences. Additionally, emphasis should be placed on the policy interactions regarding FAD management including the CCCFP and the sustaining small-scale fisheries guidelines whilst recognizing the ecosystems approach and the realities in the context of Caribbean fisheries.

The CNFO purported that considerations should be given for research and development relating to fish stock and harvesting methods; whereas markets and regional trade should have some priority in keeping with the CCCFP. The issue of communication and publicity on the national and regional level should also be emphasized.

4.9.2 Discussion

It was contended that in relation to Dominica, the process was that of collaborative co-management as the fishers were involved at every phase. It was postulated that there might have been a break in communication as the CNFO representative from Dominica was part of the process. It was contended that the CNFO was aware of the Dominican example but it was made clear that the CNFO was not made up of just Dominica; the statement was made from a region-wide standpoint, as it was also evident that more collaboration occurred in Antigua and Barbuda. However, when the CNFO attended the initial meeting, the project was presented as a completed document without input from the CNFO in general.

It was highlighted that within the Master Plan there were several components and all stakeholders were integral in the decision-making process. The aquaculture component targeted fish farmers, likewise the component on pelagic resource development and management using FADs focused on fishers in Dominica and Saint Lucia. Hence the involvment of fishers in Dominica, at the local level,was consistent with the intended level of stakeholder involvement regarding the introduction of FADs.

Regarding the CRFM, the CNFO was an observer in the FORUM and it was highlighted that the CRFM Secretariat and the FORUM were not the decision makers, since they made recommendations to the Ministerial Council. In spite of the limitations of the process, the CNFO would still be able to engage not just as the regional level but at the national level, since its national counterparts are afforded opportunities to engage at various levels with Ministers and Fisheries Officers.

5.0 TECHNICAL DISCUSSIONS - FAD TECHNOLOGY

Presentations were made by representatives from various organizations regarding FAD technology. Summaries of the presentations and the ensuing discussions are given below. The presentations are included as ***Appendix 6***.

5.1 Design of FAD, CARIFICO

5.1.1 Presentation Summary

A powerpoint presentation titled 'CARIFICO: Enhancing of the partnership among fisher and countries through FADs (Fish Aggregating Devices) co-management in six OECS countries, to promote sustainable use of fisheries and aquaculture resources by development, management and conservation of these resources in collaboration with stakeholders to benefit the people of the Caribbean region', was presented by Mr. Mitsuhiro Ishida.

The FAD design used in Dominica will be introduced in St. Kitts and Nevis and Antigua and Barbuda; the design to be used was not very technical, it was quite simple and easily maintained. The price, dependent on the depth of the FAD, ranged between XCD$3000- $4000, and all the materials to be used can be purchased in St. Kitts and Nevis.

For the main line, from the FAD head to the bottom, i.e. the anchor, ten (10) millimetres steel will be used which will give the FAD enough tension. In Dominica, the local fishers used eight (8) millimetres steel, this worked also. Concrete blocks were used for the anchor, although they had used sandbags for safety and health precautions, as well as for easier deployment, each sand bag was between 50-60 kg.

In St. Kitts and Nevis, several meetings were held with the fishers, as the co-management process was very important. It was established that the FAD licence will be displayed on the hull of the boat; it was agreed that a yearly fee of XCD$500.00 will be paid for the licence. An assessment of the

maintenance after five years will be made to determine if the fee should be revised. Additionally, penalty fees of XCD$1000.00 for first offence of fishing without licence, and XCD$2000.00 for second offence will be charged; however a decision had not been determined on the penalty for the third offence. There was discussion on the amendments to the Fisheries Act in St. Kitts and Nevis.

The high fisher participation in St. Kitts and Nevis resulted in the deployment of five (5) new FADs, it had also been requested that the fishers move away from catching tunas and focus on the harvesting of other large pelagic fish.

At the time of the presentation, there were three (3) FADs deployed in the waters of Antigua and Barbuda, with a new FAD to be added that same week. A close relationship existed between the fishers and the Fisheries Division which aided immensely in the co-management process, and FAD legislation was included in the new Fisheries Act to be legislated. Recreational fishers would be allowed to catch fifty (50) pounds of fish around FADs.

The presentation concluded by highlighting that CARIFICO was available to assist OECS countries with their FAD activities, both technically and financially.

5.1.2 Discussion

On the idea of using sandbags as the anchor, several questions were asked regarding the purchase of the bags in the Caribbean; it was indicated that the bags used were normally obtained in Japan at around $2.00USD, but the bags were difficult to source in the Caribbean. It was noted that tarpaulin could be used as an alternative but that it was expensive; a Fisheries Officer who attended training in Fiji indicated that in Fiji they used bags similar to the ones used to store sugar.

The durability of the sandbags was also questioned, particularly if they came into contact with reef. It was contended that in deploying the sandbags they were careful to place them on flat sea beds. It was indicated that the FADs were set to last for three (3) years. On the issue of the weight of the sandbags, it was established that the FADs were set with approximately 1000kg of sand, using between 16- 20 bags based on the floating forces.

It was explained that in Dominica there was an accident which resulted in the loss of a vessel and the life of a fisherman who drowned in the process of trying to drop the concrete anchor. It was purported that the sandbags were safer compared to the concrete and engine blocks previously used. It was noted that there was need for a framework for documenting FAD safety measures.

It was noted that the removal of sand from beaches was illegal in some countries, which would affect the use of sandbags. It was established that this was dependent on the arrangement between the Fisheries Division; the use of sand was dependent on the decision of the authorities involved. Additionally, it was mentioned that the sand from rivers could also be used.

In considering the environmental aspects, it was important to note that added to the impact of the removal of sand, an assessment of the impact of the other materials used in the creation of FADs would be essential.

5.2 The currents in the region and the use of FADs equipped with GPS for currents observation

5.2.1 Presentation Summary

A powerpoint presentation titled ‘Design and Modelling of Fish Aggregating Devices’, was presented by Mr. Paul Gervain.

Ocean currents were crucial in the behaviour of FADs, and therefore in their design. The Mercator data gave the maximum velocity of the currents at the vicinity of the islands between Guadeloupe and the Grenadines, in 2013. They reached 1.2 m/s at the surface and 0.1 m/s near the bottom on the leeward side of the islands. On the windward coast, the maximum of the current speed was 1.75 m/s near the surface and 0.5 m/s on the bottom. These data were needed to calculate with IFREMER "DCP" software the main feature of the FADs. Indeed, according to the currents speed it was necessary to calculate the more appropriate buoyancy of the FAD, weight of the anchor and length and characteristics of the mooring line.

The greater the buoyancy the better the FAD withstood currents, but these had consequences on the anchor. Its weight in the water must be 130 % the FAD buoyancy. The weights of the anchors made of concrete must be between 300 kg for the small artisanal FAD deployed in the region (around 120 l of buoyancy) and 1 500 kg for a one buoy FAD with a PLK 600 buoy.

Usually the ratio of the length of the rope to water depth was between 1.2 to less than 2. But during slack the loop of the floating rope must not reach 200 – 300 m depth. The FAD was less sinkable when the length of the rope was long (close to the ratio 2) and the diameter small.

By using the software "DCP" it was possible to verify if a FAD could withstand the strongest currents and to calculate the safety factors. The software gives also the radius of the watch circle and the behaviour of the FAD without current.

5.2.2 Discussion

It was indicated that the software was designed to calculate different elements, and the software completed all calculations. The demonstration of the technology was proposed to assist with clarification. It was established that the software was free.

The presenter, Mr. Gervain, was asked whether consideration was given to the size of the ropes used in relation to the number of buoys, additionally, if compensation was given to the rope diameter in relation to buoyancy points and the breaking point of the rope. It was indicated that the software possessed the ability to model all FADs whether one buoy or rosary, the software computation used all factors given. It was also established that general the characteristics of the rope changed over time.

5.3 FAD construction: Basic rules

5.3.1 Presentation Summary

A powerpoint presentation titled 'FAD Construction: Basic rules', was presented by Mr. Paul Gervain.

Different types of FADs were constructed in the region. Their conception depended on the fishing activity, their management system, the local hydro-dynamism, etc. Despite these differences, improving the FADs construction was necessary in particular to avoid collision with ships, reduce the debris, maintain the FADs on the surface all the year round or increase their life span. To achieve these objectives basic rules coming from experiences must be applied such as protecting the first 200 or 300 m from the surface or avoidance of the rope floating on the surface during slack periods. A good knowledge of the currents was essential to determine the adequate design characteristics of the FADs. Monitoring the FADs and establishment of statistics on the life span, including all related accidents, was necessary to find solution to prevent them. Maintenance was useful notably to fix the beacons but it must be done by the fishers themselves to reduce the cost. Training of FADs builders and extensionists was recommended to spread good practices in FADs construction.

5.3.2 Discussion

There was no discussion on this presentation.

5.4 Analysis of work and of safety conditions in anchored FAD fishing

5.4.1 Presentation Summary

A powerpoint presentation titled 'Health and safety at work on fishing vessels from Martinique and Guadeloupe islands using long lines around FADs', was presented by Ms. Katia Frangoudes.

The work was conducted at a Specialized Institute in France about Maritime protection working closely with fishers to assess the risk at sea, by going to sea with the fishers. The proposal aimed at improving working situation relating to health and safety.

An analysis of safety was conducted before the accident via risk assessment of trips, and after the accident via clinical analysis to determine the cause and statistics from the health system. The statistics from the Marine Rescue Coordination Centre indicated accidents were not prevalent in the Lesser Antilles, while information from the French indicated sixty reported accidents. Interviews established that accidents occurred mainly when fishing with long lines, the line can be caught around the neck or leg when catch is heavy, but mainly accidents occurred when carrying FADs to sea.

The main results of the work concluded that there should be an increase in the size of the boat, where new boats with facilities are acquired; that fishers must accept that they will have longer fishing trips and for smaller boats, collective FADs closer to the shore should be established.

5.4.2 Discussion

No discussion was generated.

6.0 TECHNICAL DISCUSSIONS – CO-MANAGEMENT

Presentations were made by representatives from various organizations regarding on the issue of co-mangement. Summaries of the presentations and the ensuing discussions are given below. The presentations are included as ***Appendix 7***.

6.1 CARIFICO approach to co-management

6.1.1 Presentation Summary

A powerpoint presentation titled 'CARIFICO Approach for Co-management', was presented by Mr. Nariaki Mikuni.

The Caribbean Fisheries Co-management Project (CARIFICO) was a joint collaboration between Caribbean Regional Fisheries Mechanism (CRFM) member countries, CRFM Secretariat, and Japan International Cooperation Agency (JICA). The project was initiated on 1st of May, 2013 and its purpose was to establish real examples of fisheries co-management.

CARIFICO will adopt suitable experiences from Okinawa, Japan, (termed the 'Okinawa Experience') where the economic activities of fisher organizations strengthened the social fabric of the community. The project investigated the basic needs of fishers and designed a plan to meet those needs through the establishment of functional Fisheries Cooperatives. Different marketing options and the advantages of these for the different stakeholders involved were explored.

The organizational structure which was set up in Okinawa was shared and proposed for consideration by the Caribbean region.

Surveys conducted at Kunigami, Japan and in Barrouallie, St. Vincent and the Grenadines showed similar results and concluded that most fishers would join fishing cooperatives if the services related to supply of materials such as gasoline and gear, ice for sale and marketing of the catch were provided.

There were some unique factors which influenced the success of a co-management system. The FAD fishery was considered a good option for testing the co-management model because it was a relatively new business venture and vested interests were not yet strong.

6.1.2 Discussion

The practicality of exporting the Japan system of co-management to the Caribbean region was questioned. The culture difference between the two regions was emphasized and the meeting was advised to carefully examine the potential of each factor of the model presented and only apply what was useful.

It was felt that the Okinawa model encouraged a rise in the price of fish, with the fishermen actually getting only about 20% of the fish cost. Significant characteristics of the Okinawa environment did not exist in the Caribbean region. The fishing cooperatives were heavily subsidized by the government and were still not considered as profitable as they should be (only 6 of the 36 fishing cooperatives were considered profitable). New ideas such as the possible duplication of the Okinawa Experience appeared attractive especially when focus was being placed on the positive aspects of the model but could prove to be detrimental in the long run when the negative aspects come into play. There was a general lack of confidence in the possibility for success of the Okinawa model.

It was reiterated that the CARIFICO project had as its objective to facilitate countries' implementation of their own co-management arrangement. It was commented that there were tremendous benefits to be derived from the co-management exercise if countries were patient enough to work through the process.

The JICA presenter was congratulated on starting the project in the region. Co-management was hailed as the way to go as it fitted into the ecosystem approach to fisheries, which was being promoted at the moment. The meeting was cautioned that its full implementation may take longer than the duration of the CARIFICO project, but advised that the important thing was to avoid making mistakes which had already been made elsewhere in the world. The FAO representative informed the meeting that FAO had done many projects on co-management and would be happy to share their experiences with partners and participating countries.

The CRFM Executive Director informed the meeting that CRFM had been working on co-management subprojects since the 1990s. He noted that there was great variation between the characteristics of the countries as they related to co-management. The value of moving towards co-management was strongly recognized and there were some rich experiences in the world and within the region, e.g. Belize, that attested to this. Countries were encouraged to identify the lessons which could be used as references for customizing and developing approaches which could be beneficial.

It was stated that whereas co-management comprised more than just economic aspects, very little research was done on the socio-cultural issues that drive co-management. This understanding needed to be presented in the co-management discussions at all times.

6.2 FAD management system in Martinique and Guadeloupe

6.2.1 Presentation Summary

A powerpoint presentation titled 'Management of FAD Fisheries in Martinique and Guadeloupe A Common Story?', was presented by Ms. Katia Frangoudes.

FAD experiences in French overseas territories were initiated in 1980 by fisheries scientists. Local authorities supported this development for social reasons (sustain fishers' livelihood, create new employment). The implementation and management of the FADs within the two islands did not follow the same process. In Martinique there were public, individual and group FAD's and in Guadeloupe an individual system of FADs was developed. Fisheries Regional Committee (fishers' organization) was given by the law the responsibility to regulate fisheries since 1991. This power was confirmed by 2010 law. They elaborated regulations that were then validated and implemented by the administration of maritime affairs. Despite this power, Martinique and Guadeloupe CRPMs were unable to anticipate FAD fishers' needs and to produce new regulation more adapted to these needs. This incapacity may be explained by the fact that fishers' leaders and the administration lack capacity to discuss together and to anticipate the future of FAD fisheries. Capacity building through training of these actors seems needed to strengthen their capacities to develop effective co-management.

6.2.2 Discussion

Ms. Frangoudes was congratulated for the delivery of a very good presentation.

The concept of 'empowerment' was reviewed. It was highlighted that managers sometimes liked to empower other members of society, thinking that it was the desire of those persons to be empowered. Noting that there seemed to be an uncanny occurrence of weak leaders in the Caribbean, it was suggested that the possible social factors that prevented the fishers from active participation in resource management be investigated and factored into the discussion on co-management.

Recognizing that all of the users of the main marine environment should be treated fairly with regards to co-management of the resources, such users must first be identified. Recreational fishers were sometimes seen as aggressive players but despite stakeholder differences, a balance that promoted equitable access for all must prevail. Good lobbying skills afforded some groups more power in the long run than others. This was true for fishers and recreationists. It must however, be respected that commercial fishers did not have jurisdiction over the resource caught by recreational fishers. There was room for discussion of these matters among the stakeholders concerned.

The story was told of the community in the French Caribbean where the factors that influenced fishers' choice to become FAD fishers were investigated. It was interesting to find that the younger fishers were unable to deploy FADs because of the unavailability of adequate marine space and development of a FAD park was proposed as a solution. It was expressed that there was a need to engage in discussions at varying levels with fishers to develop a clear, holistic understanding of the FAD fishers.

It was explained that in the co-management arrangement, it was not necessary for the leader to always take the leadership position, but that the leader could emerge from the fishery management group. CARIFICO extended an invitation to further discuss this concept.

Following from the observation that in Dominica smaller groupings yielded greater productivity, which in turn increased the tendency for fishers to want to deploy more private FADs which inadvertently led to increased conflict with other fishers, the meeting was advised to give serious consideration to governance of the marine space. Failure to do this could create great conflicts when the available marine space was used up and new fishers were prevented from entering the FAD fishery as a result. It was expressed that, in the case of Martinique, that there seemed not to be any

major conflicts. It was understood that while a FAD was a personal posession the fish belonged to all, hence any fisher can fish around such FADs.

6.3 Who is the FAD fisher in Martinique? Thinking about social consequences brought by anchored FADs

6.3.1 Presentation Summary

A powerpoint presentation titled 'Who is the FAD fisher in Martinique? Thinking about the social consequences brought by anchored FADs', was presented by Mr. Julien Timor.

The objective of anchored FADs was to concentrate offshore pelagic resources and the buoy system marked the open sea. FAD locations represented a specific fishing place where fishermen met each other more frequently. By consequence a new social space was created. However, sharing this space was also sharing fishers' chance of catching fish. For all of them the main issue was to obtain an economic success by increasing their chance of catching fish. For the achievement of this goal, the Martinique fishers go as often they can to FADs and for that they needed to obtain information on which FADs were producing compared to others. Another aspect which contributed to their regular fishing around FADs was their desire to escape the burden of sale or to ensure that the cost of fuel was covered for the next day's fishing. It appeared that collaboration between fishers was necessary for different reasons even if they were in competition. By consequence the FAD appeared as a new place where fishers shared information (technical, resources, construction of FAD) and collaborated on FAD construction. The FAD, as a place, contributed to the construction of a new fishers' community, for those who practiced this technique.

6.3.2 Discussion

The workshop accepted the presentation without any discussion.

6.4 Small scale FAD fisheries, fishing behaviour and incentives to allocate effort towards offshore resources

6.4.1 Presentation Summary

A powerpoint presentation titled 'Small scale FAD fisheries, fishing behaviour and incentives to allocate effort towards offshore resources', was presented by Ms. Héloïse Mathieu and Mr. Lionel Reynal.

FAD development started in the late 80's in the Caribbean region with three main objectives: to reduce the fishing pressure on coastal resources, to increase the fishermen's incomes and to allow the countries to be more self-sufficient in terms of fish products supply.

Even though several Caribbean islands had similar small-scale FAD fisheries fleets, there were differences in the fishing behavior among them during the FAD development. In this presentation the three islands, Guadeloupe, Dominica and Martinique, were compared on certain aspects. On the French islands, the FAD fleet seemed to reach a maximum capacity of 300 vessels after an intensive progress whereas Dominica had not reached this ceiling and continued to see its FAD fleet increasing. Concerning the FAD deployment and their type (public, collective and private), apparently Dominica and Martinique had a similar pattern by deploying private and public FADs in a reasonable total number between 20 to 30 FADs. In Guadeloupe waters, you can find more than 400 FADs, all private. The main species targeted were not the same. In Guadeloupe the numerous FADs were used to catch Dolphinfish while in Martinique and Dominica they did not target specifically this species but more blue marlin and yellowfin tuna.

The other question addressed through this work was to see if this FAD deployment came with a redeployment of the fishing effort towards offshore resources and as a result, with a reduction of the pressure on coastal resources. From different socio-economic studies, we can easily understand why the choice of FAD activity and the intensity of this activity were not homogeneously distributed within the fleet. Non-monetary incentives can also be seen to influence fishermen's behavior like: the narrowness of the insular self, the captain's age or the size of the vessel. In a monetary approach we understood that because FAD fishing was a very variable activity in terms of net benefit, the fisherman preferred to combine it with other fishing activities (most likely coastal activities) which were less economically risky.

In general it was important to improve the FAD fishery monitoring but in the whole fleet context. Development of FAD fishery without simultaneous implementation of regulations to reduce / control the effort on inshore fishing was an important consideration to effect a reduction on inshore fishing pressure (licence establishment?).

6.4.2 Discussion

The representative from Dominica informed the meeting that Dominica was currently working along with the University of Texas to analyze ways of cutting the cost associated with the operation of the FADs. One was identified as using GPS to track fishes and improve efficiency of fuel consumption of the vessels. Analysis was still being conducted and it was hoped that the conclusions may be shared at a later date.

The meeting was urged to consider the regulation of the number of FADs and FAD fishing boats as we think about recommendations for the future management of FADs. This was an important consideration in terms of conservation of the target species as well as the productivity of the FAD fishery.

In developing recommendations, it was advised that FAD managers should seek to enforce management strategies that would preserve the fishery over the long term. Regulations should address issues related to access, by implementing licences. The Guadeloupe experience served as an example of an undesirable outcome due to poor FAD management; there were lessons to be learned from our neighbours.

The fact that the impact of many FADs, as in the case of Guadeloupe, was unknown, emphasized the need for correct data to study the possible impacts. It was however recognized that much time may be required to implement such studies.

The issue of utilization of tow boats was discussed. Fuel cost was recognized as the most significant expense for fishers. A tow boat would greatly alleviate the expense associated with fuel costs for many fishers at a time. This will be especially helpful in times when fishers fail to make a sizeable catch and were unable to cover overhead costs.

Financial management by the fishers was recognized as a sore point in the region. An attempt was currently being made to curb the incidence of the indiscriminate use of finances in Dominica; fishers' catch were taken daily by the fishers' cooperative while payment was made on a fortnightly basis.

The need to capture all aspects of the data was re-emphasized. Losses and futile fishing were not captured in the data and this was vital for data analysis and information.

The concern was raised about the non-exploitation and under-exploitation of some marine pelagic resources which could be harvested on the way to the FADs and at the FAD site. The meeting was encouraged to promote the exploitation of these resources as well. Exploitation of these species could act as another incentive for offshore fishing.

6.5 Different means contributing to FAD's Fishing selectivity

6.5.1 Presentation Summary

A powerpoint presentation titled 'Different Means Contributing to FAD's Fishing Selectivity', was presented by Ms. Héloïse Mathieu, Mr. Cédric Pau, Clément Dromer and Mr. Lionel Reynal.

In order to optimize the FAD fishing, it was important to know the gears and techniques that allowed one to reduce the capture of juveniles or species that needed a decrease fishing effort, temporarily or definitively.

Through previous statistics data coming from professional fishing and new experimental fishing trips made this year, we were able to compare different gears and techniques in terms of selectivity for the species and the size of the individuals captured around FADs. We compared also different types of bait used on the drifting buoy set around FADs for their efficiency, the best hours to fish for better productivity and to target adult individuals and finally we looked at the influence of the FAD's distance from shore on the productivity and the yield made by the fishers.

The main results from the recent experimental fishing trips showed that the jigging technique around FADs target blackfin tuna between 48 cm to 60 cm (Fork Length), we can consider these individuals as adults knowing that the first maturity size is 41 cm (FL). Most of the blackfin and yellowfin tuna captures happened late in the morning and we observed a dropoff after 12:00 pm. Flyingfish bait (live or dead) seems to be more efficient in terms of capture with the drifting buoy except for the blue marlin. Apparently the further you deployed your FAD, the better yield the fisherman obtained, looking at the various ratios: fishes/trip, kg/trip and kg/FAD/day. The fishers who wanted to target Dolphinfish deployed around several FADs while the others targeting yellowfin tuna or blue marlin exploited generally one FAD per trip.

6.5.2 Discussion

The question was raised as to whether it was definitive that fishing around FADs which were placed further out at sea resulted in a higher yield, as it was likely that fewer fishers will visit those FADs due to the long distance from shore.

Different theories were suggested surrounding productivity verses fishing intensity. It was suggested that FAD fishing was more productive when multiple boats fished together. It was recalled that the presentation made by Dr. Sidman suggested no significant difference in catch between FADs placed closely together or those placed further apart. Another participant shared his observation that the catch per vessel declined as the number of fishing vessels increased. In Dominica, a strategy was employed where FADs were placed closer together, closer to shore while some FADs were placed further out to sea for use by the vessels which can reach them. In this way the fishing activity was separated and it helped to reduce fishing pressure.

On the issue of capture of juvenile fish around FADs it was evident that further research was required to inform management decision-making.

6.6 Reproduction of Black fin tuna: Preliminary results

6.6.1 Presentation Summary

A powerpoint presentation titled 'Reproduction of Blackfin tuna (Thunnus atlanticus): preliminary results', was presented by Mr. Cédric Pau.

The blackfin tuna spawn in Martinique. This preliminary study (February to September 2013) had established a size at first maturity of 41 cm fork length. The gonadosomatic index (GSI) study showed

that the larger an adult individual, the higher its relative fertility. The criteria for maturity stage assessment were redefined for this species. An image analysis approach for determining the maturity stages from pictures was also performed. The breeding season (active spawning) was identified from late April until September (end of the study). A maximum of females in stage 4 at the end of June and in late July (pre-ovulation) showed two spawning peaks: one at the end of June and another in late July. It seems that the blackfin tuna reproduction took place at night only a few hours after pre-ovulatory modifications (stage 4). Since breeding individuals were captured on FADs as well as deep reef waters on the margin of the insular shelf, the reproduction of blackfin tuna took place both in coastal and offshore areas.

6.6.2 Discussion

The presentation was commended despite the small sample numbers and short span of the research time.

Clarification was sought as to whether it was an established fact that the Blackfin tuna were spawning in coastal ground. This was not to be assumed, as evidence of spawning activity was seen on the coast as well as on the FADs further offshore. It may be likely that they were able to reproduce in either place.

In response to a suggestion that the research results may have provided proof of the destruction of the resources close to the FADs, it was expressed that the results presented did not imply any specific management recommendations.

7.0 TECHNICAL DISCUSSIONS - MARKETING

Presentations were made by representatives from various organizations under this agenda item. Summaries of the presentations and the ensuing discussions are given below. The presentations are included as ***Appendix 8***.

7.1 Experience with Tuna exports to the United States

7.1.1 Presentation Summary

A powerpoint presentation titled ‘Grenada Tuna Export Marketing’, was presented by Mr. James Ince.

The presentation attempted to share experiences of a private tuna export operation in Grenada.

There were four (4) major factors which affected the export of fresh Tuna from Grenada to the United States. These were: fish quality, on-island infrastructure, air transport and market access.

Training of fishers was of paramount importance to ensure landing of a high quality product. Quality affected the price obtained for the fish and formed the basis of the export business.

Processing facilities must be maintained at the appropriate standard of repair and operation. It was not unreasonable to factor in the cost of plant maintenance into the price of the export product. Plant staff must be trained to compete in the fresh fish business. Fishing companies in Grenada enjoyed a duty fee concession but were subjected to taxation. Investment in the employment of a cashier or an accountant was important. This however added significant cost to the business operation but still needed consideration even at the setting up stage of the business or a cooperative.

Transport time was a major factor to consider in the exportation of a fresh product. It was more beneficial for all stakeholders when the exporting country was engaged in a development project and

required airline service on a frequent basis, since a fresh product must be transported in the shortest possible time after harvest to ensure good product quality and a good price.

Access to international markets required adherence to strict food safety and quality rules. Prospective fish business operators must be careful to understand the necessary requirements.

7.1.2 Discussion

An enquiry was made about the difference between the local price of fish and the price of fish on the export market. It was explained that on the local market, the price of fish was more or less stable at XCD$10.00 per pound for export grade tunas. Tunas of a lesser but still acceptable quality would fetch XCD$4.00 – $6.00 per pound. The price obtained for the exported tunas was determined by United States after the performance of a quality check. Exporters were vulnerable in this sense, as they could become subjected to unscrupulous purchasers who wish to take advantage of the system. They looked at fish and informed what they will pay, which was very difficult if you encountered a person who wanted to take advantage.

The meeting enquired about the mechanism for ensuring a stable product supply. The response was that the fishers must engage in a stable fishing effort. A good price for the fish provided the incentive fishers needed to return to sea. Since the commencement of the tuna export business, more fishers had been noted to spend longer periods at sea, sometimes up to a week. The Grenadian Fisheries Division was instrumental in developing the long line fishery and fishers observed and capitalized on the opportunity to invest. It was stressed that the fishers must be business-minded and driven to succeed financially for the current arrangement to function in a sustainable manner.

Grenada was praised for their ability to maximize returns with relatively small investment by using relatively small boat engines, installing the largest possible iceboxes, etc. and it was thought that this constituted a good model for duplication in the other Caribbean countries. Fishing trips were reported to last from 3 to 8 days.

In response to the question about the identity of the exporters, it was reported that fish was exported by private companies and fishers' cooperatives, with the major exporters being the private companies.

The discussion concluded on the note that the exporter embraced the idea of conducting similar business in the region, but logistically, it was easier to sell fish to the United States. The mechanisms in place for sale of fish to other Caribbean countries were termed 'frustrating'. The discussion ended with a call on the Fisheries Divisions and other departments to reorganize themselves to facilitate an easier trade flow through the region.

7.2 Quality of FAD fishing products: Preliminary results

7.2.1 Presentation Summary

A powerpoint presentation titled 'Quality of FAD fishing products: Preliminary results', was presented by Mr. Clément Dromer.

Exploitation of large pelagic fishes by small vessels required a good knowledge of the parameters affecting the quality of products in order to commercialize them under good sanitary conditions and ultimately to ensure the safety of marketed products.

This study characterized the conservation methods of fish, by temperature follow up on board from catch to landing. Microbiological and chemical analyzes were performed in Pôle Agroalimentaire Régional de Martinique (PARM) on fish flesh in order to understand the impact of storage conditions on the products.

Currently, fishermen exploiting the large pelagic resources did not have a common reference to standardize their practices to post-harvest processing and chilling of their fish. The result was a wide variability in the quality and safety of products landed and sold. The main recommendation from this work was to establish a manual for Caribbean fishermen to improve the quality of FAD fishing products.

7.2.2 Discussion

Having heard the recommendation that CRFM and its partners should seek to improve the quality of the FAD fishing products, CRFM Executive Director Mr. Milton Haughton recognized the recommendation as a solid one and alluded to the fact that implementation of this recommendation may be possible through an upcoming project.

The possibility of a correlation between mercury and fat content was questioned. In response it was explained that total mercury was made up of organic and metal mercury. The types of mercury which were analyzed were total and organic mercury; not the metal mercury, which was the type that caused problems as it accumulated in the body. The relative compositions of the different types of mercury were not analyzed and so, these were not known. It was deemed important for fishers to become aware of the presence of mercury in fish species and their potential impact on young children and pregnant women, as fishers and their families were usually heavy consumers of these affected product.

7.3 FAD fishing with "Boi-fouille" at Leogane, Haiti. Extreme situations

7.3.1 Presentation Summary

A powerpoint presentation titled 'FAD Fishing with "Boi-fouille" in Haiti: Extreme Situations', was presented by Mr. Lionel Reynal.

This presentation constituted a picture account of the extreme conditions under which fishers lived and worked in the community of Léogâne in Haiti.

Fishers engaged in FAD fishing but the practices surrounding the fishing operation were extremely dangerous. The fishing vessel was made up of a small dug-out tree, fitted with plastic bags for sails or operated by paddles, ill-fitted to the task at hand. The crew was usually one person.

FADs floats were made of bottles and the FADs themselves of empty pots and similar objects. Bait was kept alive until it was used on a line overboard.

After risking their lives to bring home the catch, this was prepared under adverse sanitary conditions.

It was proposed that FAO and/or other sponsors considered lending some assistance to this community, taking care to ensure that the ones who benefitted were the ones who were involved in the fishery in the existent, traditional way.

7.3.2 Discussion

The workshop accepted the presentation without any discussion.

8.0 TECHNICAL DISCUSSIONS – DEMONSTRATION OF FAD SOFTWARE

8.1 Comparative effects of rope diameter, length and buoys volume against the currents. Case study of Dominican FADs

A two hour demonstration of the IFREMER "DCP" software was organised during the FAD working group. About fifteen participants downloaded the software from the MAGDELESA website and attended the training. Paul Gervain (animator of the FAD technology item of MAGDELESA project) explained how to design a FAD and how to launch the calculation with the computer software. This demonstration was considered by the participants as too short for an easy utilisation of this tool. A training session on FAD building, including the use of the software, the construction of a FAD and its deployment was an outcome proposal of this meeting.

9.0 TECHNICAL DISCUSSIONS – FISHERY RESOURCES

Two presentations were made by representatives from the CRFM Secretariat under this agenda item. Summaries of the presentations and the ensuing discussions are given below. The presentations are included as ***Appendix 9***.

9.1 Present Status of Fish Resources Caught in Association with Fish Attraction Devices (FADs) and their Management

9.1.1 Presentation Summary

A powerpoint presentation titled 'Present Status of Fish Resources Caught in Association with Fish Attraction Devices (FADs) and their Management', was presented by Ms. Elizabeth Mohammed.

Several species of large, highly migratory tunas, billfishes, pelagic sharks and regional species such as the Common Dolphinfish, Wahoo, Bullet and Frigate Tunas, the Four-wing Flyingfish, mackerels, triggerfish and barracudas, were identified in the Terms of Reference of the Working Group and various scientific sources, as being caught in association with FADs. All tunas, billfishes and tuna-like species are under the management purview of the International Commission for the Conservation of Atlantic Tunas (ICCAT). ICCAT assessments indicated that all species were overfished, excluding the West Atlantic Skipjack Tuna, North Atlantic Swordfish, Blue Shark and Short-fin Mako shark. However, issues of data quality and availability resulted in high uncertainty of assessment results. Species such as the Blue and White Marlins, have been severely overfished. Although between 2007 and 2011 CRFM Member States took on average only 3.8% of the total annual catch of the relevant stocks of four tuna and four billfish species assessed by ICCAT, the capture of juvenile fish in particular is a matter of concern as well as the lack of reporting on catches and fishing effort, particularly in regard to increasing catches of non-industrial fisheries. ICCAT implemented a number of management measures including effort and catch controls as well as time and area closures, size-limits and trade restrictions.

Under the purview of the CRFM/FAO Ad-Hoc Working Group on Flyingfish in the Eastern Caribbean and the Caribbean Large Marine Ecosystem Project; preliminary fishery and stock assessments had been conducted for the Blackfin tuna, Common Dolphinfish, Wahoo, King Mackerel, Serra Spanish Mackerel and the Four-wing flyingfish. The CRFM had also explored the use of Ecological Risk Assessment for the Effects of Fishing and Multi-Criteria Objective Analysis for the large pelagic and the Four-wing Flyingfish fisheries respectively. In addition, a preliminary multi-species trophic analysis using a mass balance model was constructed and used for management policy exploration under the FAO Lesser Antilles Pelagic Ecosystem Project. A lack of clearly defined management objectives as well as data limitations continue to impact on the quality of assessment results and the management recommendations provided by the CRFM. Except for Trinidad and Tobago and Saint Lucia, there appeared no specific management measures, with the supporting

legislation, for the species of relevance. Draft Fishery Management Plans had been prepared for the Blackfin Tuna and the Four-wing Flyingfish, the latter was currently under stakeholder review prior to submission for endorsement by the CRFM Ministerial Sub-Committee. Recommendations aimed at improving the quality of information provided for decision-making include: enhancement of data collection and analysis protocols and research on the ecological impacts of fishing, the socio-economic importance of FAD fisheries as well as technological, behavioural and other measures to reduce the capture of juvenile fish. Consistent with the Ecosystem Approach to Fisheries, management of FAD fisheries should occur within the broader context of pelagic fisheries resources with consideration of all fleet, gear types and fisheries that target the respective resources.

9.1.2 Discussion

It was agreed that the discussion on this presentation would follow the overview of the sub-regional fisheries management plan for Blackfin tuna fisheries in the Eastern Caribbean because of the inter-connectedness of both presentations.

9.2 An overview of sub-regional fisheries management plan for Black fin tuna fisheries in the Eastern Caribbean

9.2.1 Presentation Summary

A powerpoint presentation titled 'Sub-regional fisheries management plan for Blackfin tuna fisheries in the Eastern Caribbean', was presented by Dr. Susan Singh-Renton.

A case study on the large pelagic fisheries was conducted by CRFM under the Caribbean Large Marine Ecosystem (CLME) project. The case study addressed information knowledge gaps and informed the development of the Strategic Action Programme (SAP) and the Caribbean Large Marine Ecosystem Management and Governance framework which included priority actions for the sustainability of the Large Pelagic fishery, including regional and international (ICCAT) cooperation.

Under the CLME project, efforts were made to conduct a regional assessment of blackfin tuna. CRFM's scientific meeting undertook the tasks of reviewing and documenting all available data and information on blackfin tuna in preparation for the planned regional assessment. While some data were presented from the French West Indies, Venezuela and the United States of America, limited data were available from the CRFM member states, with the exception of St. Lucia. Consequently, the planned assessment was not completed. However, preliminary data analyses indicated no evidence of overfishing in relation to the blackfin tuna, but there was clearly an increasing use of FADs and improved reporting as a result of the use of FADs. In keeping with the principles of the precautionary approach, the CRFM recommended that no significant increase in catch levels be allowed until more information became available on the status of the stock.

At the policy/management level, CRFM also completed a stakeholder analysis and a legal, policy and institutional review for the large pelagic fishery in 2012. These scientific and management-level analyses were used by CRFM to inform development of a comprehensive management plan for blackfin tuna, that addressed several aspects, including, biology and ecology, the legal context, the management unit, fishery characteristics, status of the fishery, etc.

9.2.2 Discussion

The discussion focused on the presentations at 9.1 - Present Status of Fish Resources Caught in Association with Fish Attraction Devices (FADs) and their Management and 9.2 - An overview of sub-regional fisheries management plan for Blackfin tuna fisheries in the Eastern Caribbean.

It was established that the confusion between drifting FADs and anchored FADs must be avoided. There were three levels of fishing around the FAD; a drifting FAD was exploited by industrial boats,

which took all the fish around the FAD. Notable was that the fish, instead of eating the food, followed the FAD so there were several sizes of fish around the FADs, including juveniles. For small-scale fisheries using anchored FADs, it had been observed in Martinique that the fishers used the little fish as bait, on average about 10-15 fishes per fishing trip. In relation to the migration patterns it was observed that every evening all the fish left the FAD and in the morning they returned to the FAD or to another FAD while, around the anchored FADs they had the smaller size and the bigger size; this may be attributed to the idea that the mid-sized fishes migrate until they were bigger. It was to be noted that the FADS do not stop the migration patterns. Additionally, they had not observed the capture of mammals, turtles or whales caught around the FAD perhaps as a result of the method used for fishing in Martinique. Clarification was sought on the notion of the fishers not catching a single mammal around the FAD. It was further explained that marine mammals had been seen around the FAD, they ate the bait but they were not in the habit of capturing them as it was illegal to catch marine mammals in Martinique.

On the data presented, the total tonnage for the Blue Marlin was thought to be 1,834 tonnes for the North Atlantic stock, it was highlighted that if 200 tonnes are landed by CRFM states and 200 tonnes landed by the French Territories these landings account for a significant proportion of the North Atlantic. It was further discussed that the proportion of the overall landings taken by CRFM states was different for the respective species, additionally, the state of maturity of the fish caught must be taken into consideration. In relation to juveniles, the number caught was more important than the total catch (which may be small), as the numbers were representative of the fish that could have grown to be mature and restock the population.

In relation to sharks, it was noted that CITES had placed the white tip shark and a number of other shark species on ***Appendix 2***, to take effect next year, so this should be taken into account when assessing the stock.

On the issue of management it was purported that the fishers should not increase productive output or reduce the efforts to seek particular species. However, when considering the entire biomass of migratory species, ICCAT should allow for the region to have a greater quota share as it was unfair to stifle the already limited shared resources within our framework. It was purported that the restrictions placed indicated that our member states should leave the fishing of certain species to high seas vessels with no regard for how limited access affected our share of the take. In support of this idea, it was contended that the presentation showed that the Caribbean had seen an increase in fish and in the capture of fish but the guidelines indicated that the fishers should take a smaller quantity; this idea would have serious implications for the fishermen as it affected the sustainability of their livelihoods.

It was also purported that pressure was placed on the fishers for the environment but the effects on the environment were highly attributed to habitat degradation, which had not been targeted.

It was contended that for the blue marlin there was a serious problem. ICCAT was doing a good job, but their efforts were hampered by insufficient accurate statistical data from the Caribbean. It was considered mandatory that the requisite data and information be provided to ICCAT.

The importance of active ICCAT participation was emphasized. A situation was recalled in which it was noted that ICCAT had to be reminded that there was a plethora of the billfish within our waters and notably in the case of the sailfish which was used as food within the region. Hence, any ICCAT recommendation for sailfish should take this into account, if countries' interest are being properly represented. The fish stock matters to the region so it was imperative that the information about the fish was made available to ICCAT; the billfish catch should be capped around either 2006 or 2008 data (ICCAT recommendation), however, the data was not a true reflection, so ICCAT had no way of making an accurate assessment. With relation to the CRFM scientific meeting recommendations, it showed that it was important that scientists sent to the scientific meetings were aware of the management and fisheries information, and it was imperative that accurate data was shared. The necessity of data was highlighted as it showed the social and economic significance of the fishery to

CRFM Member States. It was indicated that by contributing to ICCAT's scientific research, countries were afforded greater attention and opportunity at the Commission meeting, especially in terms of addressing their management needs, including quota allowances.

It was also suggested that help should be given to some countries for the creation of reliable data. The contributor felt that in the case of Haiti, which engaged in the capture of billfish, a serious problem existed in the collection of accurate statistics.

The Dominican participant lamented the fact that it was difficult for small island states to become more involved in ICCAT because the existing system made it difficult for them to participate in the meetings, due to the restrictive costs associated with participation. He complained that the more affluent countries were focused on maintaining or increasing their gains and the situation was created where small countries suffered the prejudice of being excluded in the decision-making process related to fisheries management.

10.0 SUB-REGIONAL MANAGEMENT PLAN

10.1 Recommendations on FADs development and management

The meeting proposed some recommendations and resolutions of the workshop. However, it was felt that the term 'resolution' carried a stronger connotation than was required by the level of the meeting. It was suggested that the document carry the title of 'conclusions'.

The workshop recommendations were endorsed by the meeting and are included in this document as ***Appendix 10***.

10.2 Summary of Conclusions

The workshop conclusions were endorsed by the meeting and are included in this document as ***Appendix 11***.

10.3 The Way Forward

10.3.1 The transformation of IFREMER / WECAFC Working Group on FADs into a Joint Working Group on FADs

It was proposed that the current IFREMER / WECAFC Working Group on Development of Sustainable Moored FAD Fishing in the Lesser Antilles be transformed into a joint Working Group on FADs with the possible participation of JICA, IFREMER, CRFM and WECAFC.

This proposal was endorsed by the workshop by collective verbal affirmation.

10.3.2 Development of recommendations and proposed Terms of Reference for proposed new Joint Working Group on FADs

The joint Working Group would consist of one participant from JICA, IFREMER, Fisheries Division, WECAFC, JICA / CARIFICO to develop the group, whilst there would be an extension or two in each country to extend the group to all Caribbean countries.

On the issue of the Terms of Reference, it was established that the Terms of Reference for the IFREMER/WECAFC Working Group on Development of Sustainable Moored Fish Aggregating Device (FAD) fishing in the Lesser Antilles were approved by the 14th WECAFC Meeting and were included in the annex. Additionally, it was highlighted that in the absence of a discussion of the Terms of Ref-

erence for the new joint Working Group, the workshop had agreed that the Terms of Reference be refined to meet the recommendations of this meeting.

Mr. Magloire from Dominica was selected to be the country representative, Ms. Elizabeth Mohammed would be the contact person from CRFM, Mr. Nariaki Mikuni would be the JICA representative and Mr. Lionel Reynal, the representative for IFREMER. It was determined that a coordinator needed to be established for the ease of organisation. It was contended that the working group should consider stakeholder representation and in response it was highlighted that the working group was in its initial stage and was not designed to be exclusive.

10.3.3 Discussion and recommendation regarding the convener for Working Group

The Convener of the IFREMER/WECAFC Working Group on Development of Sustainable Moored Fish Aggregating Device (FAD) Fishing in the Lesser Antilles was Mr. Lionel Reynal, who had performed well during his tenure, but now proposed that someone else took on the responsibilities under the new joint Working Group.

The workshop participant from WECAFC was suggested as best-positioned to assume the responsibility of convener due to the wide geo-political range of countries for which FAD fishing was of relevance in the region, the changing role of the WECAFC, the necessity to cooperate and maintain linkages with the ICCAT and to manage related activities in support of implementation of the Strategic Action Programme under the CLME Project. The WECAFC representative, however, established that he was convener of two (2) working groups already and was reluctant to take on this additional role since this was not his field of expertise.

Mr. Reynal outlined the expectations of Convenership, which included; the sharing of information, the organisation of research and the sourcing of funds. He opined that the responsibility could be shared between members of the Committee.

Mr. Milton Haughton, Executive Director of the CRFM assured the Secretariat's support should the representative of Dominica agree to accept the role of Convener. In this regard, Mr. Andrew Magloire was nominated and agreed to serve as Convener.

10.3.4 Website hosting and management

It was indicated that the MAGDELESA website would be used for a more permanent arrangement at the end of the MAGDELESA project, and the proposed activities coordinated on a regional level for 2014 - 2015 agreed on.

10.3.5 List of proposed activities to be coordinated at regional level for 2014 – 2015

The list of proposed activities to be coordinated at the regional level for 2014 - 2015 was presented:

- The development of a "Manual for Good Practices" was to be developed to include (but not restricted to) FAD construction and deployment, FAD preservation and quality, FAD harvesting practices, FAD Fishery Management.
- Training for extension officers
- Internet site to upload all the documents including manuals
- Research and technical studies

11.0 CLOSING REMARKS

The workshop was concluded with brief remarks from the Second Secretary in the Embassy of Japan in Trinidad and Tobago, Mr. Lionel Reynal representative of IFREMER and CRFM Executive

Director Mr. Milton Haughton. The need for continued cooperation was highlighted and gratitude expressed for participation and support on all levels.

The Workshop was concluded at 1:12 p.m.

APPENDICES

APPENDIX 1: OPENING CEREMONY SPEECHES

Opening allocution

Emmanuel Thouard - IFREMER
Madam the representative of JICA, Mister the permanent Secretary, Mister Director, ladies and gentlemen, Dear colleagues,

That is a great honor for me, recently appointed as IFREMER Delegate in the French West Indies, Martinique and Guadeloupe, and a great pleasure, to have the opportunity to be here and to talk to you for the opening of this workshop organised under the umbrella of the CARIFICO Project and the WECAFC-IFREMER MAGDELESA Project with the precious help of JICA,CRFM and the Government of St Vincent and the Grenadines. I wish to thank them very sincerely for hosting this workshop and welcoming all of us.

Fishery, and particularly FAD fishery of large pelagic fish is an activity that doesn't know any border. The targeted stocks are migrating from an island to another and, at a Caribbean scale it is not always possible to identify separate fish stocks. This means that we are sharing this resource …and obviously we have to manage this resource commonly….

Today we are generally facing an excessive exploitation of our coastal resources and our fishers are going more and more fishing on FADs, on the large pelagic fish resource, and it is urgent to implement common mechanisms to study and manage this resource. That is why such workshop is so important. That is true that most of our partners and neighbour states did not wait to do so, and I admit that we, French people are a little late on this issue.

But the presence of many French people today in this workshop is the evidence of our actual will to cooperate with you in this spirit and to work with all of you with the aim to reach the sustainable management of our common resources.

Moreover, I will profit by my presence here to initiate discussion with the CRFM and to prepare a framework agreement between CRFM and IFREMER to establish the good conditions for an efficient cooperation.

I thank you for listening and I wish you a very interesting and fruitful workshop.

JICA BRIEF REMARKS

Ms. Akiko Ado Minami, Chief Representative, Caribbean Regional Office, JICA

Fisheries traditionally play an important role in the Caribbean region. This sector is the third largest employer after Tourism and Agriculture. Inter-related industries such as recreational fisheries, restaurants and hotels amplify its importance in the economy of each Caribbean country,

So far we have been expanding this role by increasing fishing efficiency and improving quality assurance and marketing; as well as sustainability.

In response to the request from the CRFM member countries, Government of Japan through JICA implemented a technical cooperation project on "Formulation of Master Plan on Sustainable Use of Fisheries Resources for Coastal Community Development in the Caribbean" from 2009 to 2012.

The Final Report of study recommended

1. Establish practical co-management models for sustainable use and management of the fisheries resources.
2. Promote participatory resource management and development toward co-management, and
3. Formulate and strengthen the regional workshop by sharing the local expertise and lessons learned in each country.

Based on recommendations, JICA started CARIFICO, Caribbean Fisheries Co-Management project, on 1sy May this year.

In Japan, fisheries cooperatives manage the fisheries with the government and their strong social cohesion among member fishermen is the basis of co-management. This is done by attending to the needs such as allocation, development and maintenance of fishery supplies and facilities, as well as securing funding for this,

CARIFICO will apply this Japanese concept utilizing the outputs achieved from our past activities in the Caribbean region such as construction of fisheries centers and development of quality assurance and marketing.

The main focus of CARIFICO is the fisheries management; however it also addresses economic benefits for fishermen, and sustainability and profitability of the activities.

Recognizing the significance for region wide cooperation JICA's bilateral framework will be combined with CRFM's multilateral cooperation framework to address the various challenges within this project.

Today, at this workshop, we have almost all countries in the region and important institutes relating to the issue. I am very happy to see that our regional cooperation has already started.

Based on the long cooperation history, including our activities in the fisheries sector, the Government of Japan and the CARICOM Member States agreed to observe next year as "Japan-CARICOM Friendship Year" as two decades would have passed by 2014 since the Japan- CARICOM Consultation was held in 1993.

It is my hope that this workshop will be the opening of the Friendship Year.

Milton Haughton, Executive Director, CRFM Secretariat

CRFM-JICA CARIFICO / WECAFC-IFREMER MAGDELESA Workshop on FAD Fishery Management
December 9th – 11th, 2013, St. Vincent and the Grenadines

Madam Chairperson, Ladies and Gentlemen

- It is my privilege to once again have the opportunity of welcoming you to a regional fisheries workshop here in SVG, on behalf of the Management and Staff of the CRFM Secretariat. I extend a very warm welcome to all of you here today for the commencement of this important workshop which has as its objective the sustainable and optimum utilization of the pelagic resources within our waters for the benefit of our people through the use of fish aggregating devices.
- Special thanks to the Gov of SVG for hosting us and assisting so generously with the logistical arrangements.
- Welcome to the representatives of the CRFM Member States. We have participants from all CARICOM States with the exception of Barbados, Guyana and Jamaica. In addition we have a participant from St. Eustacius representing the Netherlands Caribbean Islands and representatives from Martinique and Guadeloupe. We also have representatives from the CNFO (Mitchel Lay); UWI (Prof Hazel Oxenford); UF Sea Grant (Dr Charles Sidman); CLME + Project (Laverne Walker).
- I would also like to acknowledge the presence of our colleagues from FAO/WECAFC (Dr. Raymon van AnRooy), IFREMER (Mr Emmanuel Thouard and Lionel) and the French funded MAGDELESA Project who are co-hosting this workshop along with the CARIFICO Project and the CRFM.
- I wish to extend a special welcome to our colleagues from Japan. I recognize the presence Ms. Akiko Oda Minami, Chief Representative, Caribbean Regional Office in Santo Domingo; Mr. Mikuni, the Regional Coordinator for the CARIFICO Project; and MR. Ishida, JICA Expert.
- I would like to recognize the significant contribution of the Government of Japan and thank them for their support and commitment to the sustainable development of fisheries in the region. This workshop is possible because of the generous support provided by Japan through the JICA funded CARIFICO Project which commenced in May of this year. The Application for the CARIFICO project was submitted to the Government of Japan in August 2011 and field implementation commenced less than 24 months later. That is rapid turnaround for a project of this nature.
- Japan is one of the most important development partners providing sustained development assistance to the CARICOM Member States with current financial commitment of over US42.87 million covering a number of priorities areas.

- In 2000 the CARICOM Governments and Japan adopted a partnership agreement entitled "***A New Framework for Japan-CARICOM Cooperation for the Twenty-first Century***". Under this agreement the Government of Japan provided funding and technical assistance to CARICOM Governments in several areas of economic and social development.
- The Minister for Foreign Affairs of Japan and the Ministers responsible for Foreign Affairs of CARICOM Member States met in Tokyo in September 2010, and confirmed the steady development of Japan-CARICOM relations based on the 2000 J*apan-CARICOM Cooperation Agreement*. The Foreign Ministers agreed on the outcome document entitled "Partnership for Peace, Development and Prosperity between Japan and the Member States of the Caribbean Community (CARICOM)", to provide further direction to future Japan-CARICOM relations. Among the priority areas identified in this document are :
    - Disaster Risk Reduction
    - Education and Capacity Development
    - Improvement of Key Industries such as Tourism, Fisheries and Agriculture
    - Pomoting Trade and Investment (Promotion of Local Industry)
    - Promoting the use of ICT
    - Climate Change
    - Conservation of Biological Diversity

    - Renewable Energy and Energy-Saving Technology
    - Assistance for the Reconstruction of Haiti
  - It is within this framework that the government of Japan has committed over US$3.26 million to improve the contribution of fisheries sector of the CARICOM States by way of the Caribbean Fisheries Co-management (CARIFICO) Project.
  - The objective of this project, as you heard before, is to develop a fishery co-management approach suitable for each target country by providing technical assistance for capacity development of stakeholders of target fisheries.
- Pelagic species, such as, yellowfin tuna, wahoo, blackfin tuna, marlin, and dolphinfish which are the ones targeted by the use of fish aggregating devices are very important to Caribbean countries because of their contribution to food and nutrition security and livelihoods in coastal communities.
- The reason why countries and fishers in the region are very interested in FADs is because they provide cost effective means by which the people of the region can obtain a greater share and optimum sustainable benefits from these straddling and highly migratory fish stocks which are utilized by several States within the region and beyond in some cases.
- Today, however, in most Caribbean countries the economic situation is difficult. Our countries are struggling against economic stagnation, unemployment, under-development, poverty, food insecurity, heavy debt burdens, and escalating crime among other social ills. The benefits from the marine resources are threatened by problems such as climate change, pollution, overfishing, and inadequate resource management.

- The CARIFICO Project is not just about constructing FADS and increasing catches. It is really about building local capacity of stakeholders and information base for co-management, improved conservation and achieving optimum sustainable use of the fish stocks while safeguarding the marine ecosystems in which they are found.

- This project complements a number of other initiatives in the region aimed at realizing the potential benefits of the living marine resources in the waters around us.

- Just over 10 years ago, CARICOM Heads of State signed the Agreement Establishing the Caribbean Regional Fisheries Mechanism (CRFM), an indigenous, regional fisheries body comprising CARICOM Members and Associate Members, to spearhead the sustainable development of the fisheries sector of the region.

- CRFM's objective is to coordinate regional initiatives to promote and facilitate the responsible utilization of the region's fisheries and other aquatic resources for the benefits of current and future generations.
- Although the challenges facing the fisheries sector are great, and the human and institutional resources are limited, yet the region can look forward to a future that is bright and prosperous in which the living marine resources make enhanced sustainable contribution to our growth and development, based on the principles of sustainable development, mutual cooperation, good governance, participation, and international best practices.

- Many of these principles and standards have been enunciated in the Draft Agreement Establishing the Caribbean Community Common Fisheries Policy, which lay out a comprehensive road map for the future development and conservation of the region's fisheries and aquaculture resources. The Ministers responsible for fisheries signed off on the Agreement establishing the CFP in 2011; however, because it is being developed as a legally binding treaty, it requires the signature of Heads of States to enter into force.

- I am pleased to inform you that the 18th Meeting of the Legal Affairs Committee (LAC) of CARICOM which met on Friday 29 November 2013, agreed to recommend the Agreement Establishing the CARICOM Common Fisheries Policy to the Conference of Heads of Government for signature.

- It is, therefore, expected that the Agreement would be opened for signature at the next inter-sessional meeting of the Head in February of 2014.

- A key success factor is the cooperative and collaborative approach where regional and national organisations, fisherfolk and government agencies, NGO and development partners, all work hand in hand through collaborative and integrated initiatives to tackle the challenges and find creative and innovative solutions.

- We are very pleased to be associated with this project and this workshop which is a collaborative effort of a number of institutions and which envisages a strengthening of this type of partnership for the future development of the fisheries sector.
- In closing, we therefore look forward to not only strengthening our bond of friendship and cooperation with Japan, but also with our partner institutions, stakeholders, and countries in the Wider Caribbean region in dealing with the challenges in the fisheries sector to further promote responsible use of the marine resources for the benefit of our people.
- Thank you very much. God bless you.
  9 Dec 2013.

FEATURE ADDRESS

Mr. Raymond Ryan, Permanent Secretary, Ministry of Agriculture, Rural Transformation, Forestry, Fisheries and Industry, St. Vincent and the Grenadines

It is indeed a pleasure to welcome you to St. Vincent and the Grenadines and to on behalf of the Ministry of Agriculture, Rural Transformation, Forestry, Fisheries and Industry.

The Ministry of Agriculture, Rural Transformation, Forestry, Fisheries and Industry has been focusing on a number of areas in implementing a programme for the modernisation and development of the Agricultural Sector, these focus areas include: 1. The enhanced production of all commodities including fish; 2.the development of appropriate infrastructure; 3. the strengthening of public sector – private sector partnerships; and 4. the enhanced marketing and distribution of agricultural commodities. It is my understanding that this workshop intends to discuss these issues in the context of the fishing industry and is consistent with the priorities established by the ministry.

Let me hasten to say that fisheries resources are very important in securing local food consumption and production lucrative commercial commodities for the people of the Caribbean Community (CARICOM). The fishery sector is the third largest provider of employment in the region after tourism and agriculture. In fact fisheries employ approximately 2,500 persons, that is, 6% of the workforce, in St. Vincent and the Grenadines and over 2 million persons in the Caribbean region. Moreover, the fisheries resources are important for the diet of the population and are particularly a valuable source of animal protein. The Government, with support from the Food and Agriculture Organisation has embarked on a programme to zero hunger in St. Vincent and the Grenadines, given the remarkable decline from 14% to 4% over the past decade. It is expected that the Fisheries Sector will play a critical role in this programme. Ladies and Gentleman, colleagues, sustainable management of fisheries is therefore essential not only at the national level but also at the regional level.

As we are aware the diversification of coastal fisheries using FADs has great potential and can be used as a tool to involve fishers and their organizations in the sustainable use of large pelagic fishery resources, however, unregulated and excessive numbers of FADs may cause overexploitation of large pelagic fishes which could reduce the economic advantage of having such devices. Properly managed and regulated use of FADs is a basic requirement for their introduction in the region. Fisheries policy, resource management plans and budget structures must be properly developed and put in place at the national and regional level foe the coastal pelagic and other shared resources. To address this issue, a multinational master plan for fisheries resource management and development which highlights that public sector/private sector partnership must be developed and implemented.

While the co-management approach provides, an opportunity to achieve sustainable desired partnerships within the fisheries sector. However, we must be cognizant that important co-management conditions are necessary for successful management of fisheries include the presence of community leaders, strong social cohesion, and community-based protected areas. Additional critical attributed are enforcement mechanisms, long-term management policies and the influence of fishers in local markets. In other words, both governance systems and fishing communities must have certain attributes to facilitate the success of the co-management approach to fisheries management. A most significant local attribute is strong leadership: Presence of at least one individual with entrepreneurial skills, highly motivated, respected as a local leader and making a personal commitment to the co-management implementation process, is essential. Legitimate community leaders, when guided by collective interests and not self-benefits, give resilience to changes in governance, influence users' compliance to regulations and enhance conflict resolutions in resource allocation. Community cohesion founded on norms, trust, communication, effective networks and groups is also an important global attribute leading to successful fisheries co-management. It is not only the design of a co-management system that is important, but its implantation in a location with the right social characteristics.

We must continue to improve the system for marketing of fish and fish products. Several factors affect the demand function of fish and fishery products. Price, income, income distribution, substitutes, tastes and fashion, demographics, advertising and expectations of the consumers. It is therefore critical for the appropriate value chain analyses to be conducted to facilitate the establishment of a market led production system. This will ensure the fishing enterprises remain sustainable and competitive and a fair proportion of benefits derived from the sale of fish reach small scale fishers.

While there are many issues to be addressed special attention, must be given to the establishment and development of Market Information Systems. These systems can be based on simple mobile phones and local-centre web access, which help poorer groups make smarter decisions. Although, market intelligence systems are widespread globally, they primarily serve large companies in developed countries. Flexible local networks connecting producers, traders, NGOs, the public sector and consumers help them quickly find and use the information they need. Artisanal fishers have rapidly caught on to using mobile phones to find out where they can get the best prices for their catch. However, 'One Stop Shops' are required to offer fishers cheap local access to market information. Small-scale fishers around the Caribbean are at a serious disadvantage when not provided with the best available market information.

APPENDIX 2: LIST OF PARTICIPANTS

Antigua & Barbuda

George LOOBY
Fisheries Officer
Fisheries Division
Cobbs Cross, St. Paul's
Antigua and Barbuda
Tel.: (268) 720-3032
Fax: (268) 462-1372
Email: george.looby@gmail.com

Hilroy SIMON
Fisheries Assistant
Fisheries Division
Point Wharf Fisheries Complex
Lower North Street, St. John's
Antigua and Barbuda
Tel.: (268) 464-8177
Fax: (268) 462-1372
Email: hilroy_simon@yahoo.com

Belize

Marsha VARGAS
Assistant Fisheries Officer
Fisheries Department
Princess Margaret Drive, Belize City
Belize
Tel.: (501) 223 4443
Fax: (501) 223-4446
Email: species@btl.net

Dominica

Andrew MAGLOIRE
Chief Fisheries Officer
Fisheries Division
M.E. Charles Blvd., Roseau
Commonwealth of Dominica
Tel.: (767) 266-5291
Fax: (767) 448-0140
Email: fisheriesdivision@dominica.gov.dm

Jullan DEFOE
Fisheries Liaison Officer
Fisheries Division
Roseau Fisheries Complex
Bayfront, Roseau
Commonwealth of Dominica
Tel.: (767) 446-4421
Fax: (767) 448-0140
Email: Jullan.defoe@gmail.com

Grenada

Johnson P. ST. LOUIS
Fisheries Officer I (Quality Control)
Fisheries Division
Ministry of Agriculture, Lands, Forestry, Fisheries and the Environment
Ministerial Complex , St. George's
Grenada
Tel: (473) 440-3814 / 405-4358
Fax : (473) 440-6613
Email: Johnson.stlouis@ymail.com

Francis CALLISTE
Fisheries Officer
Fisheries Division
Ministry of Agriculture, Lands, Forestry, Fisheries and the Environment
Ministerial Complex, St. George's
Grenada
Tel: (473) 440-2708
Fax: (473) 440-6613
Email: tobex00@hotmail.com

Haiti

Bernard CHAUVET
c/o Fisheries Department
2 Rue T Guilbaud
Ave Toussaint L'ouverture
B. P. 13039, Delmes
Haiti - 6120
Tel: (509)-370-22424
Email: chauvet.bernard@gmail.com

St. Kitts and Nevis

Althea L. ARTHURTON
Director
Department of Fisheries
Prospect Estate, St. John's
Nevis
St. Kitts & Nevis
Tel: (869) 663-9380
Fax: (869) 469-0839
Email: fisheries@niagov.com

Kareem WILKIN
Fisheries Field Officer
Department of Fisheries
Prospect Estate, St. John's
Nevis
St. Kitts & Nevis
Tel: (869) 760-6297
Fax: (869) 469-0839
Email: kwpsomer@gmail.com

Samuel J. HEYLIGER
Fisheries Officer
Department of Marine Resources
P. O. Box 09, Basseterre
St. Kitts

St. Kitts and Nevis
Tel.: (869) 465-8045
Fax: (869) 466-7254
Email: dmrskn@gmail.com

St. Lucia
Rufus GEORGE
Chief Fisheries Officer
Department of Fisheries
Ministry of Agriculture, Rural Development, Food Production and Fisheries
Pointe Seraphine, Castries
St. Lucia
Tel: (758) 468-4135
Fax: (758) 452-3853
E-mail: rufus.george@govt.lc
rufusgeorge1@hotmail.com

Seon FERRARI
Fisheries Officer
Department of Fisheries
Ministry of Agriculture, Rural Development, Food Production, and Fisheries
Pointe Seraphine, Castries
St. Lucia
Tel: (758) 468-4143
Fax: (758) 452-3853
E-mail: seon.ferrari@govt.lc
deptfish@govt.lc

St. Vincent & the Grenadines
Jennifer CRUICKSHANK-HOWARD
Chief Fisheries Officer (Ag.)
Fisheries Division
Ministry of Agriculture, Rural Transformation, Forestry, Fisheries and Industry
Bay Street, Kingstown
St. Vincent & the Grenadines
Tel: (784) 456-1178
Fax: (784) 457-2112
Email: fishdiv@vincysurf.com
jencruickshankhoward@yahoo.com

Hyrone JOHNSON
Fisheries Division
Bay Street, Kingstown
St. Vincent & the Grenadines
Tel: (784) 456-2738
Fax: (784) 457-2112
Email: fishdiv@vincysurf.com

Suriname
Muriel P. WIRJODIRJO
Fisheries Department
Ministry of Agriculture
Cornelius Jongbawstraat 50
Paramaribo
Suriname
Tel: (597) 472-233 / 721-0095
Fax: (597) 421-114
Email: murielwirjodirjo@yahoo.com
kbclvisserij@gmail.com

Trinidad and Tobago
Ruth REDMAN
Fisheries Development Officer
Tobago House of Assembly
53 Guy Street, Canaan, Tobago
Trinidad and Tobago
Tel: (868) 639-4354
Fax: (868) 639-1382
Email: emlyn24@hotmail.com

Caribbean Netherlands
Roberto HENSEN
Fishery, Agriculture, Nature Manager
Government of St. Eustatius
Concordia, St. Eustatius
Caribbean Netherlands
Tel. (599) 318-5741
Email: lvv@statiagov.com

CNFO
Mitchell LAY
Coordinator
Caribbean Network of Fisherfolk Organizations
New Winthorpes, St. George's
Antigua and Barbuda
Tel.: (268) 784-4690
Email: mitchlay@yahoo.co.uk

University of the West Indies
Hazel OXENFORD
Professor
Centre for Resource Management and Environmental Studies (CERMES)
Cave Hill Campus
University of the West Indies
Barbados
Tel: (246) 417-4571
Fax: (246) 424-4204
Email: hazel.oxenford@cavehill.uwi.edu

University of Florida Sea Grant
Charles SIDMAN
Associate Director of Research
Building 803, Mc/Carty Drive
P. O. Box 110400, Gainesville,
Florida, USA
Tel: (352) 392-5870
Email: csidman@ufl.edu

CLME
Laverne WALKER
Senior Project Officer
CLME Project Coordination Unit
Cartagena, Columbia
Tel. : +57-5-664-0914
Fax : +57-5-664-8882
Email : lavernew@unops.org

FAO/WECAFC
Raymon VAN ANROOY
Fishery and Aquaculture Officer/Secretary of WECAFC
Food and Agriculture Organization
Sub-Regional Office for the Caribbean
2nd Floor, United Nations House
Marine Gardens, Hastings
Christ Church
Barbados BB11000
Tel. : (246) 426-7110/11 Ext. 249 /230-1741
Fax : (246) 427-6075
Email : Raymon.vanAnrooy@fao.org

IFREMER/MAGDELESA
Mr. Lionel REYNAL
IFREMER
Pointe-Fort
97231 LeRobert
Martinique
Tel.: (596) 696-94-46-33
Fax: (596) 596-66-19-14
Email : lionel.reynal@ifremer.fr

Heloise MATHIEU
Engineer in Fisheries
IFREMER – Fisheries Division of Dominica
IFREMER Station
Route de Pointe Fort
97231 LeRobert
Martinique
Tel.: (767) 265-5917
Email: Heloise.mathieu@ifremer.fr

Julien TIMOR
Anthropologist
IFREMER/MAGDELESA
Route de Pointe Fort
97231 Le Robert
Martinique
Tel.: (596) 696-95-10-88
Email: julien.timor@ifremer.fr
Julien.timor@gmail.com

Emmanuel THOUARD
IFREMER
79, Route de Pointe Fort
97231 Le Robert
Martinique
Tel.: +33 (0) 596-66-19-60
Email: Emmanuel.thouard@ifremer.fr

Cedric PAU
Biologist
IFREMER/MAGDELESA
Route de Pointe Fort
97231 Le Robert
Martinique
Tel.: +596-696-18-86-16
Email: cedric.pau@wanadoo.fr

Nicolas DIAZ
Secretary General
Regional Committee of Fisheries (CRPMEM)
2 bis Rue Scroelemer, 97 Mo Point A Pitre
Guadeloupe
Tel.: +590-590-90-97-87
Email: diaz.crpmem971@orange.fr

Paul GERVAIN
MAGDELESA
Rue Authe 2
Petit-Paris
97 100 BASSE-TERRE
Guadeloupe
Tel.: +0590-590-99-05-74
Email: paul.gervain@wanadoo.fr

Katia FRANGOUDES
Researcher
University of Western Brittany
Centre IFREMER Brest
BP70, 29280 Plouzané Cedex
France
Tel: +33-298-224-973
Email: katia.frangoudes@univ-brest.fr

Climent DROMER
Biologist
Impact Mer
90 rue du Professeur
Raymond Garcin
97200 Fort de France
Martinique
Tel: +596-696-28-18-45
Email: cdromer@impact-mer.fr

Elie EUSTACHE-ROOLS
CRPMEM
Morne Pitault
97240 LeFrancois
Martinique
Tel: +0596-696-307-910
Email: elie.eustache.rools@gmail.com

RESOURCE PERSON
James INCE
Spice Isle Fish House Ltd
Grand Mal

St. Georges
Grenada
Tel: (473)-420-2127
Fax: (473)-435-7124
Email: jamesince@sifishhouse.com

JICA/CARIFICO
Ms. Akiko Oda MINAMI
JICA Chief Representative
Caribbean Regional Office in Santo Domingo
Avenida Sarasota No.20, Torre Empresarial AIRD,
7mo. Piso, La Julia, Santo Domingo,
República Dominicana
Tel : (1-809) 381-0005
Fax : (1-809) 381-0048

Mr. Tsuyoshi KOGA
Second Secretary (Economic Cooperation Officer)
Embassy of Japan
Tel: (868)-628-5991 Ext. 222
E-mail: tsuyoshi.koga@mofa.go.jp

Mr. Nariaki MIKUNI
JICA Senior Fisheries Expert
c/o Fisheries Division
Bay Street, Kingstown
St. Vincent & the Grenadines
Tel.: (784) 496-1689
Email: fjmick@gmail.com

Mr. Mitsuhiro ISHIDA
Marine Biologist
JICA/CARIFICO Project
Fisheries Division
Point Wharf Fisheries Complex
St. John's
Antigua and Barbuda
Tel.: (268)-462-1372/772-7564
Fax: (268) 772-7564
Email: paramichan@gmail.com

Sherill BARNWELL
Resource Person
JICA/CARIFICO Project
C/o CRFM Secretariat
3rd Floor Corea's Bldg., Halifax Street
St. Vincent and the Grenadines
Tel: (784) 532-5145
Email: ms_svg83@yahoo.com

Mikhail FRANCIS
Administrative Assistant
JICA/CARIFICO Project
C/o CRFM Secretariat
3rd Floor Corea's Bldg., Halifax Street
St. Vincent and the Grenadines
Tel: (784) 457-3474
Fax: (784) 457-3475
Email : mikhail.francis@crfm.int

CRFM SECRETARIAT:
Milton HAUGHTON
Executive Director
CRFM Secretariat
Princess Margaret Drive
Belize City
Belize
Tel.: (501) 223-4443
Fax: (501) 223-4446
Email: milton.haughton@crfm.int

Susan SINGH-RENTON
Deputy Executive Director
CRFM Secretariat
3rd Floor Corea's Bldg., Halifax Street
St. Vincent and the Grenadines
Tel: (784) 457-3474
Fax: (784) 457-3475
E-mail: susan.singhrenton@crfm.int

Peter A. MURRAY
Programme Manager, Fisheries Management & Development
CRFM Secretariat
Princess Margaret Drive
Belize City
Belize
Tel.: (501) 223-4443
Fax: (501) 223-4446
Email: Peter.a.murray@crfm.int

Elizabeth MOHAMMED
Programme Manager, Research and Resource Assessment
CRFM Secretariat
3rd Floor Corea's Bldg., Halifax Street
St. Vincent and the Grenadines
Tel: (784) 457-3474
Fax: (784) 457-3475
Email: Elizabeth.mohammed@crfm.int

June MASTERS
Statistics & Information Analyst
CRFM Secretariat
3rd Floor Corea's Bldg., Halifax Street
St. Vincent and the Grenadines
Tel: (784) 457-3474
Fax: (784) 457-3475
E-mail: june.masters@crfm.int

APPENDIX 3: AGENDA

DAY 1 – Monday 9th December 2013					
Date	**Time**	**Activity**	**Contents**	**Responsible**	**Duration**
9 Dec	**Morning**				
	08:00 -09:00	Registration	Completion of Registration Forms	Workshop Admin.	
	09:00-10:00	Opening Ceremony	Remarks by host Government and partner organisations	CRFM / Fish. Div.	45 min
	10:00-10:15	**Coffee Break**			15 min
	10:15-10:30	Introduction	Introduction of participants Objectives and Context of Workshop Adoption of Agenda	Workshop Chairperson (Milton Haughton)	15 min
	10:30-13:10	**Country Presentations**	Activities of MAGDELESA and CARIFICO		
			Antigua and Barbuda	Hilroy Simon	20 min
			Dominica	Jullan DeFoe	20 min
			Grenada	Francis Calliste	20 min
			Guadeloupe	Nicolas Diaz	20 min
			Martinique	Katia Frangoudes	20 min
			St. Kitts and Nevis	Samuel Heyliger	20 min
			St. Lucia	Seon Ferrari	20 min
			St. Vincent	Hyrone Johnson	20 min
	13:10-14:10	**Lunch Break**			60 min
	Afternoon				
	14: 10-15:30	Country Presentations	Activities of MAGDELESA and CARIFICO		
			Haiti	Bernard CHAUVET	20 min
			Belize	Marsha Vergas	15 min
			Suriname	Muriel Wirjodirjo	15 min
			Trinidad and Tobago	Ruth Redman	15 min
			Caribbean Netherlands	Roberto Hensen	15 min

Date	Time	Activity	Contents	Responsible	Duration
	15: 30-15:45	**Coffee Break**			15 min
	15:45- 17:15	**Organizations Presentations**	Theme of Presentations		
		CRFM	(i) CRFM – Recent policy developments of relevance to FADs (ii) Introduction to the CRFM Website and Collaboration Tools	Susan Singh-Renton, Peter A. Murray	20 min 20 min
		CARIFICO	JICA activities for the profitability and sustainability of FAD Fisheries	Mitsuhiro Ishida	30 min
		UN-FAO/WECAFC	WECAFC – latest developments and the 15th session	Raymon van Anrooy	5 min
		MAGDELESA	Objectives and Stakes of MAGDELESA Project	Lionel Reynal	15 min
Day 2 – Tuesday 10th December 2013					
10 Dec	**09 : 00-10:00**	Organizations Presentations	Theme of Presentations		
	Morning	CLME	CLME+ Project Update: Next Steps	Laverne Walker	15 min
		U.W.I	UWI Research and training activities relevant to FADs	Hazel Oxenford	15 min
		University of Florida Sea Grant	Testing an engagement strategy to support co-management of the Caribbean FAD Fishery	Charles Sidman	15 min
		CNFO	CNFO's Activities relevant to FADs	Michel Lay	15 min
	10:00-1020	**Technical Discussions**	**FAD Technology**		
			Design of FAD, CARIFICO	Mitsuhiro Ishida	20 min
	10:20-1035	**Coffee Break**			15 min
	10:35-11:35	**Technical Discussions**	**FAD Technology**		
			The currents in the region and the use of FADs equipped with GPS for currents observation	P. Gervain	20 min
			FADs construction. The basic rules	P. Gervain	20 min
			Analysis of work and of safety conditions in anchored FAD fishing	Y. Le Roy	20 min

Date	Time	Activity	Contents	Responsible	Duration
	11:35-13:00		Co-Management		
			CARIFICO approach to Co-management	Nariaki Mikuni	25 min
			FAD Management System in Martinique and Guadeloupe	K. Frangoudes	20 min
			Who is the FAD fisher in Martinique? Thinking about social consequences brought by anchored FADs	J. Timor	20 min
			Small Scale FAD fisheries, fishing behaviour and incentives to allocation effort towards offshore resources	H. Mathieu, L. Reynal, O. Guyader	20 min
	13:00-14:00	**Lunch Break**			60 min
	14:00-15:00	Technical Discussions	Co-management		
	Afternoon		Different means contributing to FAD's Fishing selectivity	H. Mathieu, C. Pau, C. Dromer, L. Reynal	20 min
			Reproduction of Black fin tuna: Preliminary results	C. Pau	20 min
	15:00-16:00	**Technical Discussions**	**Marketing**		
			Experience with Tuna Export to the United States	James Ince	20 min
			Quality and valorization of sea food products. Protocol of Studies by the PARM	S. Eugene	20 min
			Quality of product fished around FAD: Preliminary results	C. Dromer	20 min
	16:00-16:15	**Coffee Break**			15 min
	16:15-16:35	**Technical Discussions**	**Marketing**		
			FAD Fishing with "Bois fouillé" at Leogane (Haïti). Extreme situations	L. Reynal & M. Bordey	20 min
	16:45-18:45		**Demonstration of FAD Software**		
			Comparative effects of rope diameter, length, and buoys volume against the currents. Case Study on Dominican FADs	P. Gervain	2 hours training For motivated person

Day 3, Wednesday 11 December 2013

	11 Dec	09:00-09:40	**Technical Discussions**	**Fishery Resources**		
				An overview of sub-regional fisheries management plan for blackfin tuna fisheries in the Eastern Caribbean	Susan Singh-Renton, CRFM Sec.	20 min
				Present status of fish resources targeted by FAD and their management	Elizabeth Mohammed, CRFM Sec	20 min
			Recommendations/ Conclusions	Recommendations on FADs development and management	Lionel Reynal, Raymon van Anrooy, CRFM	
		09:40-10:00		Summary of conclusions		20 min
		10:00-10:15	**Coffee Break**			15 min
		10:15-11:00		Discuss and develop proposed recommendations for consideration by countries and regional agencies involved in fisheries management		45 min
		11:00-11:40	Way Forward	The transformation of the IFREMER/WECAFC Working Group on FADs into a joint JICA/IFREMER /CRFM/WECAFC Working Group on FADs		40 min
		11:40-12:00		Develop recommendation and proposed Terms of Reference for proposed new Joint FAD WG		20 min
		12:00-12:20		Discussion and recommendation regarding the Convener for Working Group		20 min
		12:20-12:40		Website Hosting and Management		20 min
		12:40-13:00		List of proposed activities to be coordinated at regional level for 2014-2015		20 min
		13:00 – 13:15	**Closing**	**Brief Closing Remarks**	**JICA, IFREMER, CRFM**	15 min
				END OF WORKSHOP		

APPENDIX 4: HISTORY AND PRESENT SITUATION OF FAD FISHERIES AND THEIR MANAGEMENT: COUNTRY REPORTS

Antigua and Barbuda Country Report

Slide 1

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Slide 3

Action Plan From Okinawa – Fiji Training

Situation of target area and target group

These Fishers are currently seeking to capitalize on the underutilized pelagic resources in an effort to be able to remove them from having to compete too much for the already heavily fished demersal fish.

Slide 4

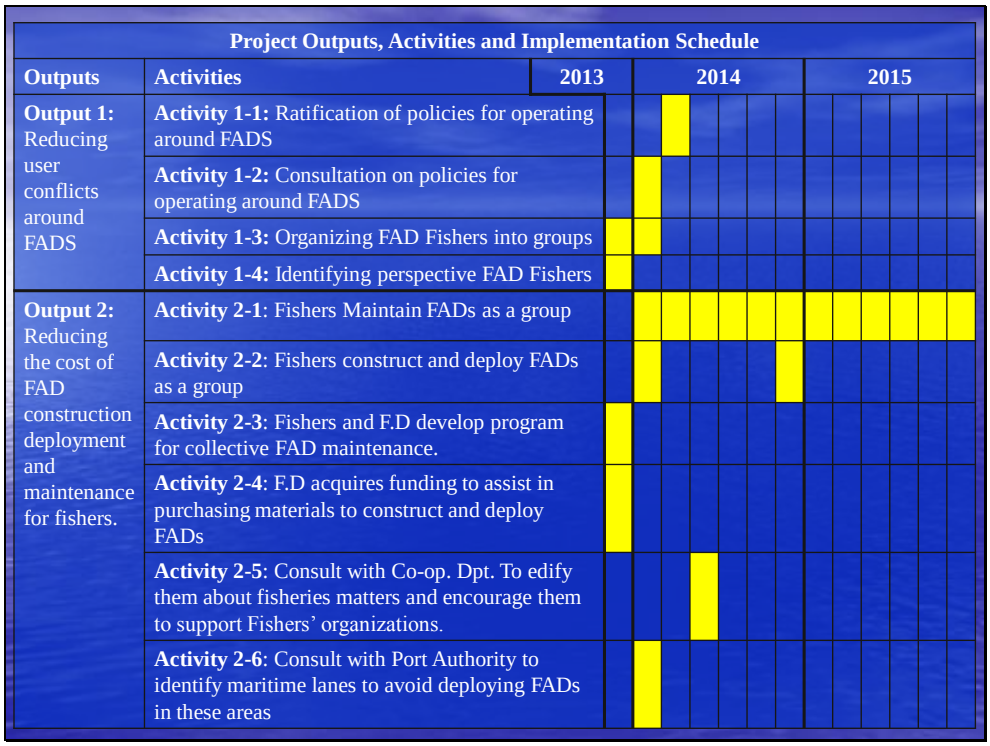
Overall Goal (After ten years vision)

Fishers will be involved in co-management activities and will be able to develop, manage and maintain effective fisher-folk organizations.

Project Purpose (in Action plan)

To get fishers engaged in the utilization of FADs to assist them to successfully harvest pelagic fish in an effort to facilitate co-management through working together to construct, deploy, manage, maintain and monitor these FADs.

Slide 5



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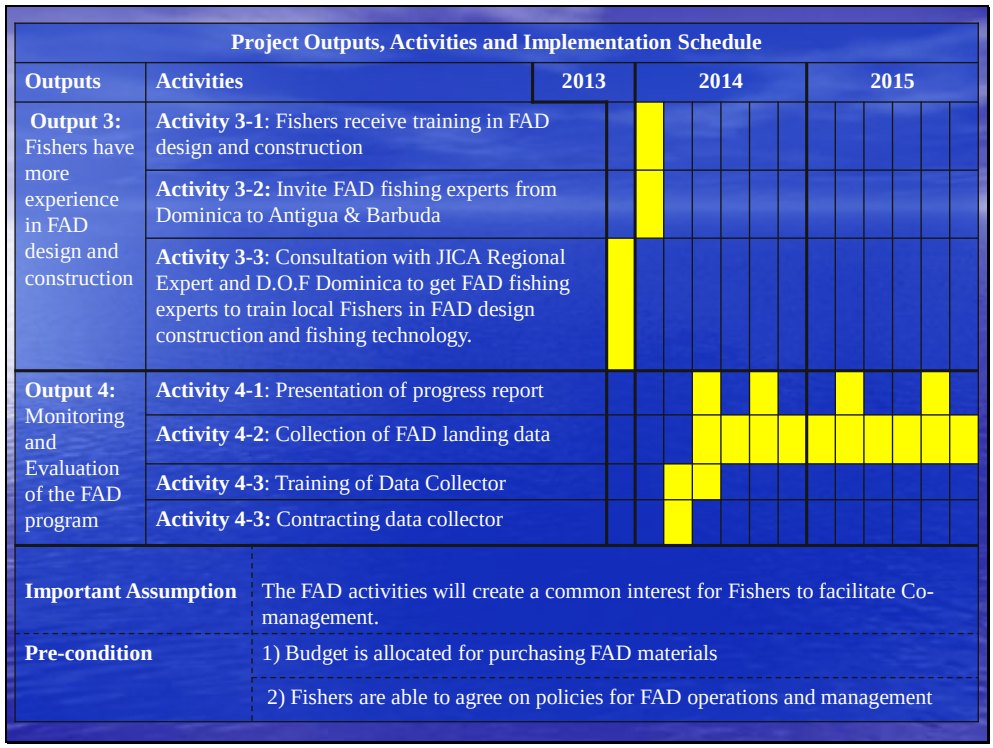


Slide 7

Implementation Structure (Strategy) of the Project

The project will be implemented under the auspices the JICA CARIFICO project with the guidance of the Fisheries Division with the support of the local FAD Fishers.

Continuous monitoring and evaluation of the project's activities will be done by the Fisheries Division and support from the FAD Fishers.

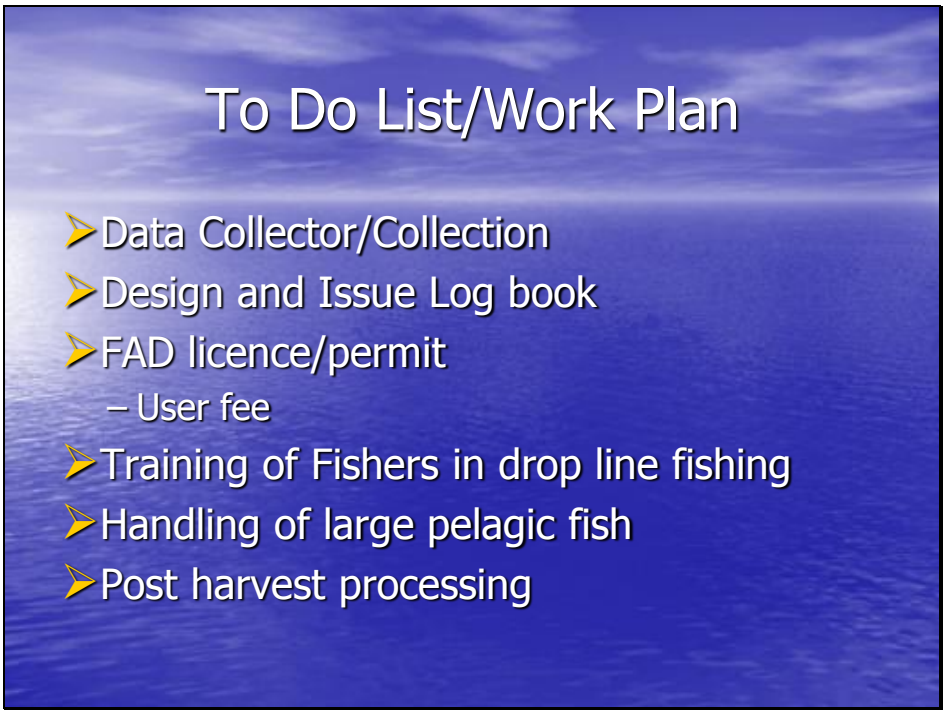
Slide 8

Implementation Structure (Strategy) of the Project

Catch data from FAD fishing will be collected to compare to non-FAD (pelagic) fishing trips in order to monitor the economic benefits of the program.

Fisheries Co-management will be promoted throughout and beyond the duration of the project period.

Slide 9



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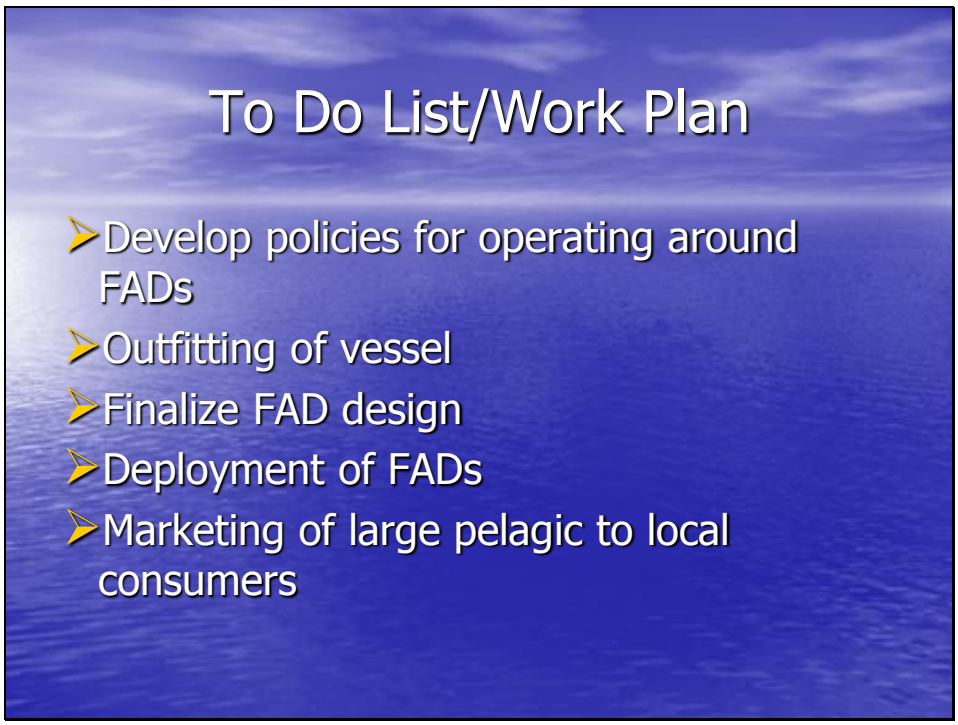


Slide 11

Slide 12

Belize Country Report

Slide 1

Fish Aggregating Devices

December 9th – 11th

2013

St. Vincent

Slide 2

Introduction

- In 2002 The Belize Fisheries Department, Coastal Zone Management Authority and Institute and (CARICOM Fisheries) *now* CRFM collaborated together in the FAD Pilot Project for Belize.
- Note: actual constructions started in 2004

Slide 3

Pilot project using FADs

The pilot programme was developed to provide a possible alternative for fishers to increase production and reduce fishing pressure on the reef system.

- - diversification
- - underutilized species
- - more grounds

Slide 4

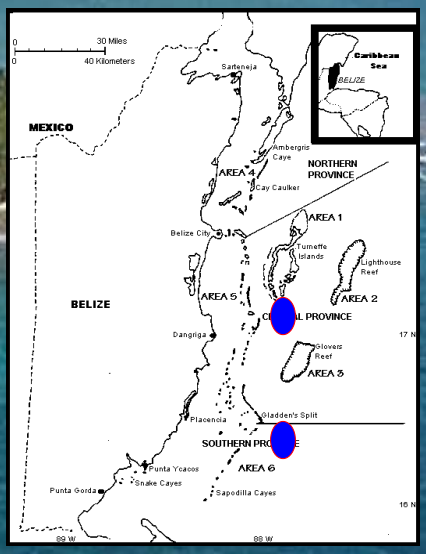
Cont'd

- The Fisheries Department was charge with the coordination and execution of endeavors of the project.
- In Phase 1 - Two FADs were constructed and deployed around Turneffe atoll.

Slide 5

DEPLOYMENT SITES

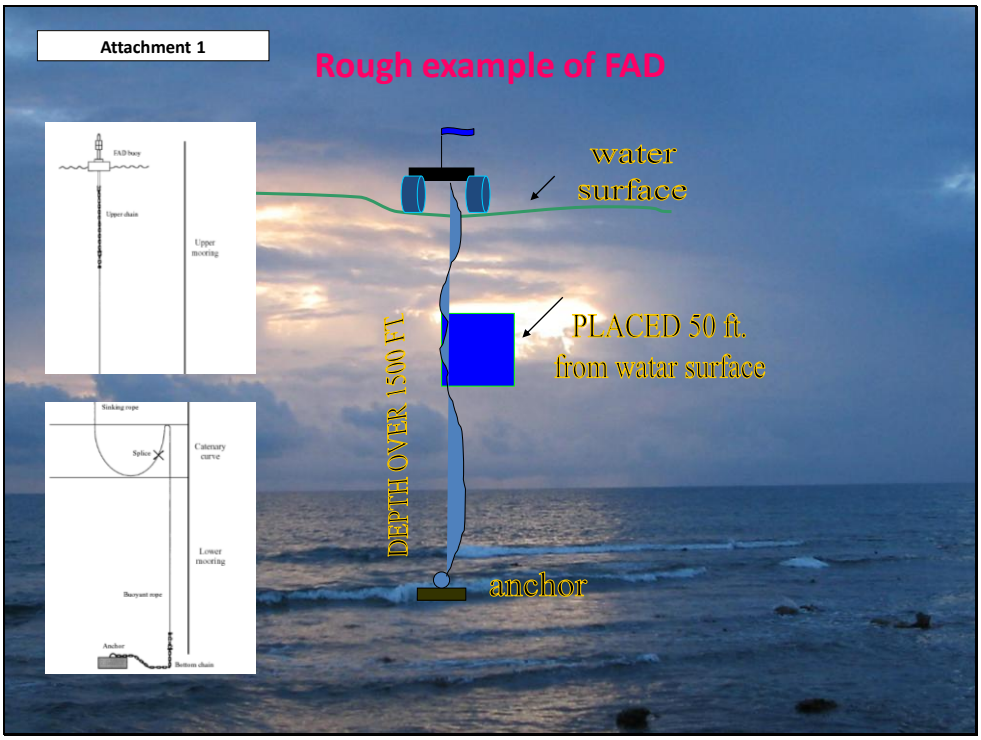
- Two FADs were scheduled to be deployed near Turneffe atoll and the other two near Gladden Spit.
- Each FADs is expected to be deployed at an approximate depth of 2000 ft.



Slide 6

Fish Aggregating Device (FADs)

Slide 7



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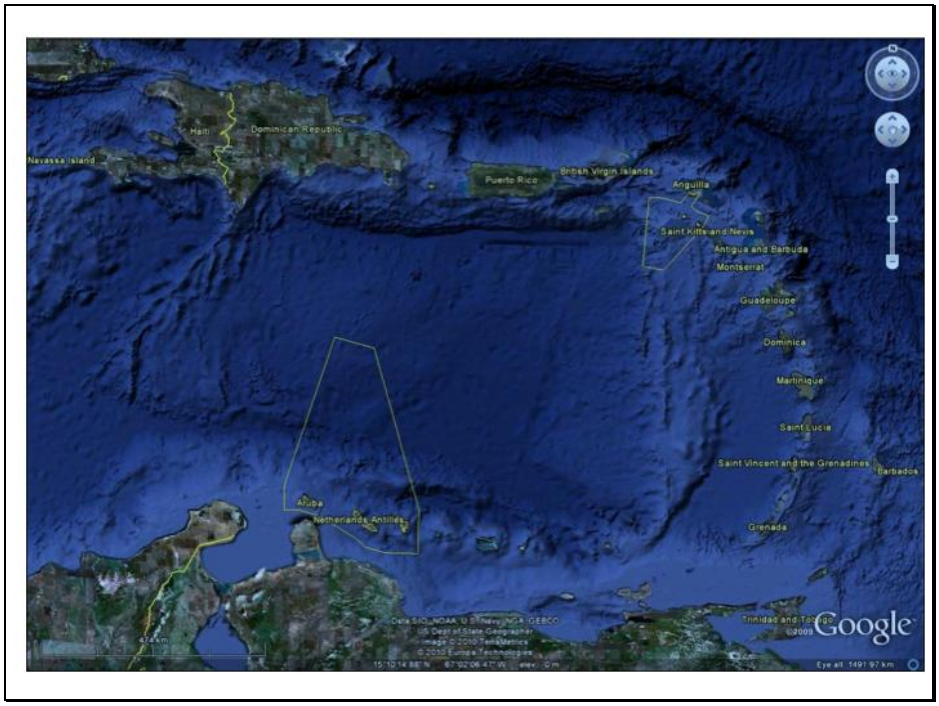
Caribbean Netherlands Country Report

Slide 1



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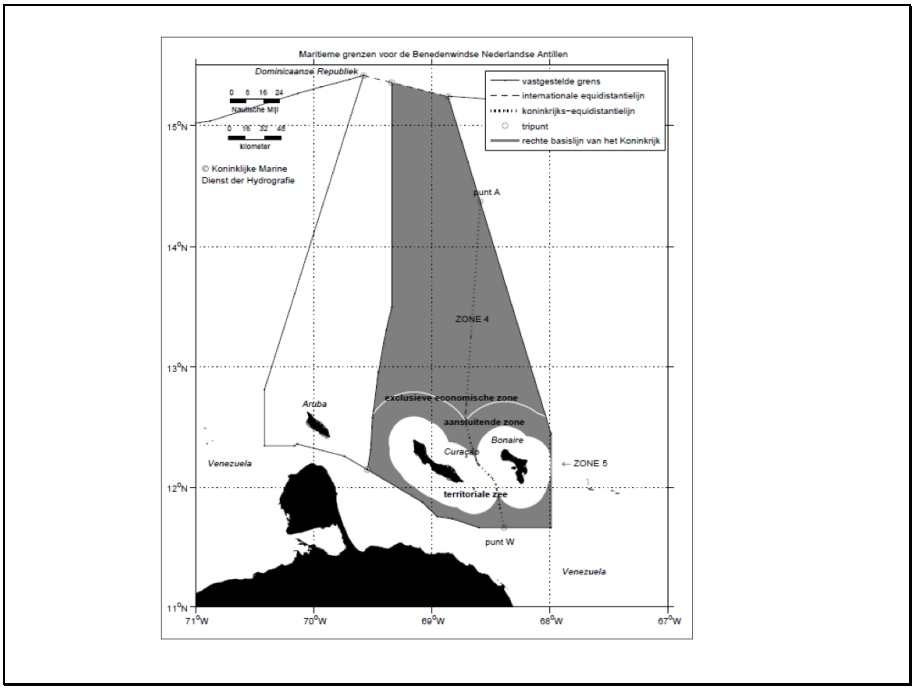

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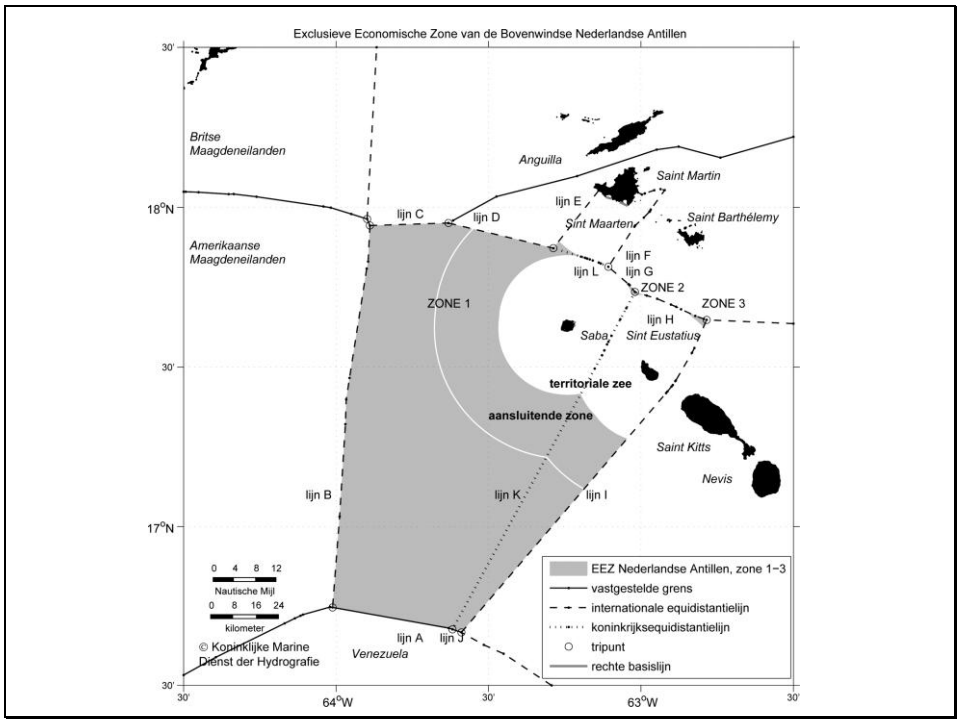

Slide 4

MKII FAD-GRP3,
700 m mooring depth

MKII-GRP7
Medium strength current
560 m mooring depth

Slide 5

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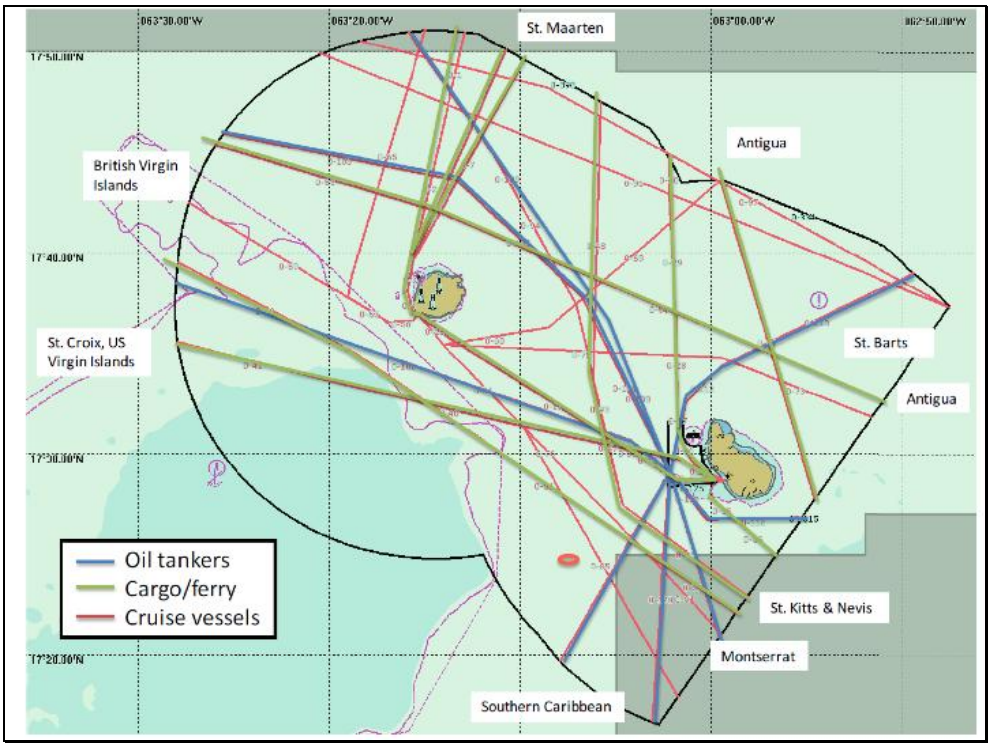


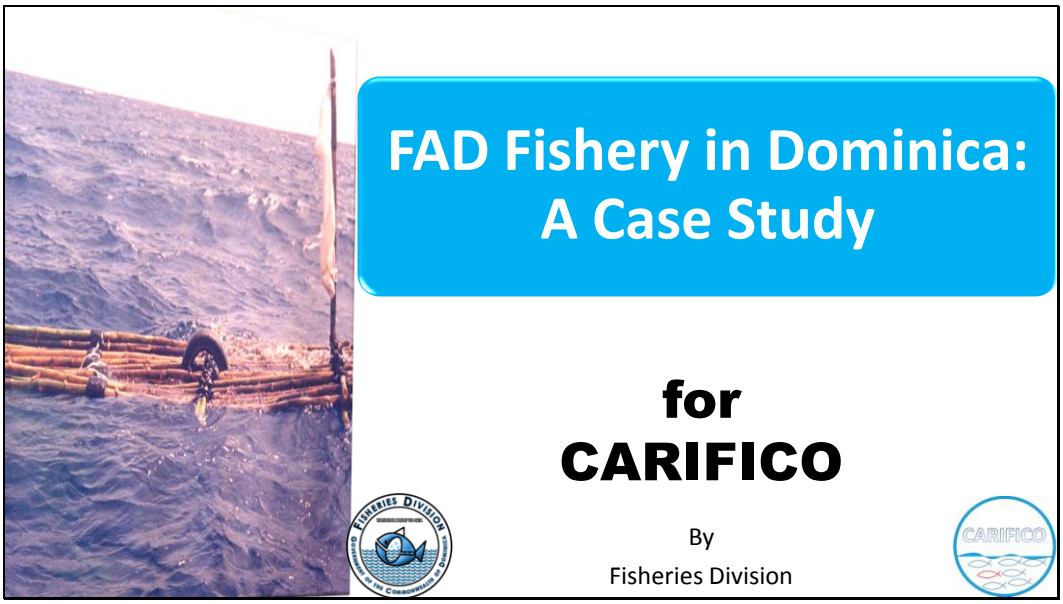
Slide 10

FAD Rules and Regulations

- **Maintenance schedule and procedures:**
- The fishermen whom are using the FAD will monitor all the surface structures. Thus making sure that the batteries for the light is still charged and that the surface buoys remain and are intact. The underwater structure down to the recreational dive limit 40m will be inspected every 6 months under the supervision of the fisheries department. Fishery officials will during the year make regular trips to the FAD to inspect the structure and functionality.
-
- **Rules to be agreed on at the meeting of potential FAD users on February 5, 2013:**
- All vessels fishing within the vicinity of a fish aggregating device shall move in a clockwise direction around the FAD.
- No vessel at any time shall be moored onto the fish aggregating device, except for maintenance reasons or if the vessel is forced to do so in case of engine failure or other emergency until help arrives.
- All vessels undertaking night time fishing in the vicinity of the fish aggregating device shall deploy navigational lights appropriate to vessel size.
- If fishing line gets entangled in the FAD, the fishing line should be cut immediately.
- All vessels fishing within the vicinity of fish aggregating device shall provide data, as specified by the Chief Fisheries Officer, to the person in charge, as specified in regulation (fisheries act).
-
- **User Recommendations**
- Do not catch too much bait fish, just to cover cost of gas. The bait fish are possibly of the main reason the large fish are there.
- Set Drop line up current from the FAD and let them drift towards the FAD on the side.
- When drift line gets to close (100-150m) retrieve the line and set it up current again.
- When trolling for bait fish do not fish too close to the FAD head.

Dominica Country Report

Slide 1



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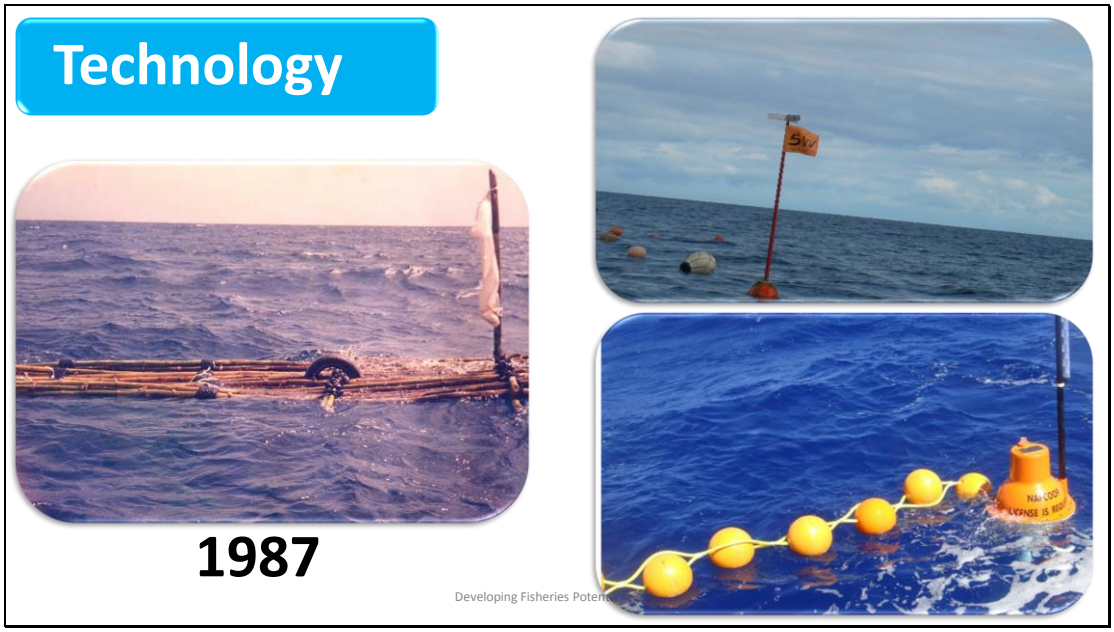


Slide 3

Socio-economics

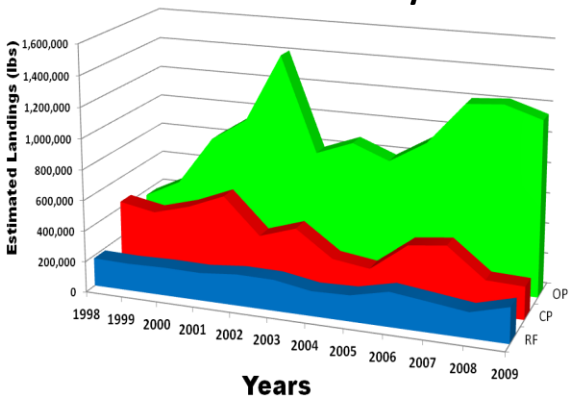
Importance of FAD fishery to Dominica

- Diversification of fishery
- Increased production
- Cost and Effort savings (CBA)
- Eases pressure on Reef fish populations
- Inspire new entrants to the fishery
- Contributes to National Food and Nutrition Security
- Encourage greater collaboration among fishermen

Slide 4

Production, Quality and Development

Effect of FAD fishery in Dominica



Key to Codes Used:

- OP = Ocean Pelagics
- CP = Coastal Pelagics
- RF = Reef Fish

Dominica fish production 1998 ~ 2009

Slide 5

Fish in Ice project

Promotion of ice Boxes on Boats



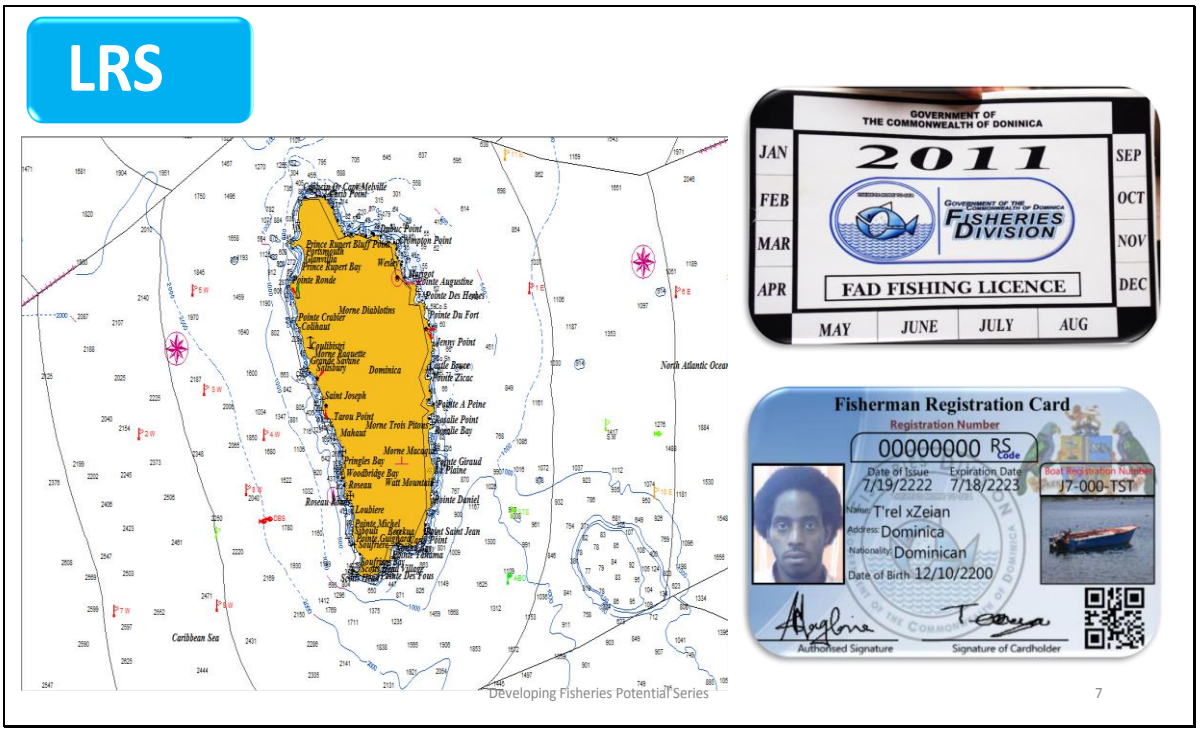
Slide 6

Fishing Fleet



1990s **2000s**

Slide 7



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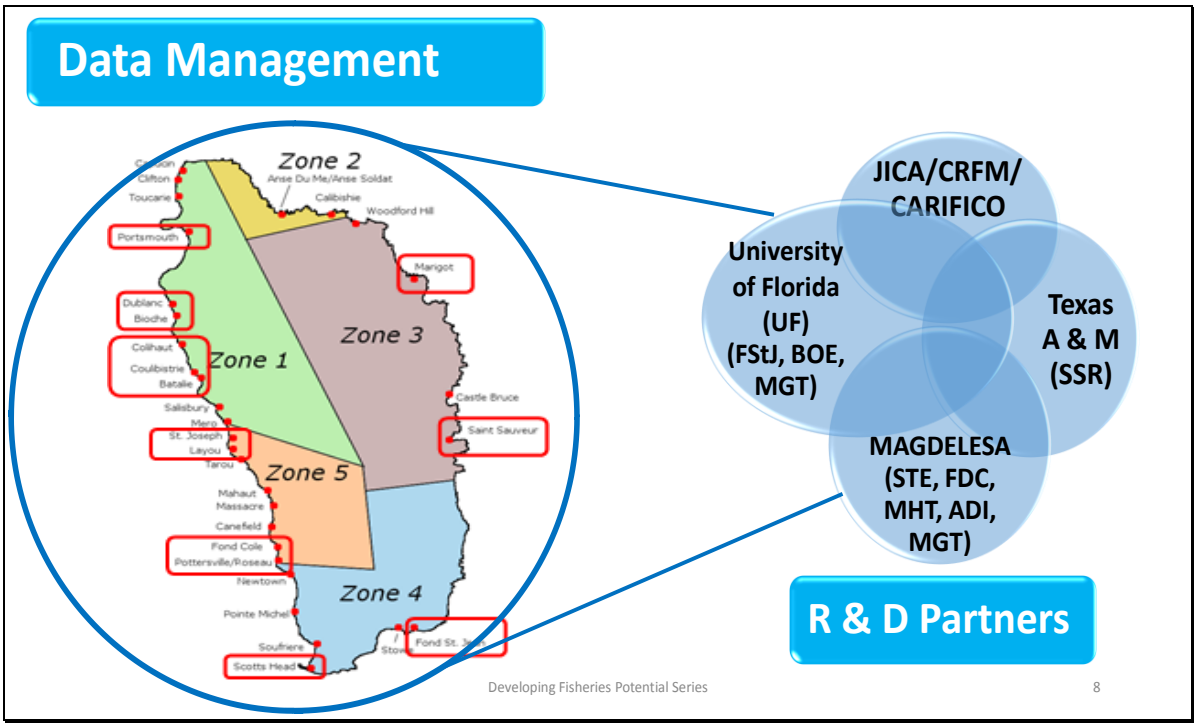


Slide 9

JICA/CARIFICO project

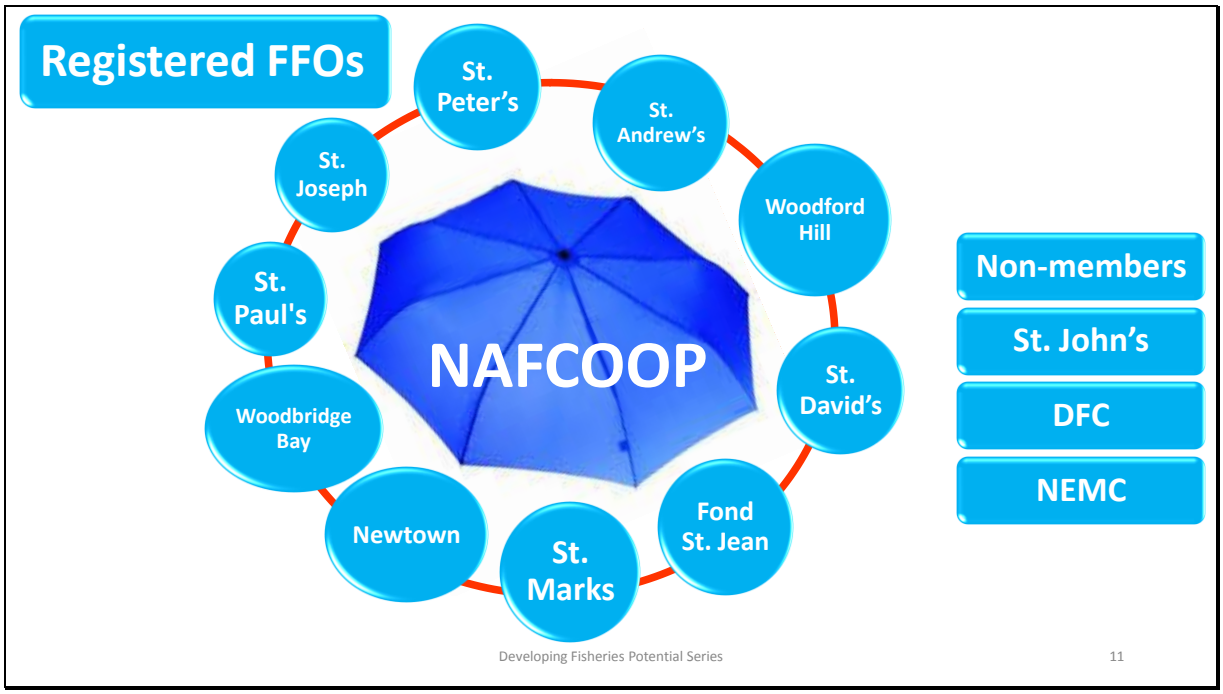
- Requirements for FAD fishery access
- Formalize rules and regulations for FAD fishery
- Utilization of fisheries data to inform FAD fishery management
- Promote co-management principle for FAD fishery management
- Enhancement of fisherfolk organization and Fisheries Agencies to implement co-management mechanism for FAD fishery

To establish real FAD fisheries co-management examples

Slide 10

Fisherfolk Organizations

Slide 11



Slide 12

Slide 13

Slide 14

Slide 15

Gaps/Challenges

Technology (T)

Issues associated with technology improvement

Resource (R)

Issues associated with resource management

Management (M)

Issues associated with management body

Slide 16

THANK YOU

Grenada Country Report

Slide 1

Slide 2

Slide 3

INTRODUCTION

- Location of Grenada Carriacou & Petit Martinique
- latitude 11° 58 minutes/ 12 ° 13 minutes north
- Longitude 61 ° 20 minutes/61 ° 35 minutes west
- Total land area 133 sq, miles
- Coast line 121 Km
- EEZ 8000 sq miles
- Shelf area 3,000 sq km
- GND lies between two water bodies Caribbean Sea & Atlantic Ocean
- Population 100,000
- Annual Fish production 4,000.000 Lbs
- Number of fishing vessels 700

Slide 4

History of FAD Fishery in Grenada

- Grenada has been experimenting with FADs since the 1990s which has proven to be effective & successful
- Several FAD programmes have been funded by donor agencies through the Fisheries Division FAO, OECS, JICA, Govt. of GND and most recently the Magdelesa Project
- Fishers have also deployed FADs which was short leaved
- FADs were deployed in commercial shipping lane
- Inadequate capacity in the construction and deploying of FADs
- Lack of policy/mechanisms in place for collecting of FAD data, separately from commercial fish landings data
- Theft of buoys on FADs by longline fishermen
- Poor quality of FADs constructed by fishers

Slide 5

Current Information on FADs

- Approximately fifty(50) boats utilize the FAD
- Percentage of the fishing fleet engage in FAD fishing 7%
- Thirty (30) boats engage in commercial FAD fishing
- Twenty (20) boats engage in catching of bait
- Recorded landings from FAD fishing 49,916 Lbs
- Percentage to national fish landings 1.2%
- Two additional FADs have been deployed privately
- Petit Martinique Longliners are engaged in FAD fishing
- Two CARIFICO meetings have been held with FAD fisher and Japanese experts.

Slide 6

Grenada's Fishing Fleet


Longline Trawlers


Pirogues engaged in longline fishing


Pirogue engaged in trolling & FAD fishing


Pirogue engaged in demersal fishing

Slide 7

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Slide 9

Management of FADs

- The management of FADs in Grenada remains a challenge
- Fisheries laws does not make provision for governing FADs
- Lack of maintenance
- Limited monitoring of FADs
- Inadequate consultation and communication with fishers
- Inappropriate selection of site for deploying FADs resulting in lost of equipment and investment

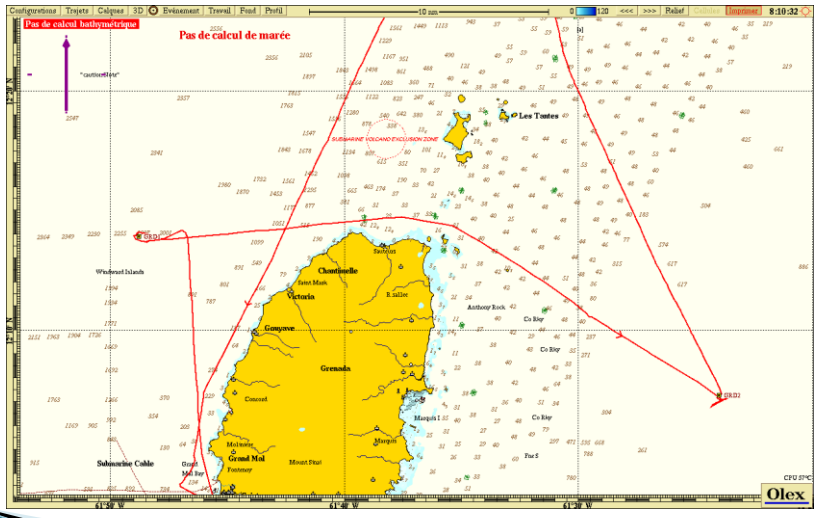
Slide 10

Existing FAD East Coast of Grenada

	FAD – GRD2
Position North and West coordinates	12˚.07.271 N / 61˚.24.005 W
Water Depth (m)	840m Length of rope 1300m
Distance from main fish market/landing site (NM)	13.5 Nautical Miles
Date of deployment	June 2012
Design of FAD	Magdelesa Project
Estimation cost	
Funding agency	Indereg/Ifremer (Magdelesa Project)
Management body	Fisheries Division?
Number of fishing boats utilizing the FAD	30 – 50
Fishing community to which the majority of boats belong	Soubise, St. Andrew's
Fish market where the boats land the catch	Grenville Fish Market
Fishing gear and methods utilized	Trolling / small Tuna like species

Slide 11

Location of FAD deployed by Magdelesa Project



Slide 12

Registration, Licencing & Inspection of Fishing Vessels

- The Fisheries laws require all fishing vessels to be registered and licenced
- It is advised by the Fisheries Division that registration numbers be placed on all registered fishing boats.
- Registered Fishers are issued with photo IDs processed by the Fisheries Division. This process is continuous.

Slide 13

Data Collection and Management

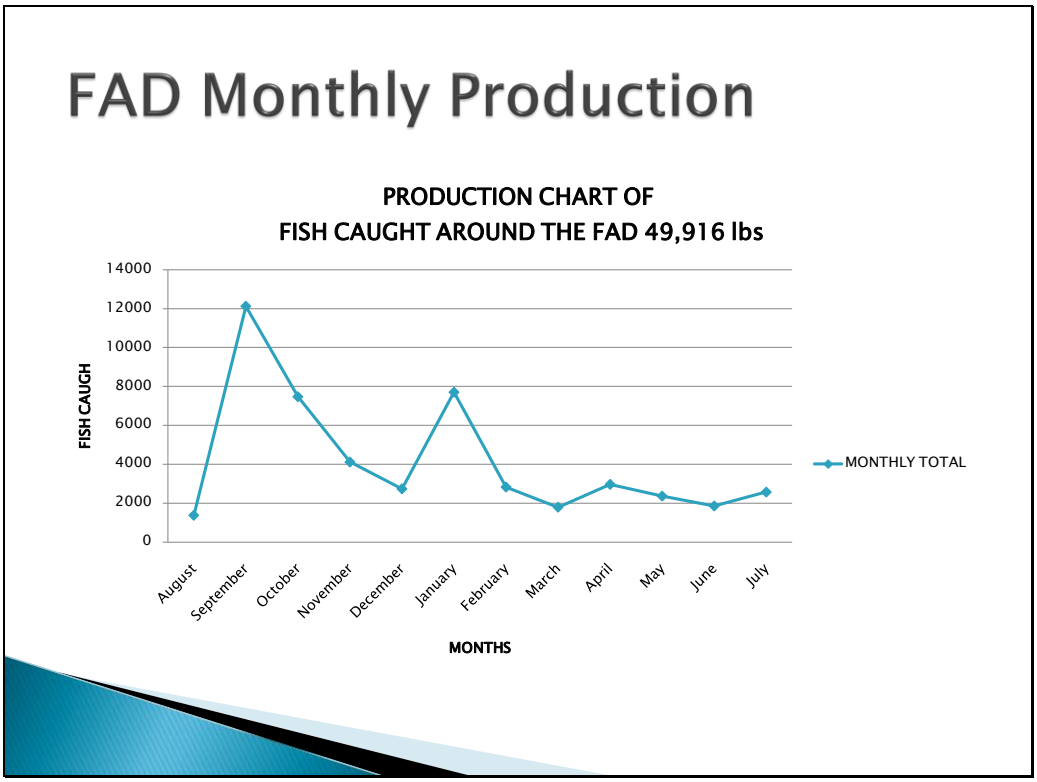
- As of August 2012 management systems have been put in place to enhance the collecting and recording of FAD data
- A database has been established for inputting FAD data
- Catch and effort data are collected
- Fish caught around the FAD is weighed and recorded at the Grenville Fish Market
- The monitoring of species of fish caught around the FAD is ongoing
- Reporting of irregularities are investigated
- Catching of juveniles is under review as there is no specific law prohibiting, the catching of same.

Slide 14

FISH CAUGHT AROUND THE FAD

MONTHS	BFT	WAHOO	DOLPHIN	CAVALLI	BARRACUDA	RAINBOW RUNNER	LITTLE TUNA	YFT	KING MACREL	SKIP JACKS	MONTHLY TOTAL
August	730	44	316	188	43	48		9			1378
September	7775	44	1757	1089	345	355		702		52	12119
October	3210	80	744	1059	317	717		1336	9		7472
November	1522		141	439	982	641	3	337	21	29	4115
December	804	37	36	495	132	363	10	839	26		2742
January	3716	229	87	97	182	322	8	2816		244	7701
February	1313	31	42	68	15	159		1076		125	2829
March	852		97	30	2	87		624		104	1796
April	1472	15	162	430		412		313		164	2968
May	917		103	160		467		648		71	2366
June	885		252	235		35		352		98	1857
July	837		203			118		1316		99	2573
Yearly Total	24033	480	3940	4290	2018	3724	21	10368	56	986	49916

Slide 15



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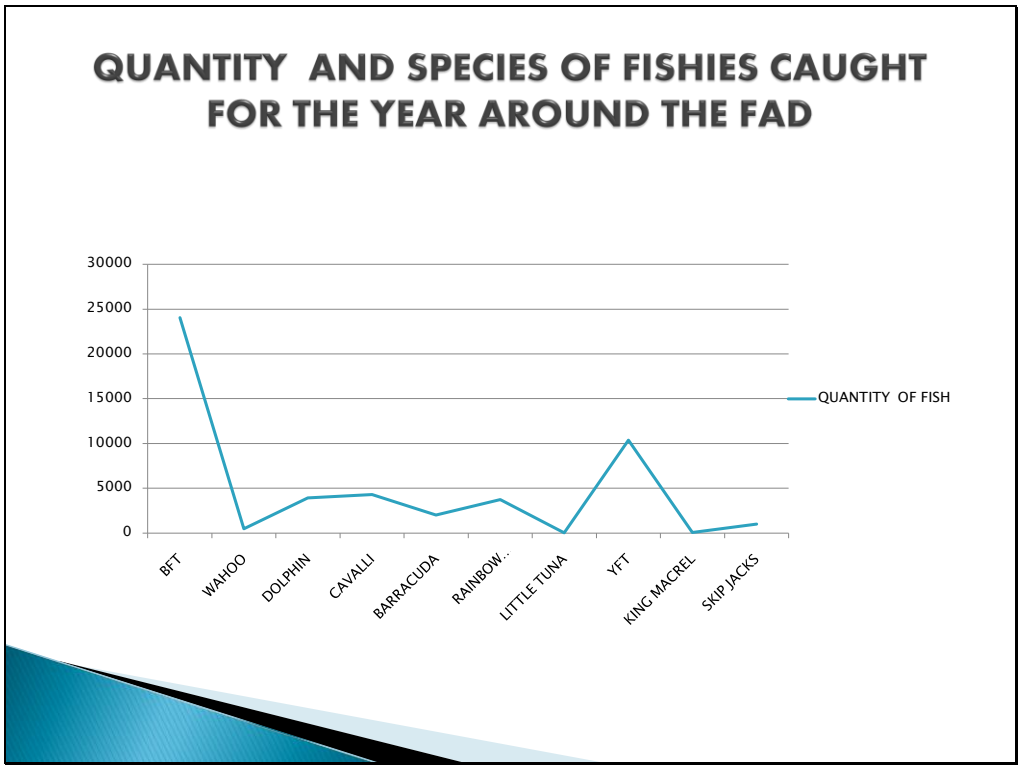


Slide 17

Fish Caught Around the FAD

Slide 18

FAD Maintenance

- Lack of policies in place in Grenada regarding co-management and monitoring of FADs
- Fishing around the FAD is open access fishing
- Ownership of the FAD has not been established
- Maintenance is non-existent
- Inadequate information on maintenance of FADs needs to be addressed

Slide 19

CARIFICO FAD Fishers Consultation & Meeting

Consultation at Bain's Hall, Grenville 25/07/13

Meeting at Grenville Fish Complex 13/11/13

NJCC Meeting at The Fisheries Division Conference Room 21/08/13

Slide 20

Conclusion

- FAD fishing has tremendous potential and must be encouraged at the policy level by legislation being put in place to minimize irregularities/ conflicts
- Mechanism should be established for monitoring, maintenance and co-management of FAD fishing
- Data collection system also needs to be enhanced to conduct analysis for decision making regarding FAD fishing
- Fisherfolks must be properly trained before being allowed to engage in FAD fishing
- Workshop must be organized and conducted to inform fisherfolks of the use of appropriate gear to maximize catch in FAD fishing
- Sub surface FADs should be encouraged
- Droplines technologies should encouraged for FAD fishing

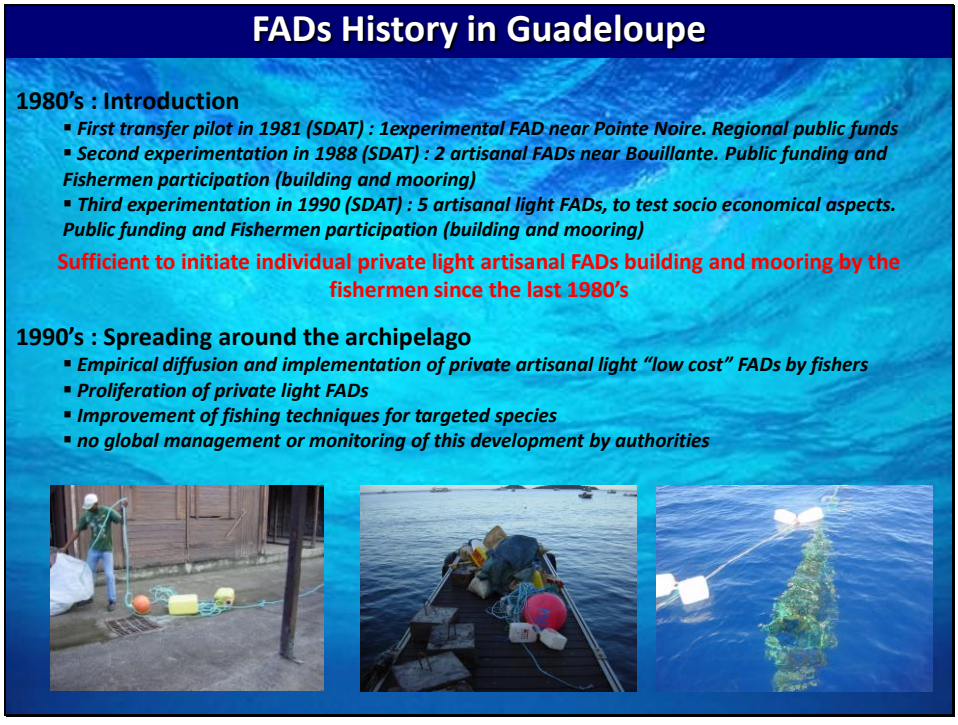
Slide 21

THANK YOU

Guadeloupe Country Report

Slide 1

Slide 2



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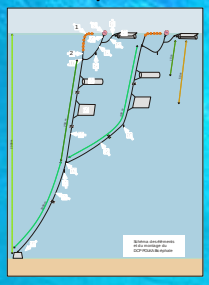
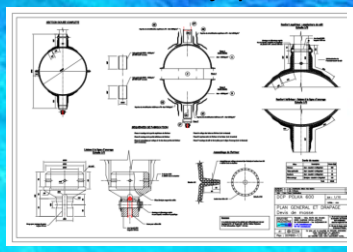
FAD's History in Guadeloupe

2000's : FADs Technological implementation (Paul Gervain)

- *To reduce FADs losses and increase FADs lifespan*
- *To optimize costs…*



Twin heads FAD
IRPM 2002



Monobuoy PLK 600
APSBT/CRPMEM 2004-2008

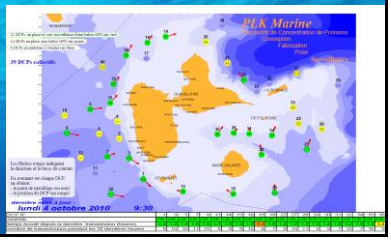
2000's : Implementation of collective investments and management frames (comanagement)

- *To reduce FADs number and individual costs*
- *To reduce usage conflicts*
- *to increase security in this fishery*

2008 : prohibition of FAD public funding by E.U. (FEP)

No public maintenance of the collective FADs moored : Only a few remaining to date

40 PLK 600 collective FADs around Guadeloupe in 2008



Slide 4

FADs rules and regulations in Guadeloupe

1994 : Introduction of specific FAD regulations in the fisheries regualtions.
No evolution to date.

PROPERTY

Private and individual FADs allowed for licensed fishermen

FAD DECLARATION

FAD mooring is conditioned by maritime authorities agreement. The demand should include :

- *Identity and identification of the fisherman*
- *Description of the FAD design, materials and position*
- *The FAD must be signalized and identified with the owner registration number*

FAD ACCESS

The owner has priority access for fishing in a 1/2 NM radius circle around the FAD.
When present, the other boats must remain outside this area
When away, other boats can exploit the FAD

FISHING GEARS

No restriction concerning fishing techniques and gears around FADs

Low monitoring and enforcement by the authorities

Slide 5

FADs deployment in Guadeloupe

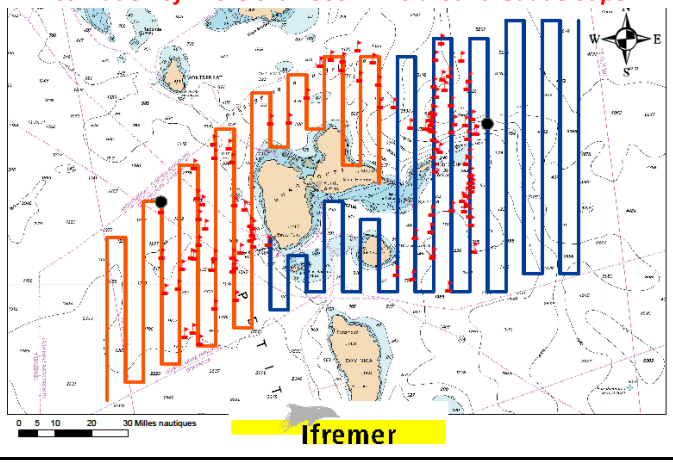
Because of :

- *permissive regulation ;*
- *historically no frame, strategy and working plans for FAD development*
- *low regulation enforcement and monitoring ;*
- *access and usage conflicts...*

Uncontrolled proliferation of FADs

Plane transects by Ifremer (Dec. 2012)

Estimation of more than 300 FADs around Guadeloupe



Slide 6

FADs fleet, gears, activity and yields in Guadeloupe

262 Small scale undecked boats : (« saintoises »).

- *Av. lenght 7.6 m*
- *Av. crew : 2*
- *multipurpose fleets*
- *36 % of the total fleet fishing on FADs*

Activity :

- *12 000 day trips/year (19 % of total activity)*
- *day trips : av. 10h*

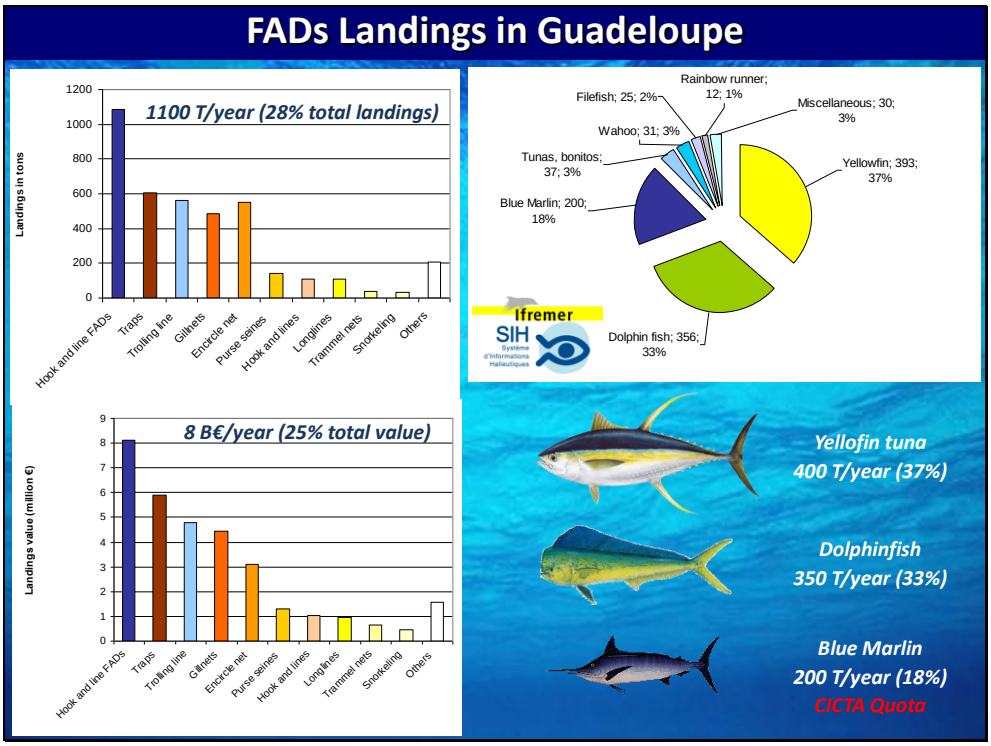
Artisanal fishing techniques

- *Trolling in surface and sub-surface*
- *Drifting vertical lines with live bait ("bidon")*

Yields

- *av. 9 kg/h at sea eq. 90 kg/trip*

Slide 7



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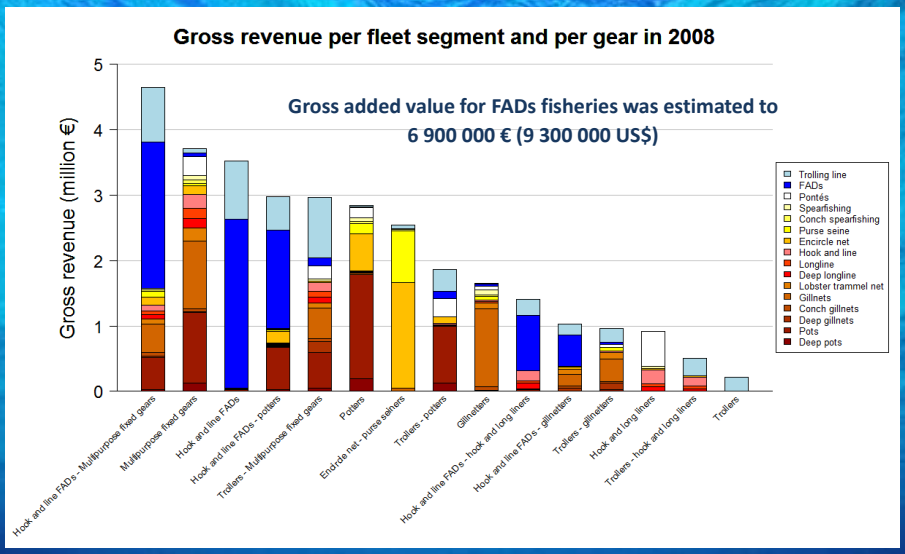
Slide 9

FADs profits in Guadeloupe



Slide 10

FADs next steps in Guadeloupe

Regulation implementation : **reducing FADs proliferation is a challenge !**

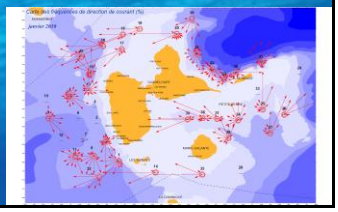
- ***Towards FAD licenses and fees for collective FADs maintenance***
- ***Progressive substitution from private FADs to collective FADs***
- ***Better understanding of social concerns influencing FAD deployment and management***
- ***Management frame for recreationnal fishers access***
- ***More enforcement of regulation, against illegal practises***

Restoration of public FAD funding by E.U.

- ***Investment for restoration and new collective FADS deployment***
- ***Modulation of collective FAD deployement by sectors, according to will and capacity of the local communities to manage the FADs***
- ***FADs deployment around chlordecone contaminated (closed) areas***
- ***New FAD technology and innovation : geolocation, environmental sensors and data transmission***

Collective organization of the markets : ***increase added value***

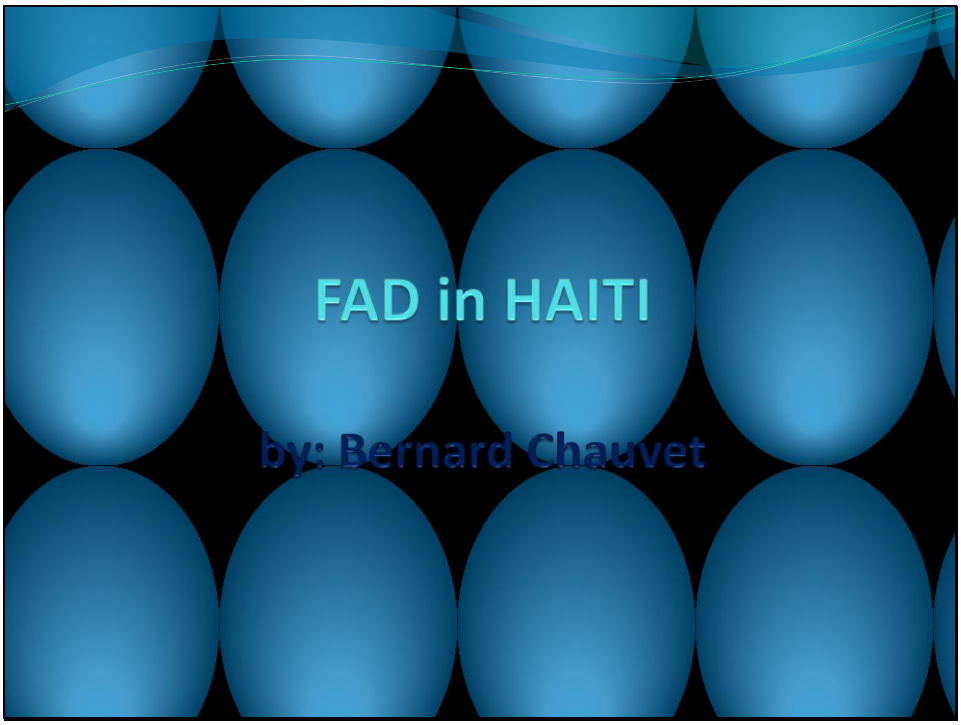
- ***Handling and quality of captures***
- ***Transformation***
- ***Products promotion and marketing campaigns***



Regional cooperation for regional management of sustainable small scale and selective MFAD fisheries

Haiti Country Report

Slide 1



Slide 2

Slide 3

History

- 1985 : Introduction of first FAD in Haiti by Mr. Tony Simon.
- 1988: First FAD drop in Grande-Anse (South) by Gabriel Selimen and Michel …
- Notable results were observed 6 years later.
- 2001: FAD introduced in multiple regions across Haiti.

Slide 4

Slide 5

Pros of FAD

- Long lasting (5 years still producing)
- The increase in catch thus in revenue ameliorates the life of the fishermen (up to 10,000 Lbs per day in some regions)
- Creates new and stable Jobs
- Could possibly resolve food problems due to the volume of fish caught (20,000 – 50,000 lbs per month in areas with multiple FAD)
- Without a FAD a fishing village cannot survive

Cons of FAD

- Expensive (materials, fuel cost)
- Strenuous (hard work, far to reach due to quality of boat)
- Hard to convince the fisherman to do repairs together.
- Lack of solidarity amongst fisherman from different areas.
- No set rules in fishing, creates conflict.
- The capture of small fish and overfishing.
- Hard to document catch due to lack of cooperation.

Slide 6

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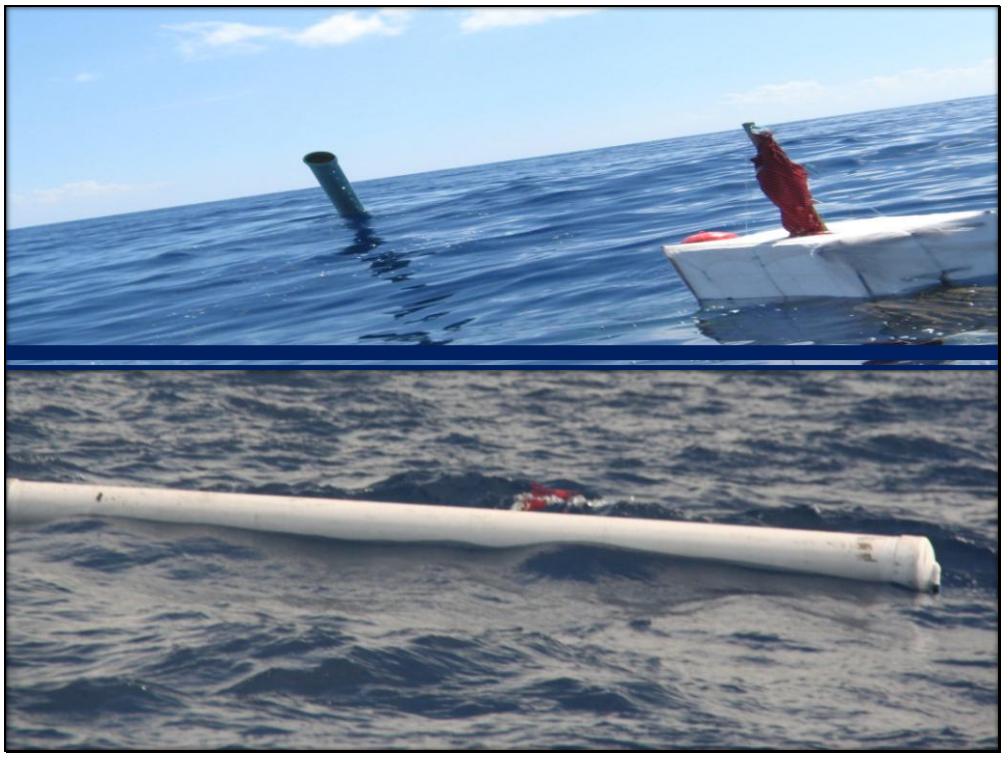

Slide 12

Problems

- At first FAD were not successful,
- FAD drop too close to shore
- Night fishing,
- Fishing hooks,
- Buoys loose their hermetic capacities,
- No database,
- No Technology (No GPS, FAD get lost due to wrong drop)
- Sabotages,
- Strong currents,
- Weather,
- Continental shell in some areas,

Solutions

- Changes in drop and design of FAD,
- Education of the fishermen on FAD,
- Teach the fishermen how to fish in strong currents,
- Fishermen catch bonitos,
- New stronger FAD are hurricane resistant,
- New PVC design,
- Technology

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The Importance of Fishing Associations

- Educate the members of Fishing Associations to learn all aspects of FAD (Technology, all steps of assembly, drop, repairs, new adapted models)
- Fishermen could put together resources to create FAD and do repairs.
- Follow-up
- Promote commercialization of fish, specifically during high season.(loss due to abundance)
- Giving a percentage of the daily catch to the Association could:
  1. Help the community,
  2. Enable the fishermen to buy a new FAD,
  3. Purchase coolers and freezers to conserve the fish longer (vs. salted)

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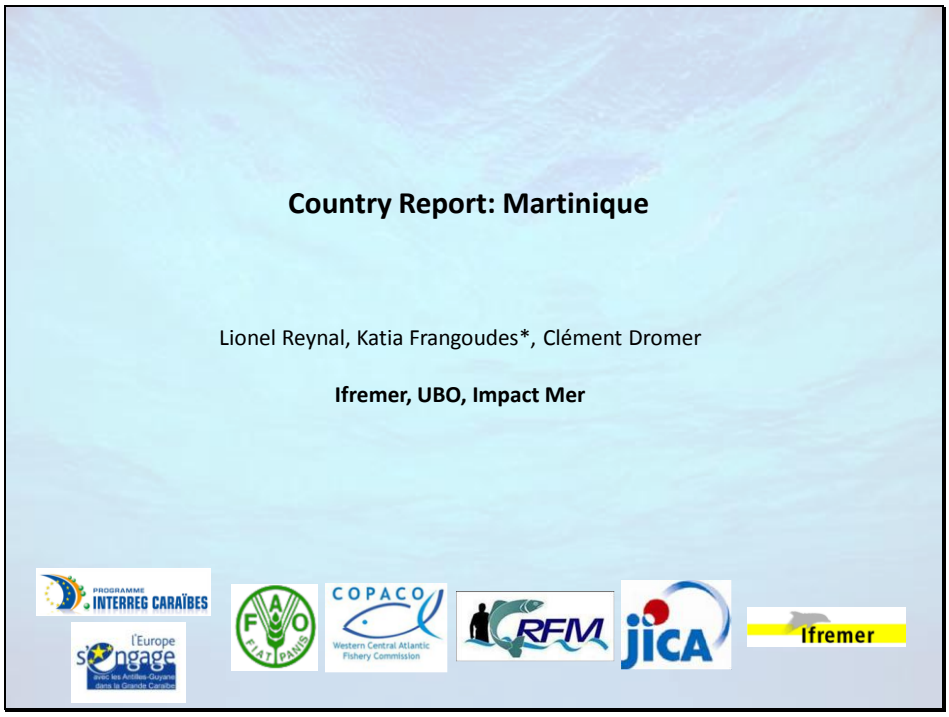
Martinique Country Report

Slide 1



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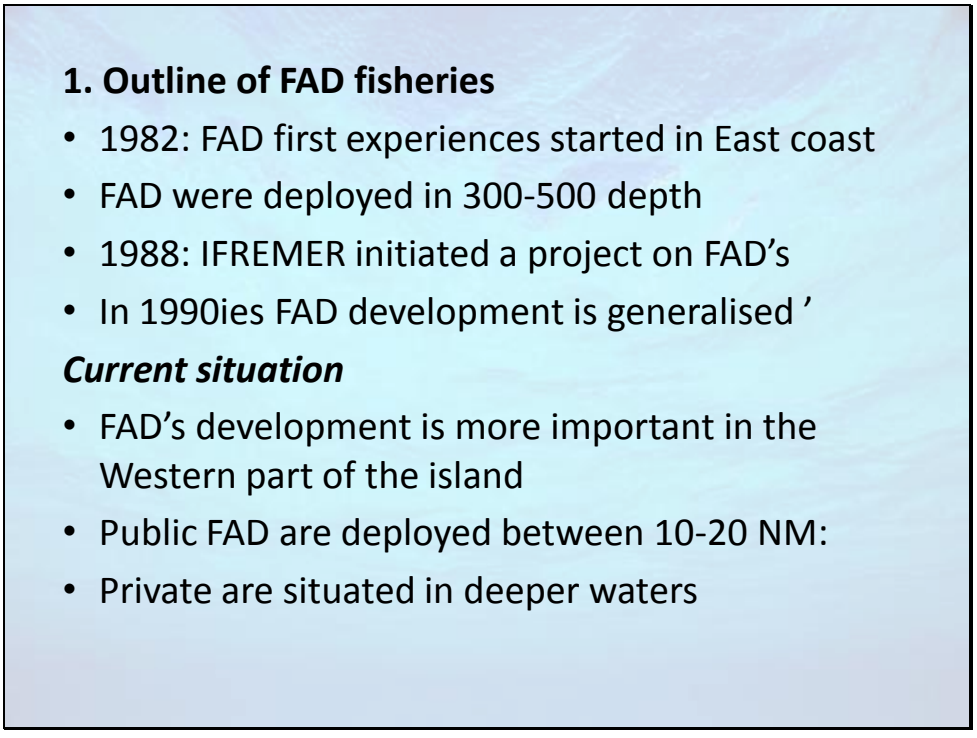


Slide 3

Fishing fleet

- 303 undocked boats operate around FAD's (outboard engines)
- 76 are more specialising in FAD's
- Undocked boats/ no authorise further to 5 NM
- Decked boats authorise further to 20 NM
- Both operated often further

Landings are composed

- Blue Marlin 35 to 44%
- Yellow tuna 15 to 31%
- Bonitos 16 to 21%
- Dolphin 4 to 6 %
- Black fin tuna 3-5%

Each Fishing trip: 55 to 84kg average

With a **total Annual landings: 400 tons**

Slide 4

Landings points:

99 with refrigeration equipment

Fish is sold at local level and prices

- 8-10 € for blue marlin
- 10 € for yellow fin tuna and black tuna

Data collection

- IFREMER: Fisheries Information System (2009)
- 2 methods to collect information :
- Telephone (75 interviews/week)
- Sampling at landing places (10 boats/5 working days)

Slide 5

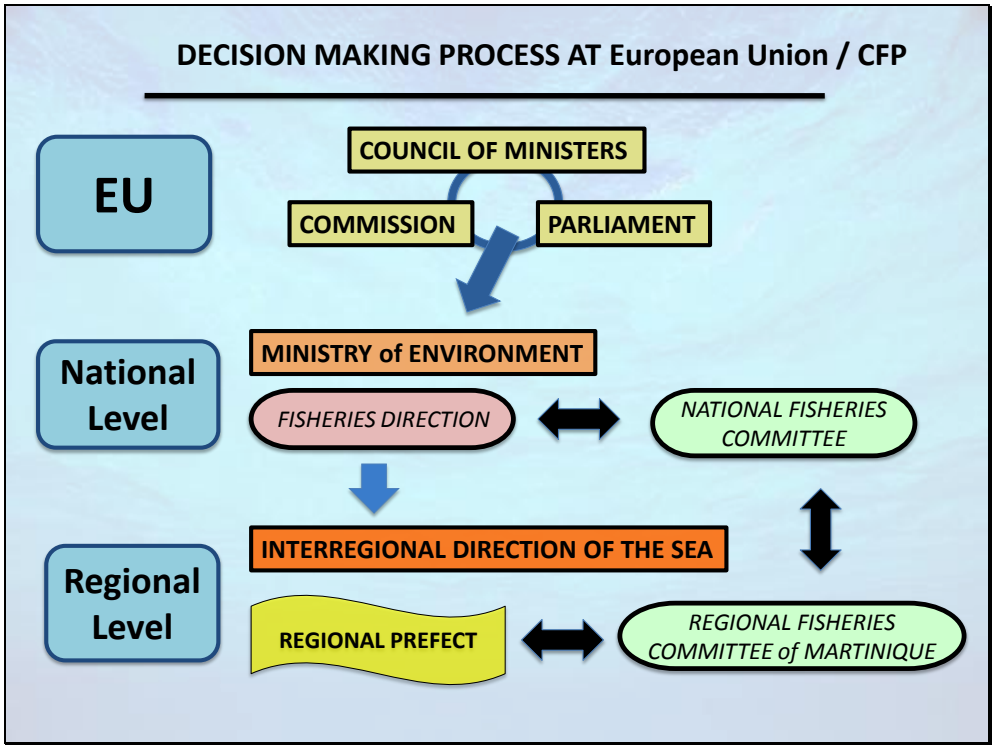
Registration and licenses

- Fishing boats are in possession of fishing license, security certificate, etc
- Fisher is declared at the social security system of fishers
- Different administrations are in charge of licence deliverance : Direction of the Sea, Customs, etc...

Be fisher means ACCESS to

- Fisheries resources, training,
- Social insurance (health, retire pension, others
- Elect fishers representatives, etc...

Slide 6



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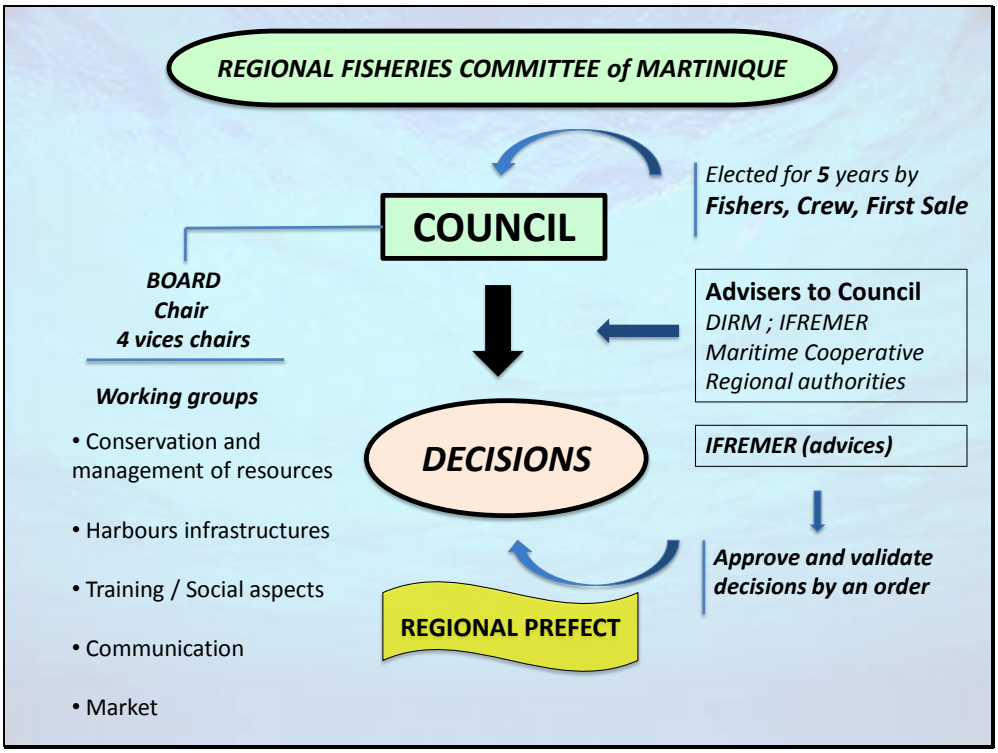


Slide 8

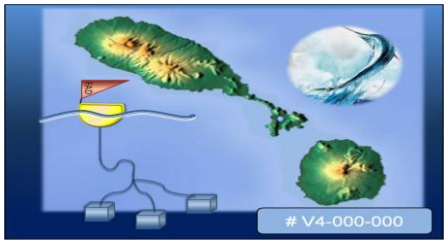
Martinique: Rules and regulations for FAD Fisheries Management / CRPM

- 1996: CRPM regulate FAD deployment and access
- Authorisation for Temporary Occupation of the Sea
- Access Limited to fishers / licence
- Fees for the licence / maintenance of FAD
- Authorise fishing gears (Surface or subsurface trawling line, drifting vertical line)
- Decision was valided by the Prefect / Order n° 962941 of 30/12/1996

St. Kitts and Nevis Report

Slide 1

St. Kitts and Nevis



Update on CARIFICO Project
December 2013
SVG

Samuel Heyliger
Fisheries Officer (St. Kitts)

1

Slide 2

Activities November 2013 – April 2014

- Group Meetings
- Replace Lost FAD
- Deploy New FAD
- Repair damaged FAD
- Design FAD Licence

2

Slide 3

Activities November 2013 – April 2014 con't

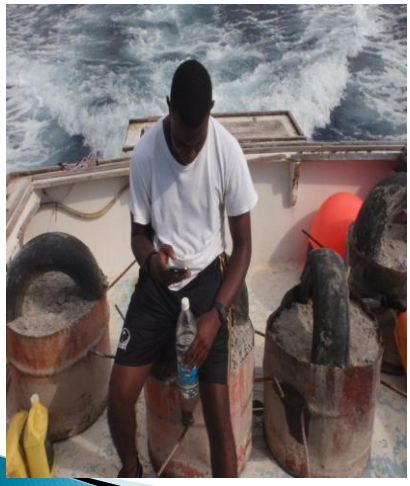
- Demonstrate use of "Chum Bag"
- Deploy Additional FADs
- Submit Market improvement Project for Funding
- Data collection
- Employment of Liaison Officer

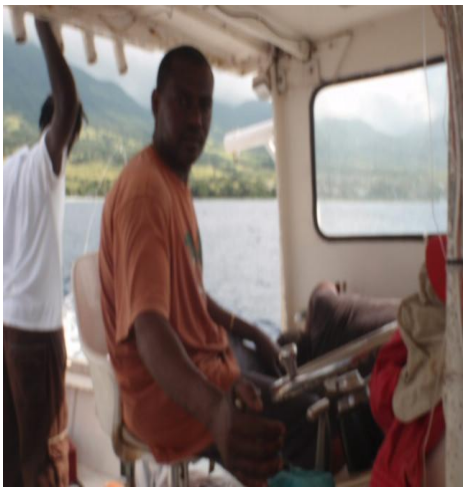
Slide 4

FAD Loaded and Ready to Go

Slide 5

Heading for FAD location





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Slide 6

FAD Repair Mission

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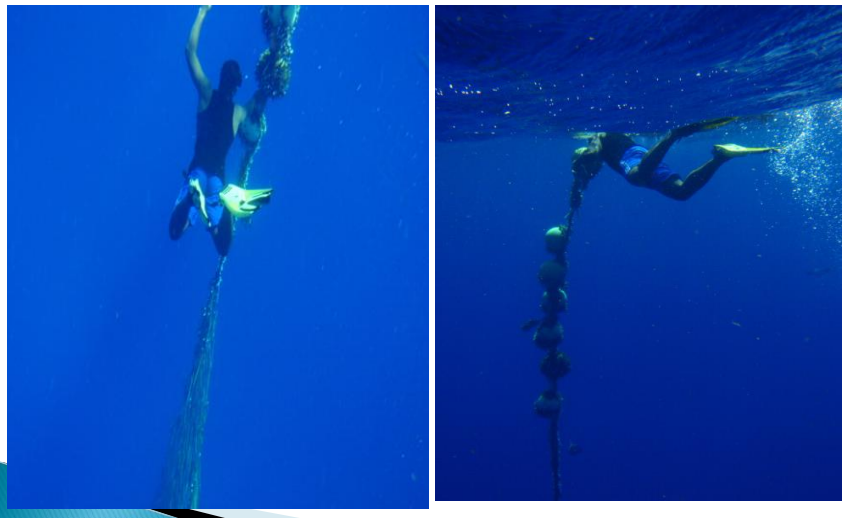
Slide 7

Checking and Repairing



Slide 8

Okinawa/Fiji Experience

- Cultural Difference
- Multiplicity of Products on sale at Fisheries Cooperatives
- The alternatives to Coastal Capture Fisheries
- The Empowerment of FCAs through Legislation
- Safety at sea issues
- Knowledge exchange

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Slide 10

Extension Officers in Fiji

Slide 11

Safety at Sea issues

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Outputs and Activities for Market improvement Project

Fishers have little difficulty selling large pelagic/:Workshop

Fish handling/Demonstration at sea and on shore at Complex.

Slide 18

Outputs and Activities con't

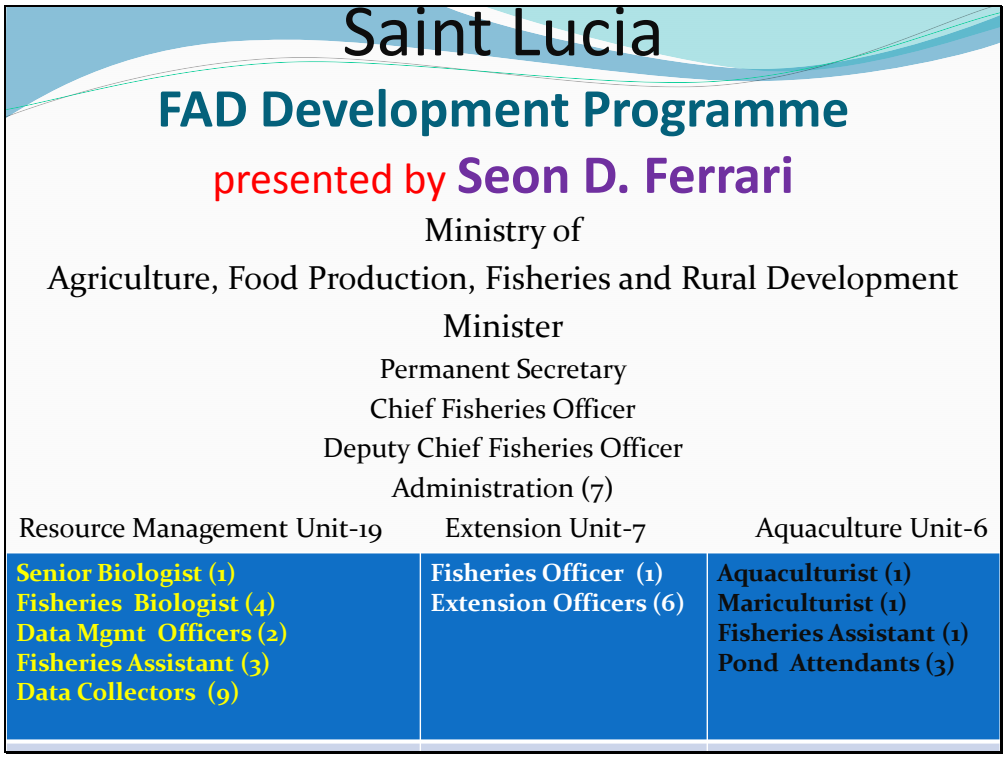
- Fish is sold as customers require/:(Workshop on Product development)
- Demonstration on handling for processors
- Processing for specific product (Value added)
- Demonstration and tasting (public and media)
- National Eat Fish day

Slide 19

THANK YOU!!!

St. Lucia Country Report

Slide 1



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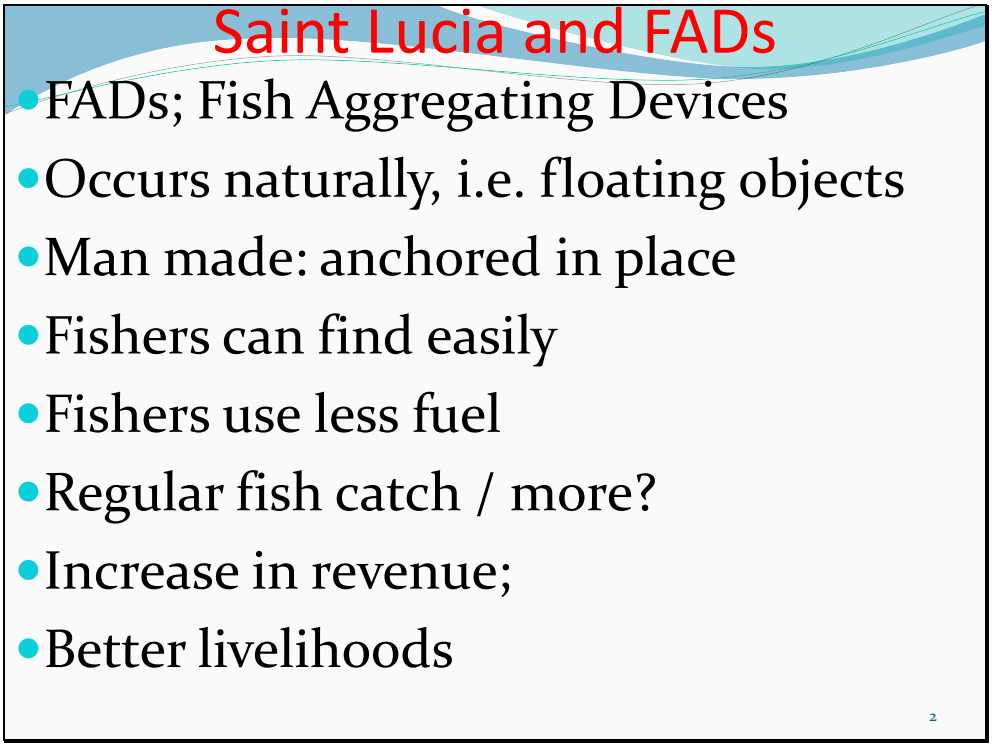


Slide 3

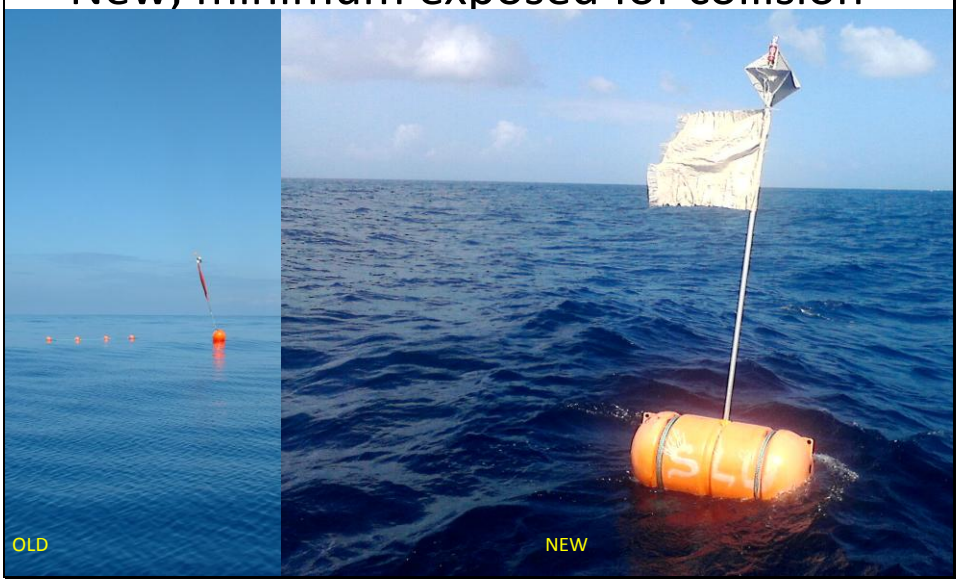
Saint Lucia and FADs

- Started in the early 90's [late 80's]
- Funding and designs from Japanese, French, EU and other friends
- Funds from GOSL
- Fishers' Co-ops [MOU?]
- Fishers [FAD benefits realised]
- Requires; Sustainable Mgmt Plans and durable yet cost effective design(s)

3

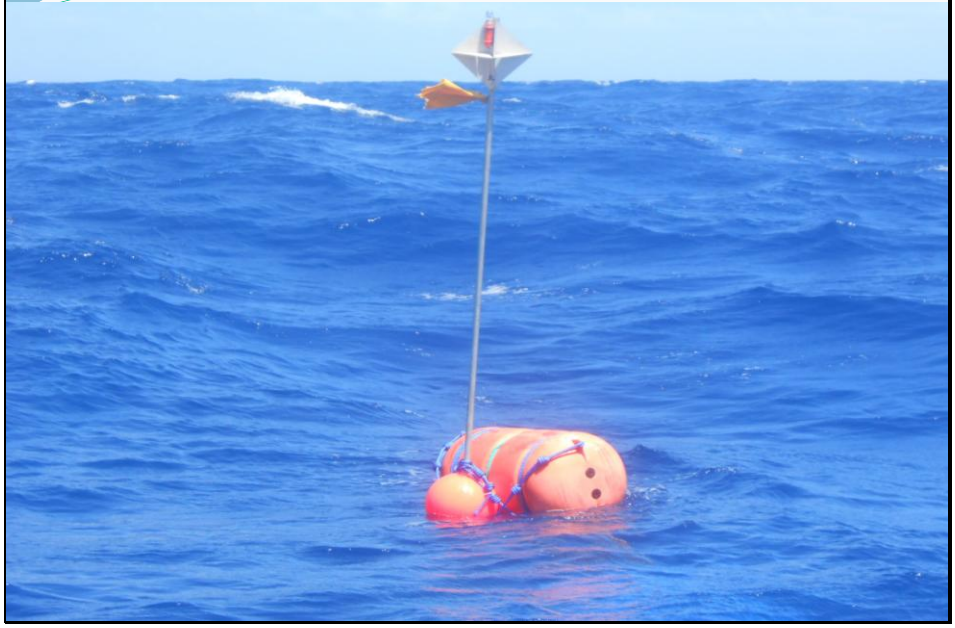
Slide 4

FAD design: old vs "new"
New; minimum exposed for collision



Slide 5

SLU Vieux Fort FAD[nd]

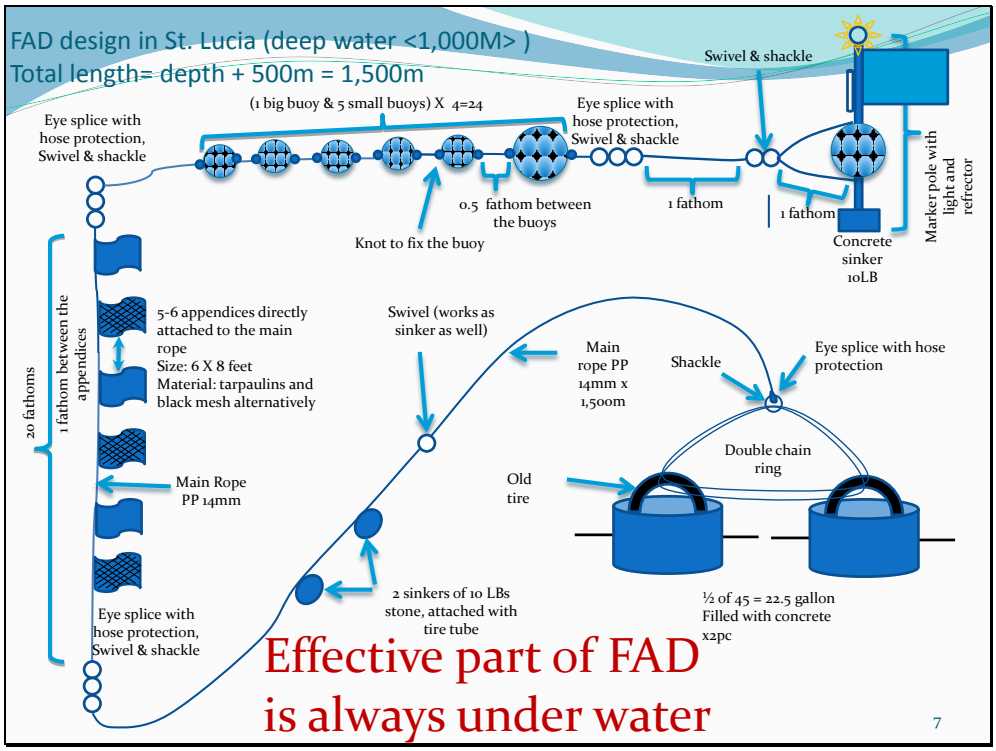


Slide 6

FAD; what is seen and not seen

- The pole with light, flag and RADAR reflector is primarily for fishers to locate the FAD.
- It also serves to minimise collision with marine traffic.
- Buoys to keep attraction devices up in water column.
- Anchors, rope, chain, other items …
- KISS; Keep It Simple Seon

Slide 7



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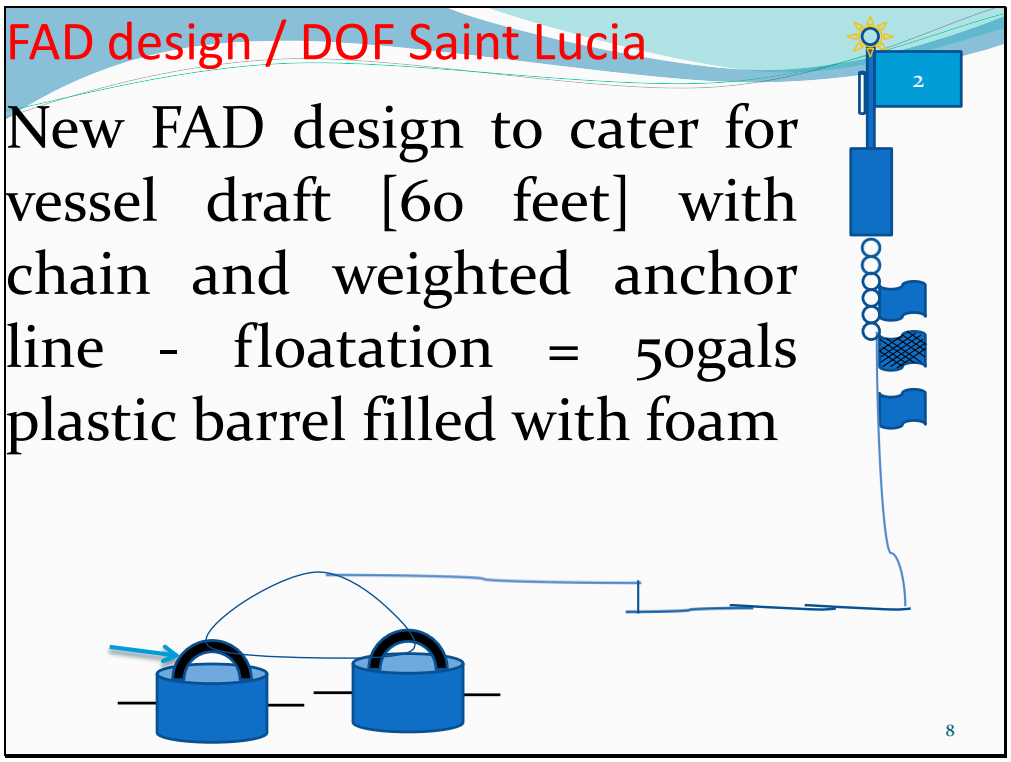

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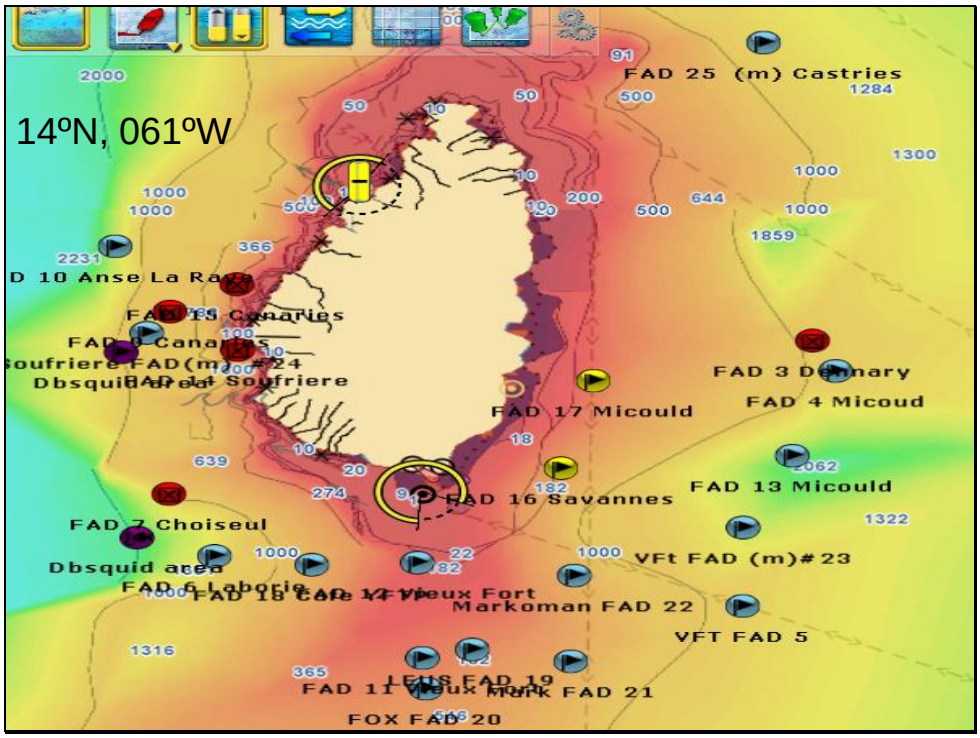

Slide 10

SLU / FADs the way forward

- Research and Development
- Assessment of new fisheries [DBS]
- Technology transfer / Co-mgmt
- Boat to throat concept [quality]
- Fishing efforts [mother-ship?]
- Sustainable Management Plans
- Information sharing [Countries]
- Data Collection

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Slide 11


Email: seon.ferrari@govt.lc
QUESTIONS?
THANK YOU
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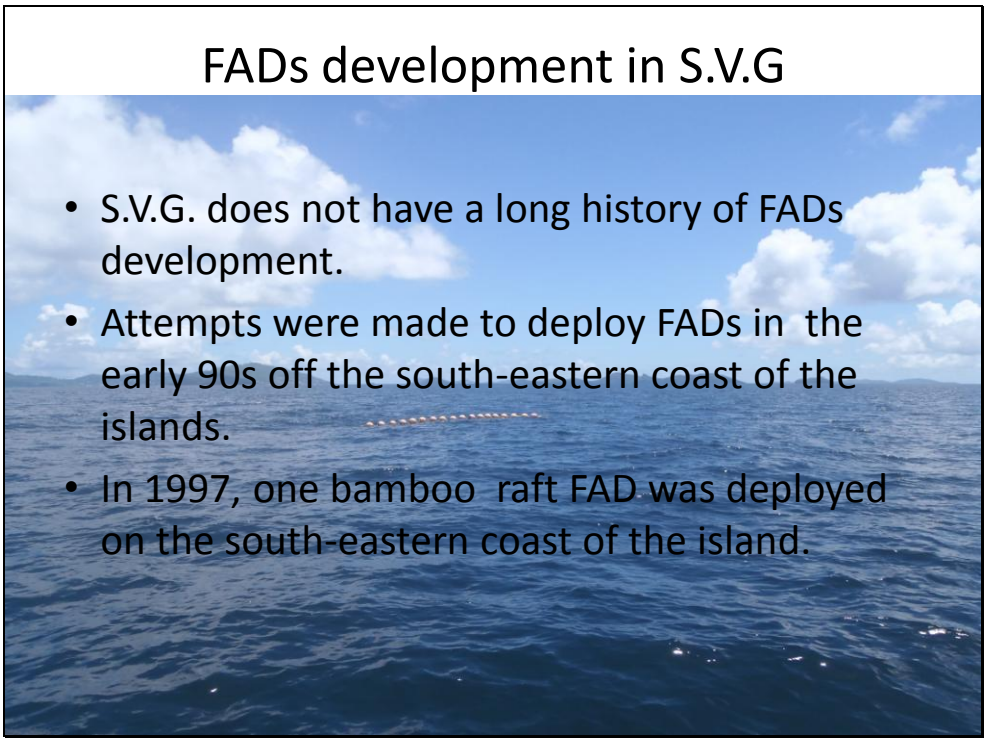
11

St. Vincent and the Grenadines Country Report

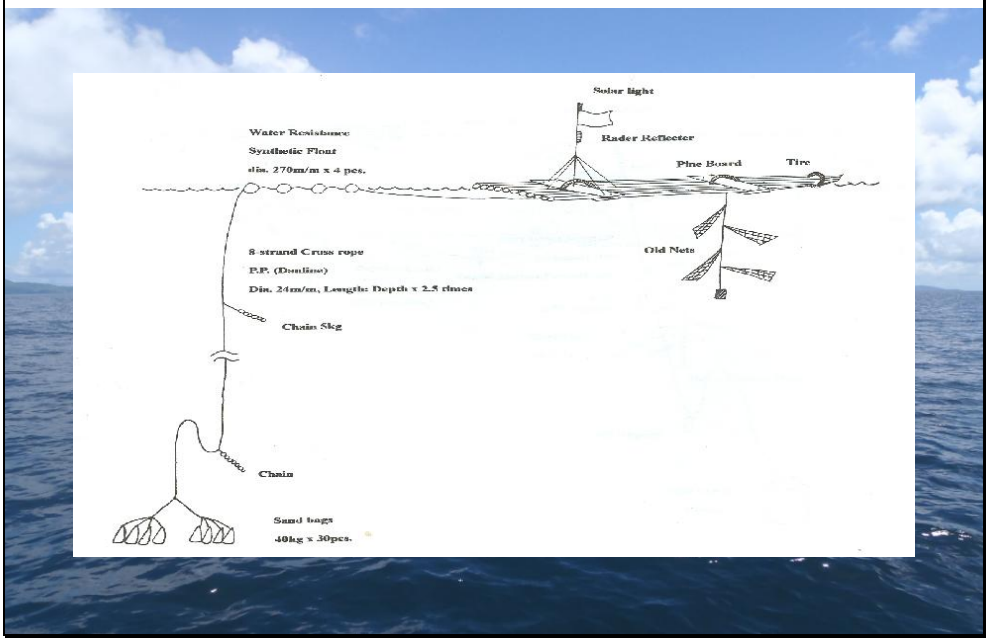
Slide 1

Slide 2



Slide 3

Bamboo raft FAD deployed



Slide 4

FAD Development in S.V.G.

- On March 19th 2010, the Fisheries Division deployed two single head buoy FADs on the eastern coast of S.V.G.

Slide 5

FAD Development in S.V.G

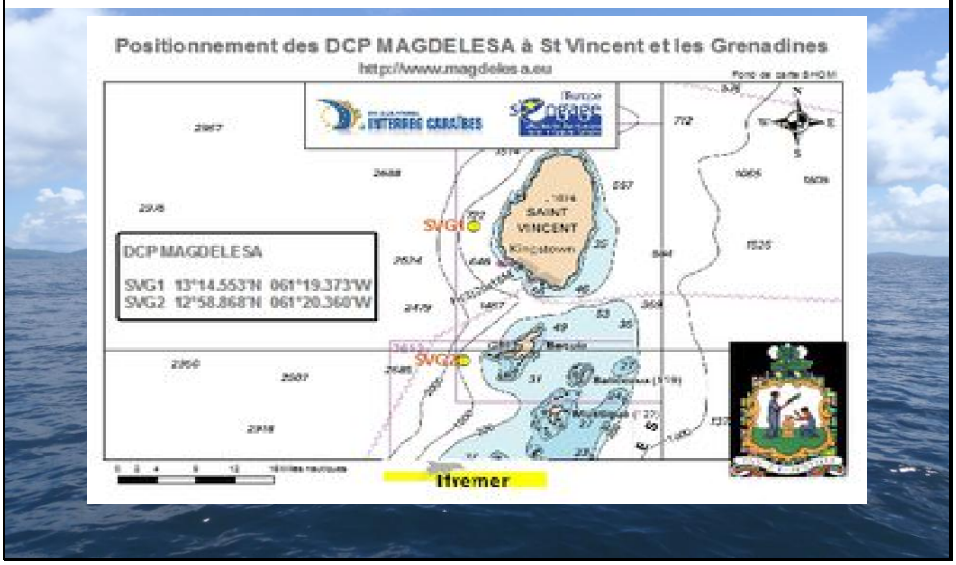
- On March 15th 2012, two buoy FADs were deployed on the western coast of S.V.G.
- The deployment of these FADs is part of a project known as the MAGDELESA project and was done in collaboration IFREMER and the Fisheries Division.
- It is a single head buoy FAD with a GPS indicator that give real time information on the floatation device present position.

Slide 6

FLOATATION DEVICE OF THE MAGDELESA PROJECT

Slide 7

Location of FADs



Slide 8

FAD MANAGEMENT

- The policy of the Fisheries Division at present:
- - work in partnership with the industry stakeholders in constructing and deploying FADs.
- Provides some level of control on the number of FADs being deployed and the areas where they are deployed.

-Individual FAD ownership is not encouraged.

Slide 9

FAD MANAGEMENT

- Co-management and partnership approach is encourage.
  - work with FAD stakeholders
- Presently:
  -No qualification or permission is required to fish around FADs.
  -No fees are collected or charged for FAD fishing.

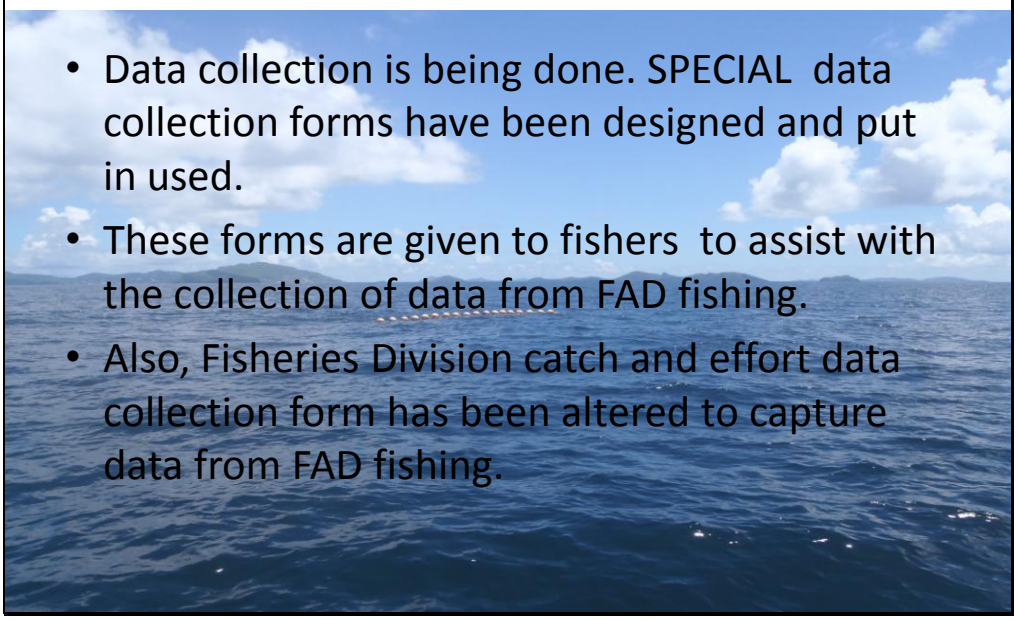
Slide 10

FAD MAINTENANCE

- The maintenance of the FADs are being done in partnership with the fishermen who fish the FADs and the Fisheries Division.

Slide 11

Data collection



- Data collection is being done. SPECIAL data collection forms have been designed and put in used.
- These forms are given to fishers to assist with the collection of data from FAD fishing.
- Also, Fisheries Division catch and effort data collection form has been altered to capture data from FAD fishing.

Slide 12

FAD data collection form

Date: _____ Departure from Landing Site: _____ a.m./ p.m. Arrival at Landing Site: _____ a.m./ p.m.

Boat I.D: _____ Captain: _____

FAD I.D # _____ Fuel consumption $ _____			FAD I.D # _____ Fuel consumption $ _____		
Main Gear Used: TR/HL/DL/RR			Main Gear Used: TR/HL/DL/RR		
Total wt caught: _____ lb/kg			Total wt caught: _____ lb/kg		
Total number of fish: _____			Total number of fish: _____		
Individual Species Data			**Individual Species Data**		
Specie	**Number**	**Weight (lb/kg)**	**Specie**	**Number**	**Weight (lb/kg)**
Skipjack Tuna			Skipjack Tuna		
Yellowfin Tuna			Yellowfin Tuna		
Bullet Tuna			Bullet Tuna		
Frigate Tuna			Frigate Tuna		
Blackfin Tuna			Blackfin Tuna		
Big Eye Tuna			Big Eye Tuna		
Albacore Tuna			Albacore Tuna		
Little Tunny			Little Tunny		
Atlantic Bonito			Atlantic Bonito		
Swordfish			Swordfish		
King Mackerel			King Mackerel		
Cero Mackerel			Cero Mackerel		
Blue Marlin			Blue Marlin		
Wahoo			Wahoo		
Dolphin fish			Dolphin fish		

Key to codes

Gear: TR = trolling; HL = hand line; DL = drop line; RR = rod & reel

Slide 13

FAD Landings August 2012 – November 2013

SPECIES	WEIGHT (LBS)
Yellowfin tuna	2358
Skipjack tuna	1279
Blue marlin	2523
Kingfish (wahoo)	634
Rainbow runners	123
Dolphin fish	1286
Blackfin tuna	2103
BONITO	368
CAVALLI	503
TOTAL	15177

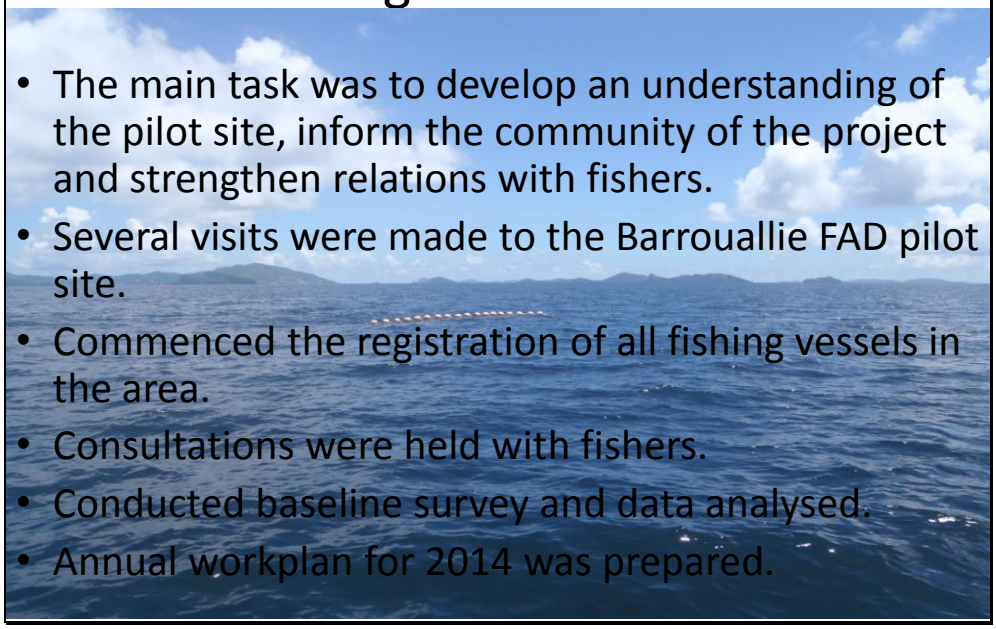
Slide 14

Caribbean Fisheries Co-Management Project (CARIFICO) S.V.G

- FAD fishery development off the west coast (Barrouallie) of St. Vincent and pot fishery for lobsters in Bequia.
- Co-Management approach will be implemented as a pilot.
- The Barrouallie Fisheries Cooperative Society has been identified to participate in the project.

Slide 15

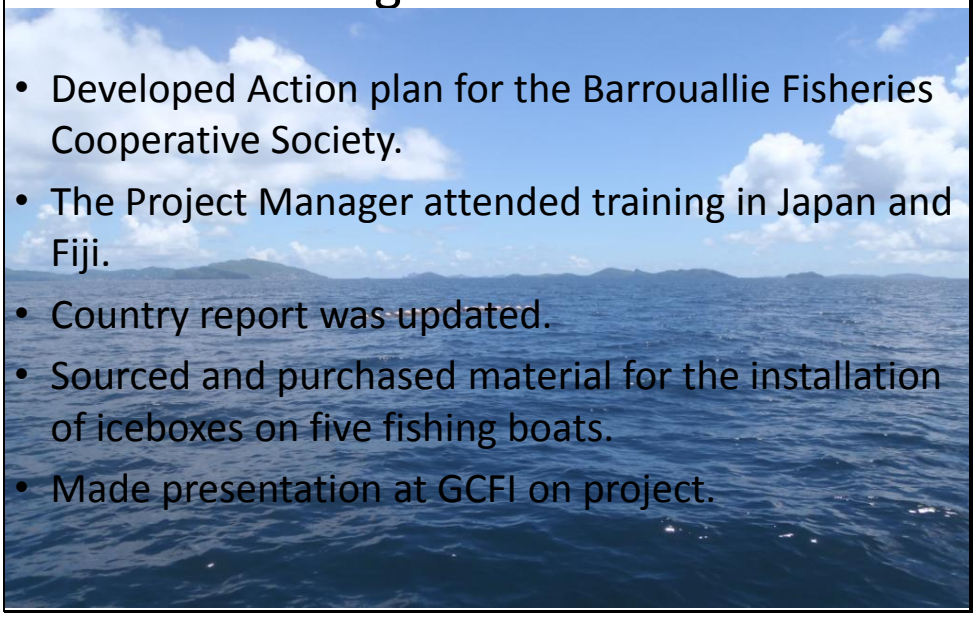
Progress to date



- The main task was to develop an understanding of the pilot site, inform the community of the project and strengthen relations with fishers.
- Several visits were made to the Barrouallie FAD pilot site.
- Commenced the registration of all fishing vessels in the area.
- Consultations were held with fishers.
- Conducted baseline survey and data analysed.
- Annual workplan for 2014 was prepared.

Slide 16

Progress to date



- Developed Action plan for the Barrouallie Fisheries Cooperative Society.
- The Project Manager attended training in Japan and Fiji.
- Country report was updated.
- Sourced and purchased material for the installation of iceboxes on five fishing boats.
- Made presentation at GCFI on project.

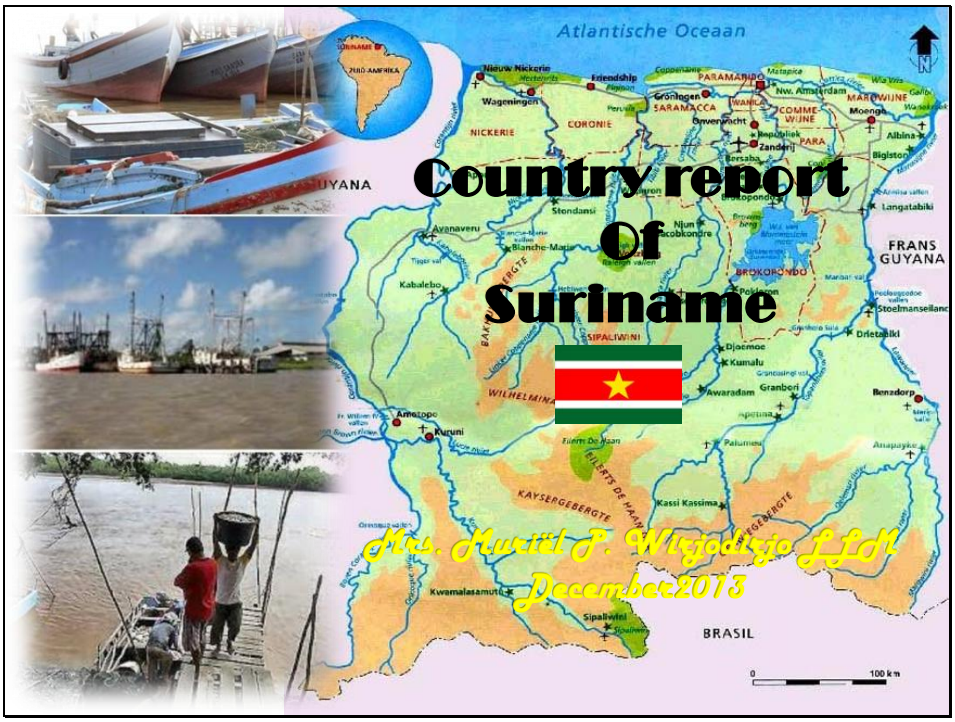
Slide 17

THANK YOU

- ANY QUESTION?

Suriname Country Report

Slide 1



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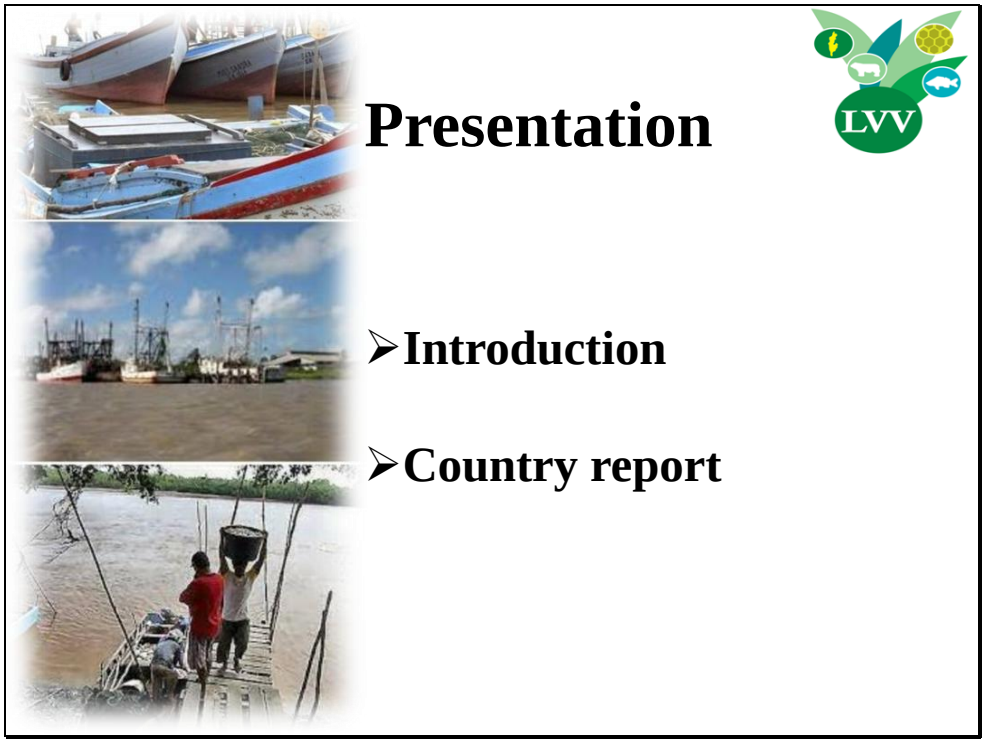

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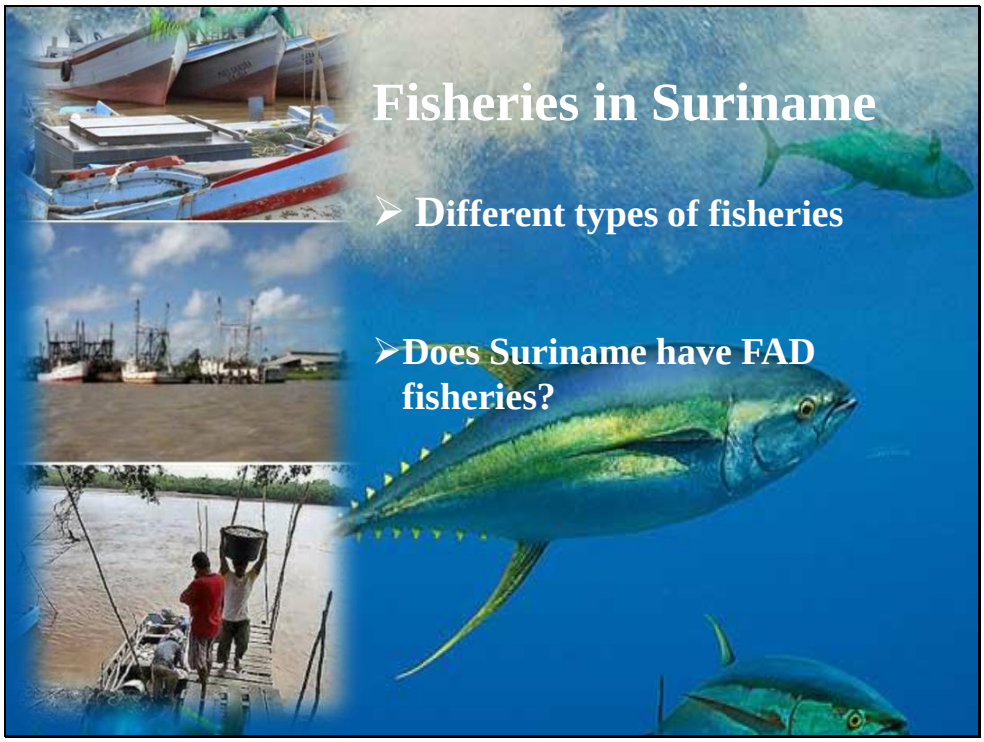

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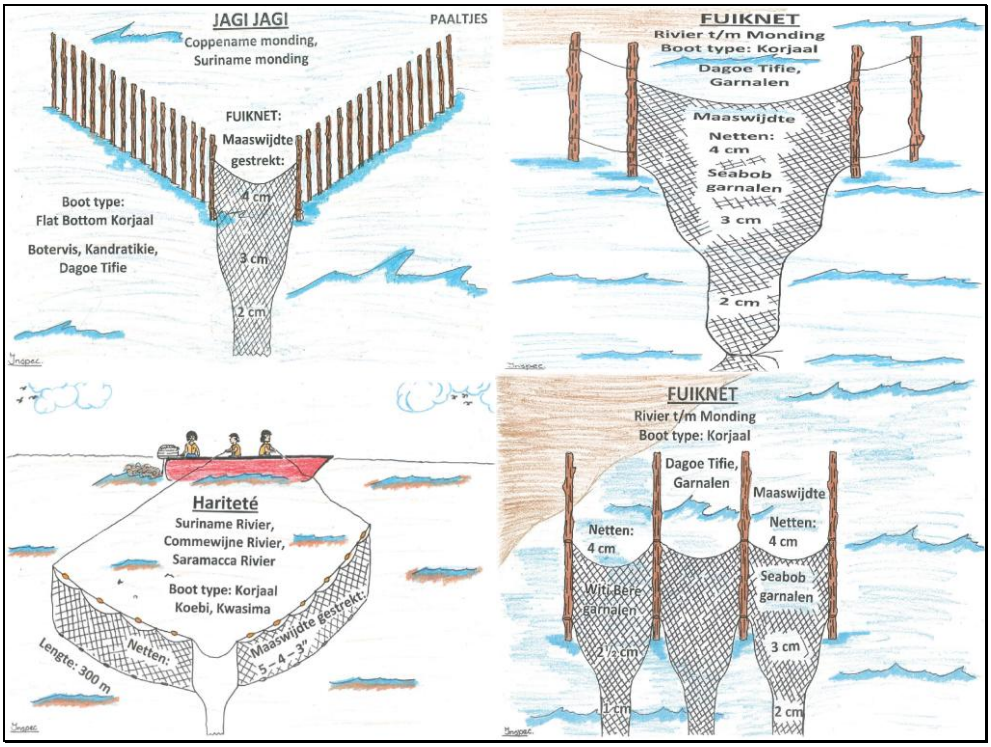

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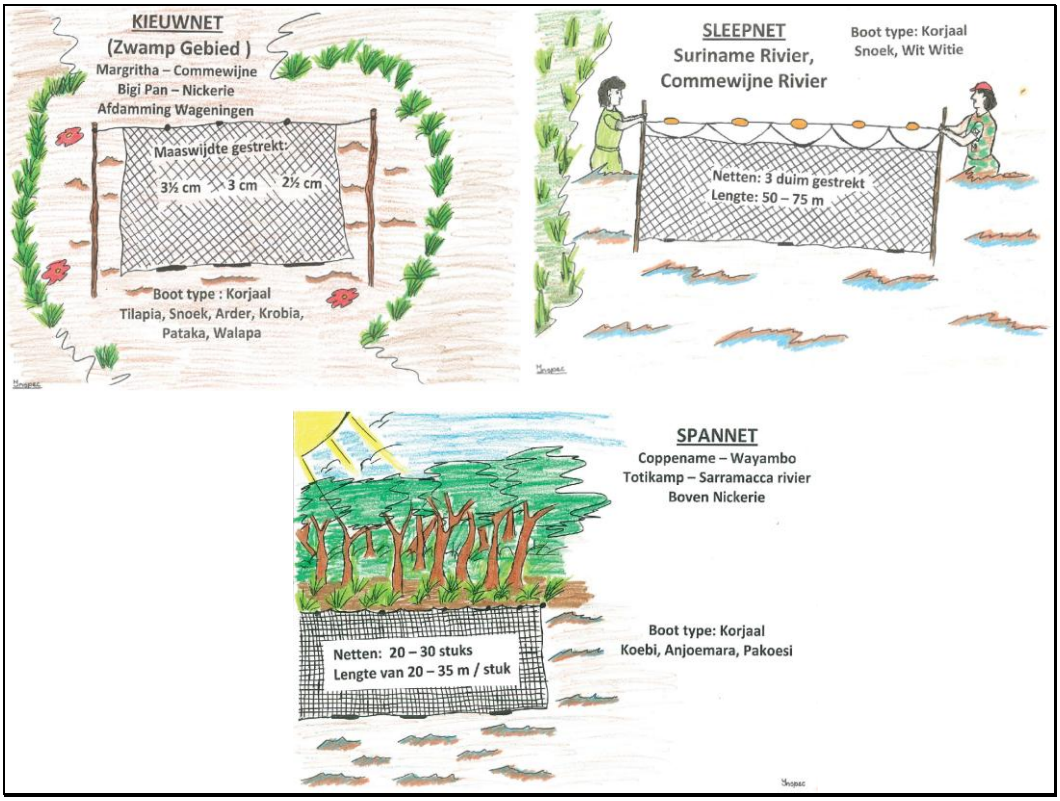

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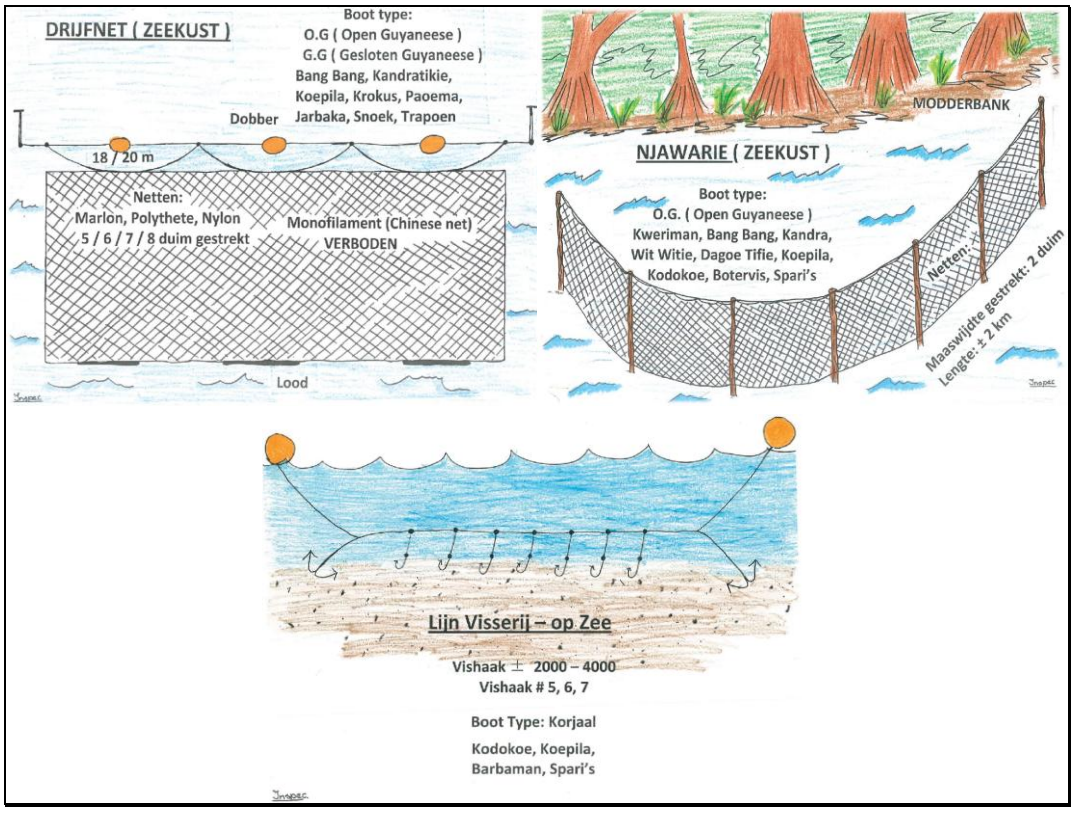

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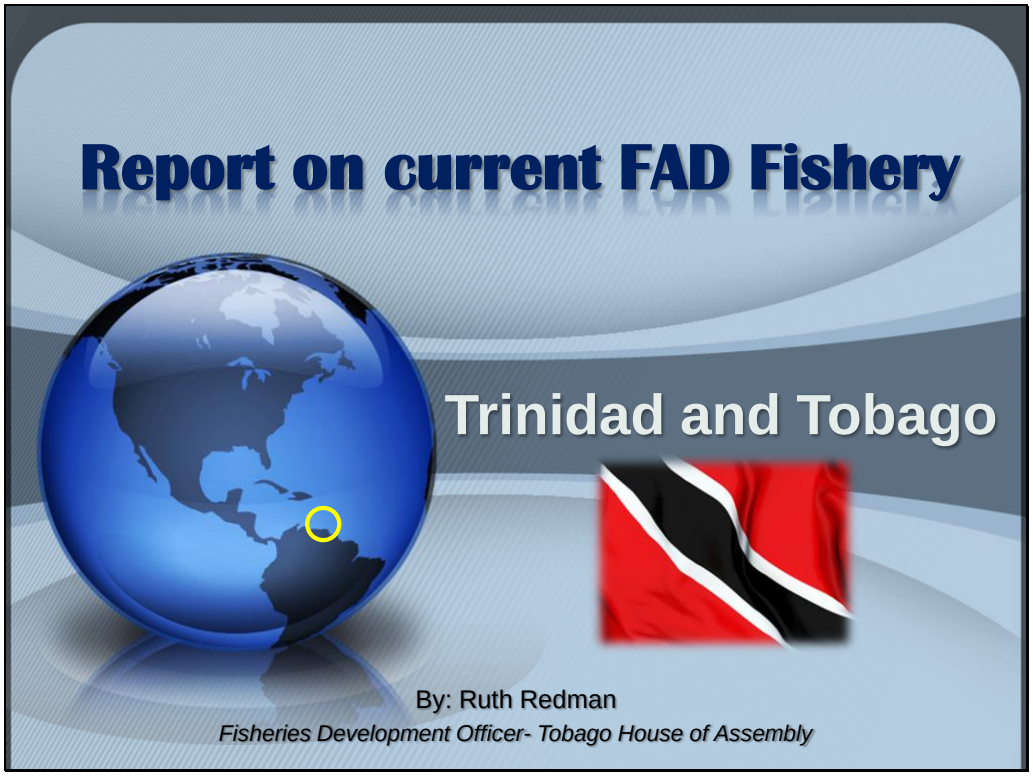
Slide 13

Trinidad and Tobago Country Report

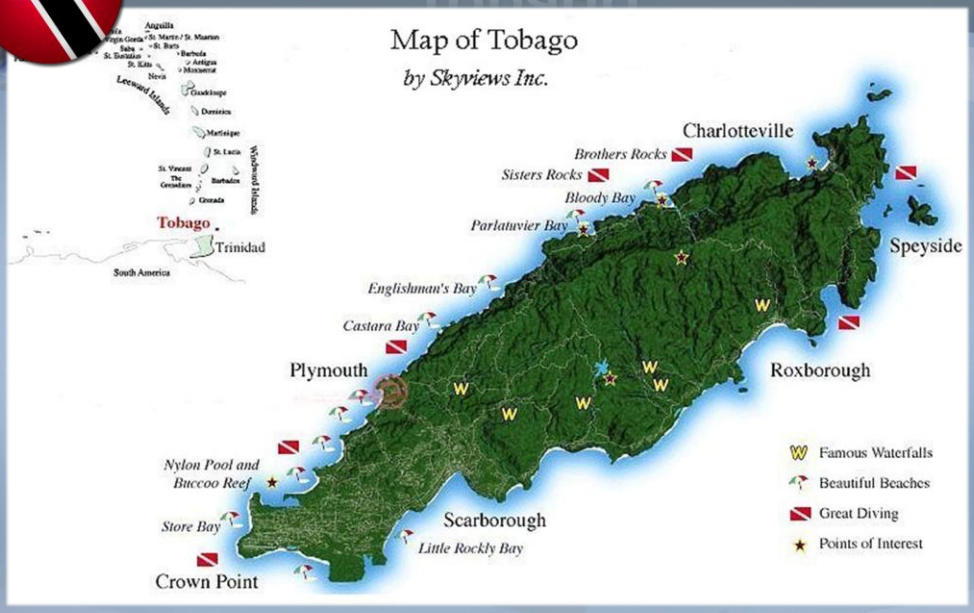
Slide 1



Slide 2

Slide 3

Tobago



Slide 4

General Information

- FAD in Tobago is associated with the Flying Fish Fisheries
  - Privately operated (Locations)
- Approximately 25% of around 400 fishers use FAD during the drift/ flying fish season
  - Flying fish season: October to June of following year

FAD in Tobago

Slide 5

Main FAD sites in Tobago

- Mt Irvine
- Pigeon Point
- Plymouth
- Buccoo
- Studley Park
- Castara
- Belle Garden
- Delaford

Slide 6

General Information

- FAD in Tobago is associated with the Flying Fish Fisheries
  - Privately operated
- Approximately 25% of around 400 fishers use FAD during the drift/ flying fish season
  - Flying fish season: October to June of following year

FAD in Tobago

Slide 7

FAD construction

- Made from mangrove wood or bamboo, different sizes of rope, buoys and nets
  - About 6-8 square feet.
- Anchored by cemented engine block or steel anchor
- Costs between $800.00 to $2,500.00 TT
- A flag of ownership may be tied to the top of the FAD

FAD in Tobago

Slide 8

The Catch

- Type of Catch:
  - Main targeted fish: Dolphin fish/ Mahi Mahi
  - Significant Bi-catch: Flying fish
  - Others: Wahoo and tuna
- Average weight of catch:
  - Dolphin: 250- 400 lbs
  - Flying Fish: 1000 lbs

FAD in Tobago

Slide 9

The Catch

FAD in Tobago

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The Catch

- Type of Catch:
  - Main targeted fish: Dolphin fish/ Mahi Mahi
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FAD in Tobago

Slide 11

The Catch

FAD in Tobago

Slide 12

The Catch

- Type of Catch:
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  - Significant Bi-catch: Flying fish
  - Others: Wahoo and tuna
- Average weight of catch:
  - Dolphin: 250- 400 lbs
  - Flying Fish: 1000 lbs

FAD in Tobago

Slide 13

The Catch

- Method of fishing: Trolling
  - Fisher would drive the boat slowly around the FAD with baited hook on a line
  - Dolphin would follow baited line and is caught
  - Net that is hung with FADs trap flying fish
- After the catch:
  - FAD fish not differentiated from fish caught by other methods
  - Fishers make their own arrangements for their sale

FAD in Tobago

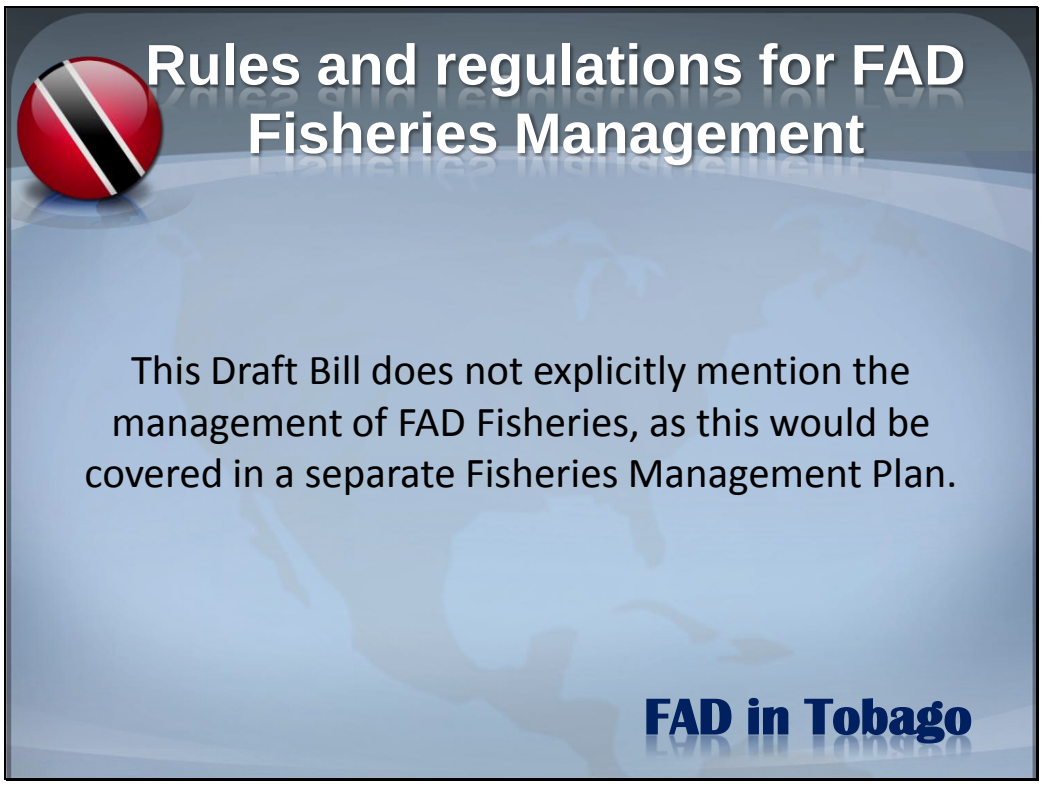
Slide 14

Registration and Licenses

Currently, legislation does not allow for registration and licensing of FADs; However, there is a draft Fisheries Management Bill which addresses this issue.

FAD in Tobago

Slide 15



Slide 16

Slide 17

Catch and Effort Data

There is no differentiation in data collected of the catch from FAD fishing against other fishing methods.

Presently:

- Random sampling of 8 out of 28 landing sites in Tobago
- Sites: Castara, Plymouth, Pigeon Point, Buccoo, Mt. Irvine, Studley Park, Roxborough and Charlotteville
- THA has approved employment of 17 additional data collectors to comprehensively cover our Fisheries

FAD in Tobago

Slide 18

Fishermen's Organization

- More than 10 fishermen organizations
  - 4 are well-organized with good structure
- All Fishing Organizations fall under the umbrella of the "All Tobago Fishermen Association" (ATFA).
  - This functions as the voice of Tobago's Fisherfolk on the national organization, "Trinidad and Tobago Unified Fisherfolk" (TTUF)

FAD in Tobago

Slide 19

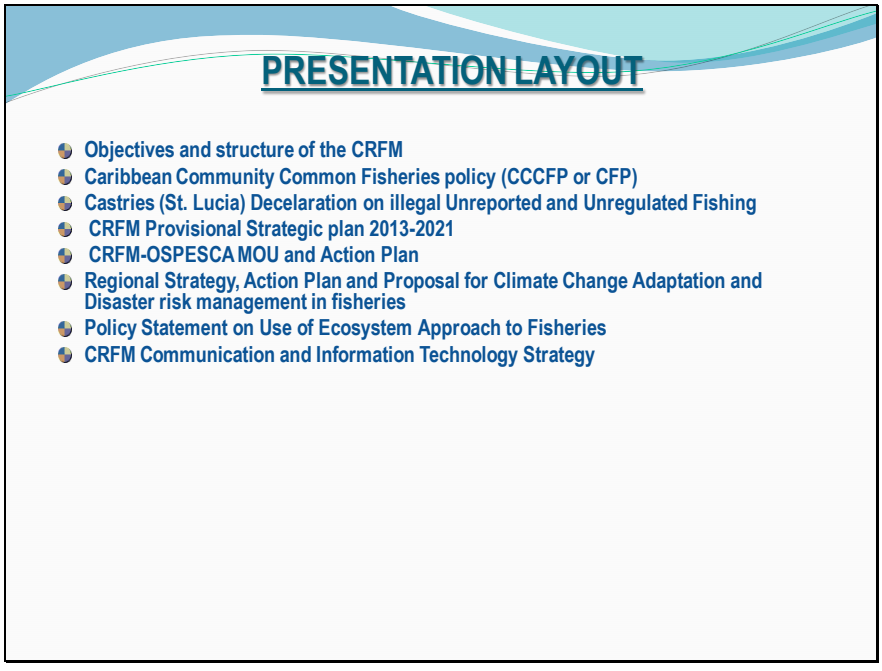
Slide 20

APPENDIX 5: SUPPORTING ACTIVITIES OF ORGANIZATIONS

CRFM- Recent policy developments of relevance to FADs

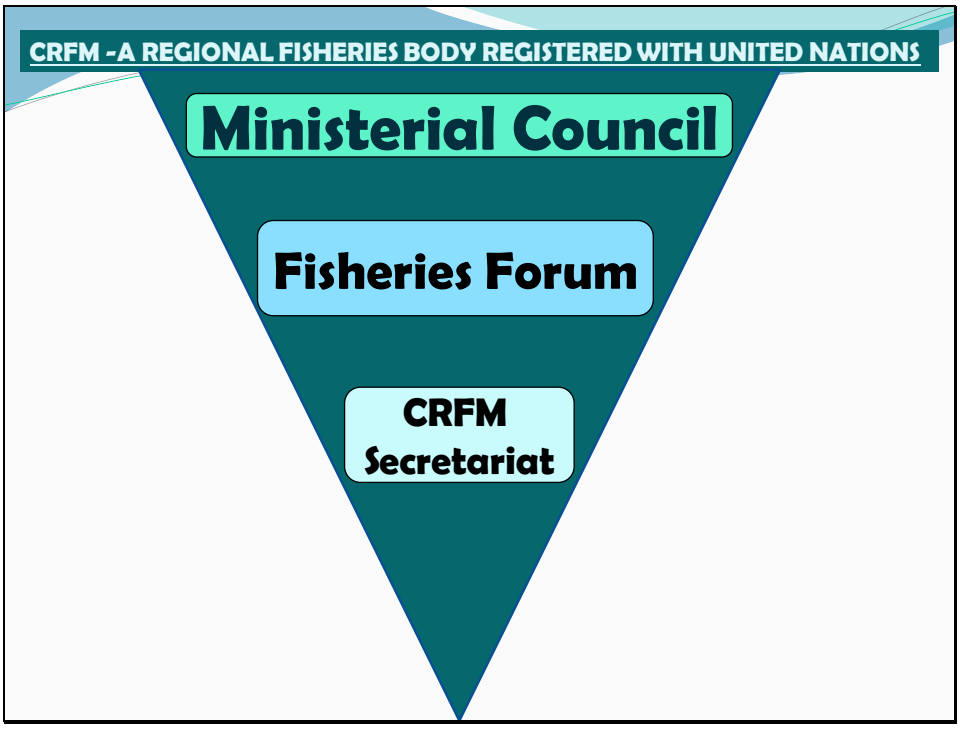
Slide 1

Slide 2



Slide 3

Slide 4



Slide 5

CARICOM COMMON FISHERIES POLICY (CCCFP)

- HEADS OF GOVERNMENT DIRECTIVE IN 2003 → CRFM ASSUMED RESPONSIBILITY
- ADOPTED BY CRFM MINISTERIAL COUNCIL IN 2011 →
- ADOPTED BY ATTORNEYS GENERAL IN 2013 →
- SIGNATURE BY HEADS OF GOVERNMENT IN 2014

IMPLEMENTATION - All CCCFP objectives are relevant of course

ART 6 (Scope): conservation, sustainable development & management, of resources & ecosystems; production, processing, marketing, trade of products; welfare of fishers; Waters under jurisdiction of participating states, and on board fishing vessels controlled by participating states.

Attention: Several articles address specific objectives, also reflected in scope, e.g. access to Resources, fisheries sector development, information management, public awareness
Art 20 – PROVISION FOR SPECIFIC PROTOCOLS

Slide 6

Declaration on Illegal, unreported & unregulated fishing

2006 – 2010

The CRFM's Caribbean Fisheries Forum began work in 2006 that eventually led to the adoption of the *Castries (St. Lucia) Declaration on Illegal Unreported and Unregulated (IUU) Fishing – speaks to a specific bjective of the CCCFP*

A Jamaica Defence Force soldier guards Honduran fishers who were fishing illegally for lobster and conch in Jamaican waters
Source: *Jamaica Gleaner*

2010 - present

1. A CCCFP objective
2. Updated 2005 regional report on illegal, unreported and unregulated (IUU) fishing and monitoring, control & surveillance (MCS)systems in CRFM/ CARIFORUM States.
3. CRFM-OSPESCA Joint Declaration & Action Plan identified need for cooperative action on IUU/ MCS
4. CRFM 's Forum has a Working Group on IUU fishing

Slide 7

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CRFM-OSPESCA JOINT DECLARATION & ACTION PLAN: 2012

Mandated by CARICOM & SICA Heads of Government

ACTIVITIES TO BE ADDRESSED IN THE PLAN :

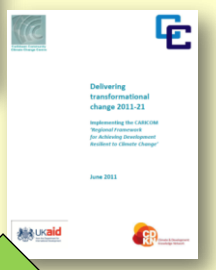
1) SPINY LOBSTER
2) MIGRATORY PELAGIC FISH STOCKS
3) ILLEGAL FISHING & CONTROL & SURVEILLANCE
4) AQUACULTURE
5) QUEEN CONCH
6) INVASIVE SPECIES, WITH EMPHASIS ON LIONFISH
7) INTRA-REGIONAL TRADE, MARKETING AND CONSUMPTION
8) DISASTER RISK MANAGEMENT & CLIMATE CHANGE RESILIENCE AND ADAPTATION STRATEGIES
9) SMALL-SCALE FISHERIES & LIVELIHOOD SECURITY
10) DEVELOPMENT OF UNDER-UTILIZED AND UN-UTILIZED AQUATIC RESOURCES
11) CAPACITY BUILDING
12) LONG-TERM REGIONAL WORK PROGRAMME
13) LONG TERM FISHERIES AND AQUACULTURE POLICY

Slide 10

Regional Strategy, Action Plan and Proposal for Climate Change Adaptation and Disaster risk management in fisheries

Comprehensive Disaster Management Strategy and Programme Framework

Regional Framework for Achieving Development Resilient to Climate Change



Implementation Plan (IP) for the Regional Framework

Caribbean Community Common Fisheries Policy plus numerous separate and often poorly linked fisheries, aquaculture, CCA, DRM and related initiatives at multiple scales and levels

strategy and action plan

Slide 11

Regional Strategy, Action Plan and Proposal for Climate Change Adaptation and Disaster risk management in fisheries

- CRFM /FAO /UWI/ CCCCC/CDEMA Completed assessment study in 2012 to formulate

  "*a strategy, action plan and programme proposal on disaster risk management, and climate change adaptation in fisheries and aquaculture in the CARICOM region*."

- 1^0 output - a regional strategy and action plan for integrating Disaster Risk Management, Climate Change Adaptation and fisheries and aquaculture, *with a focus on small-scale fisheries (SSF) and small-scale aquaculture (SSA)*.

Slide 12

Policy Statement on Use of Ecosystem Approach to Fisheries (EAF)

The Forum prepared a formal statement to

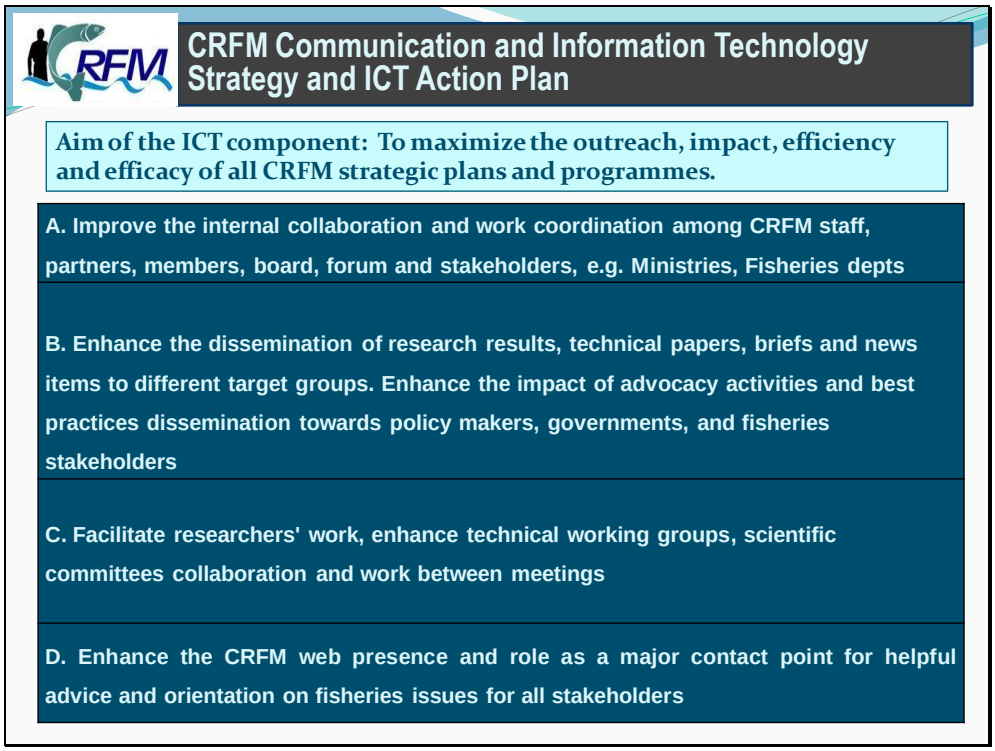
i. Acknowledge the work of FAO on the implementation EAF
ii. Acknowledge the need for further action at the regional, national and local levels to ensure long-term sustainable use and management of fisheries resources and marine biodiversity through wide application EAF
iii. Recall the provisions in the CCCFP for the application of EAF
iv. Note initial efforts and the need for continued effort by CRFM Member States and partner organisations to strengthen their commitment to EAF through fisheries policies, plans and management arrangements at regional, national and local levels.

The Ministerial Council reviewed the statement and:

i. Reaffirmed & declared EAF as a key guiding principle for the CRFM, including the Member States, in order to ensure the long-term conservation and sustainable use of marine living resources;

Slide 13

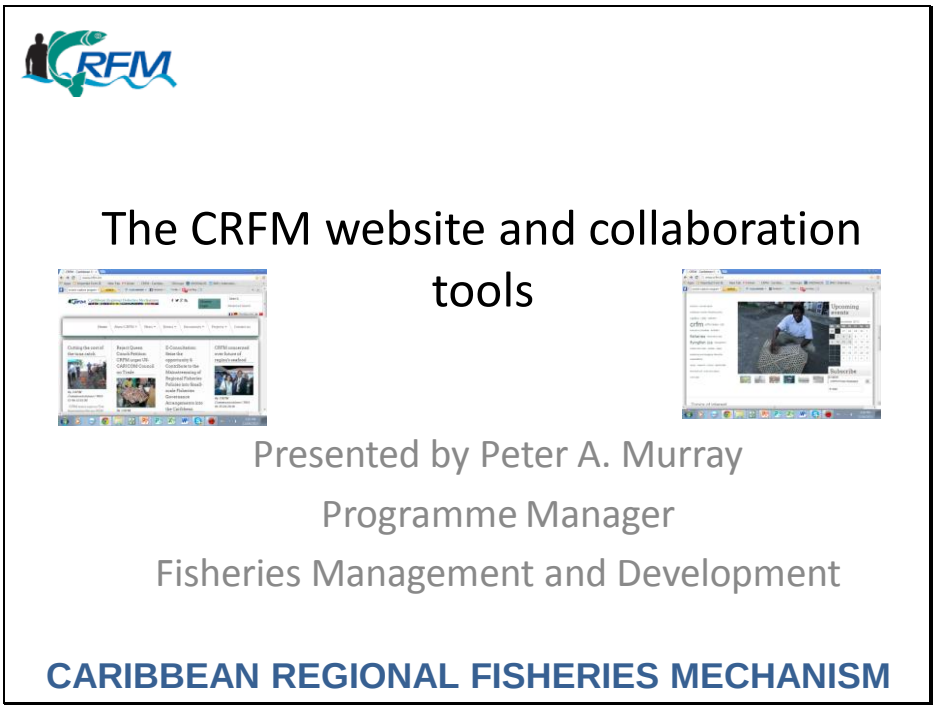
Slide 14



Slide 15

Introduction to the CRFM website and collaboration tools

Slide 1

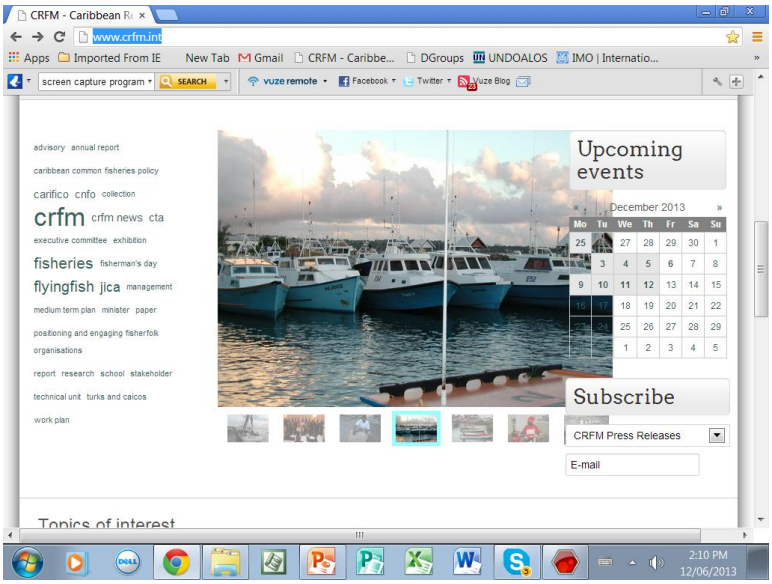


Slide 2

Slide 3

The Website

http://www.crfm.int



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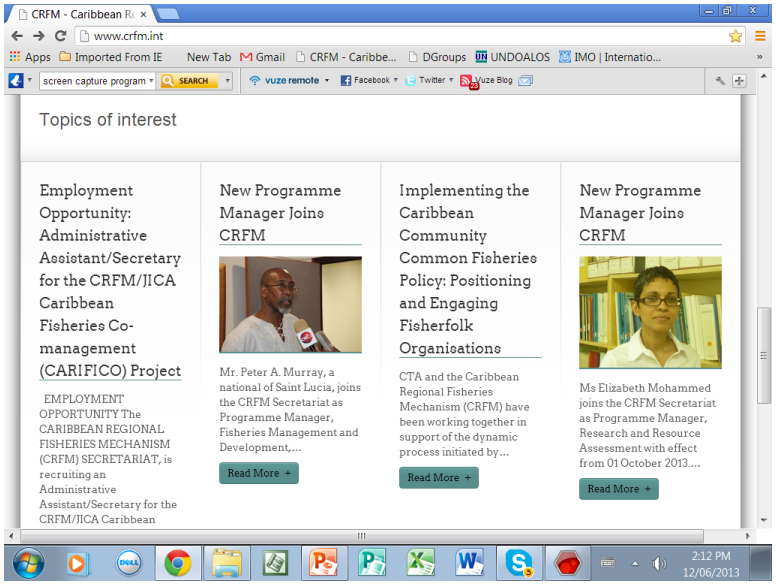
The Website

http://www.crfm.int



Slide 5

The Website

About CRFM

http://www.crfm.int

Slide 6

The Website

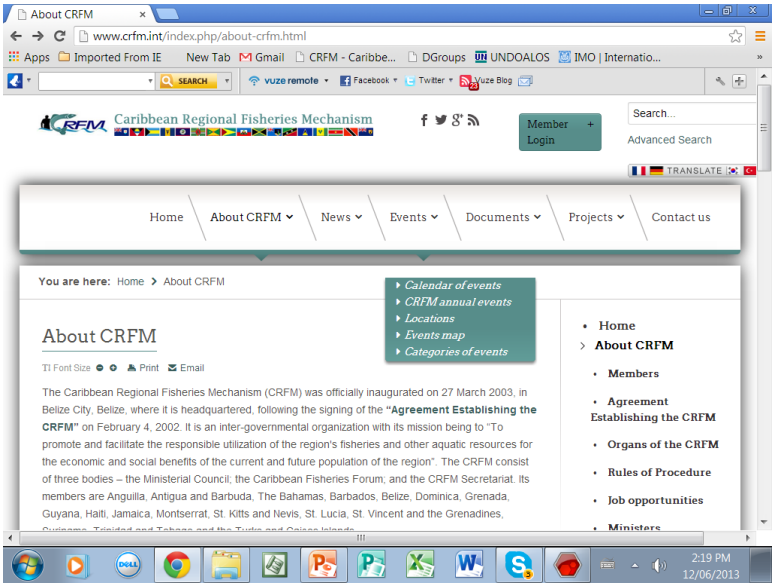
News

http://www.crfm.int

Slide 7

The Website

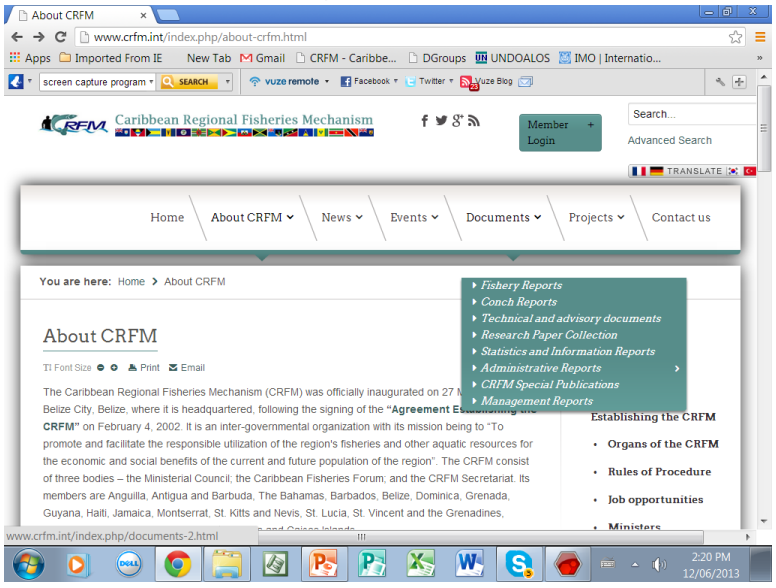
Events http://www.crfm.int



Slide 8

The Website

Documents http://www.crfm.int



Slide 9

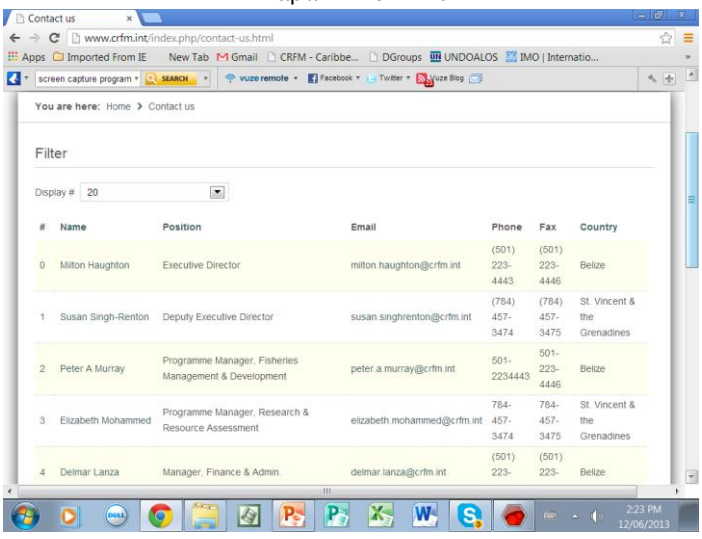
The Website

Projects http://www.crfm.int

Slide 10

The Website

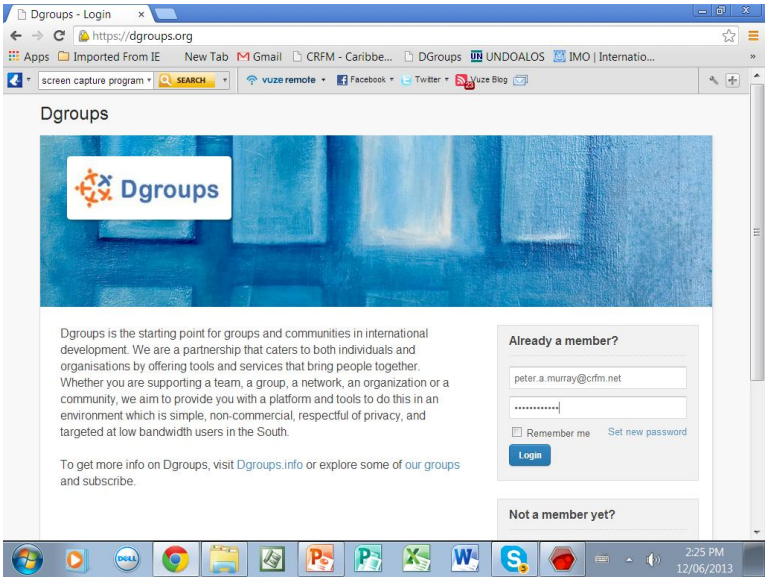
Contact us http://www.crfm.int



Slide 11

Dgroups

DGroups https://dgroups.org



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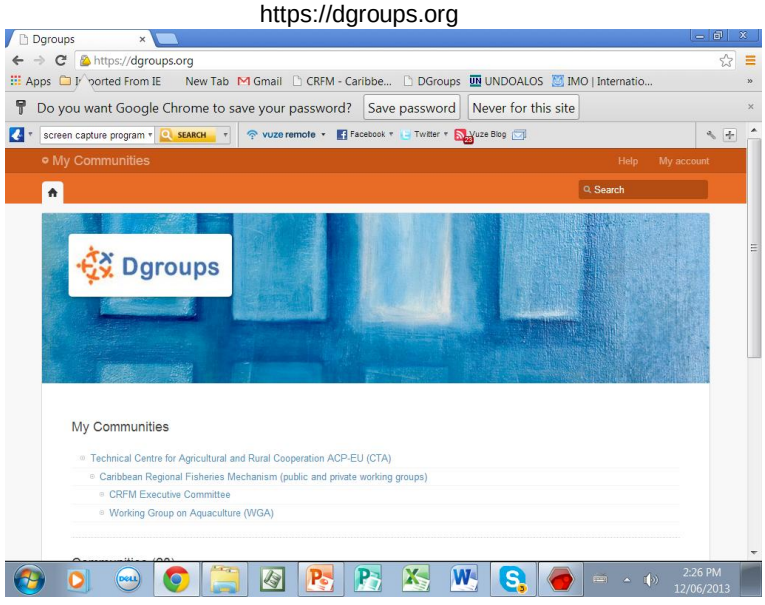
Dgroups

https://dgroups.org



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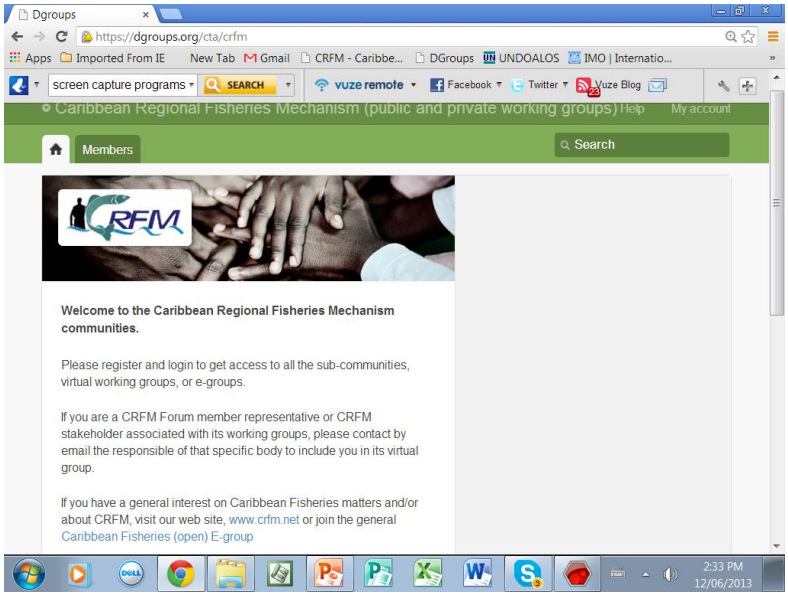
Dgroups

https://dgroups.org/cta/crfm



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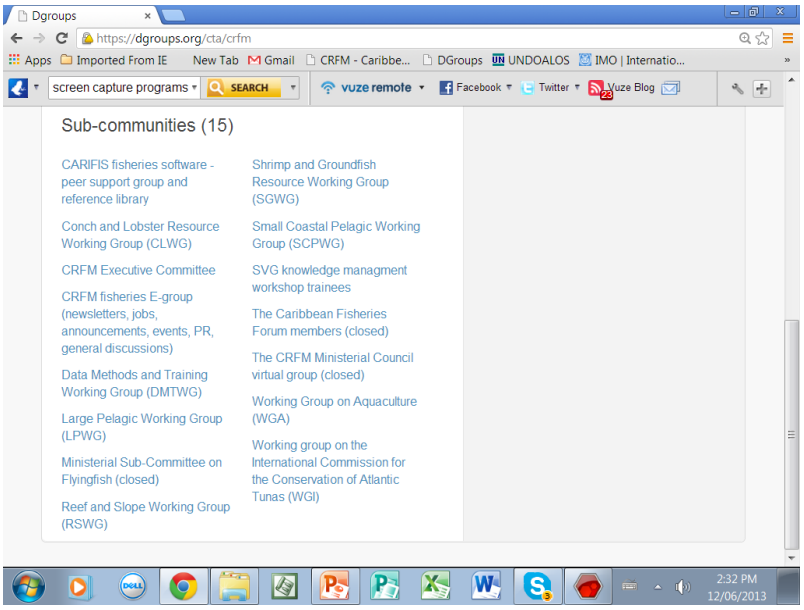
Dgroups

https://dgroups.org/cta/crfm



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Slide 17

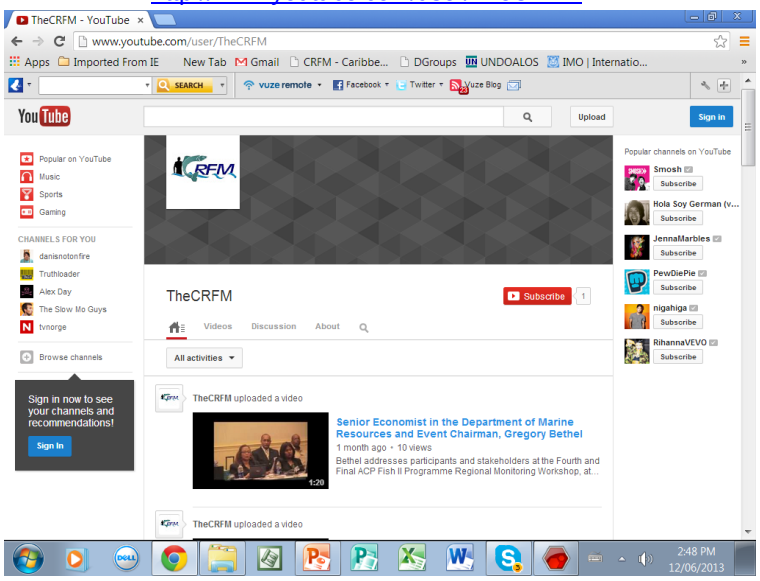
Twitter

https://twitter.com/CaribFisheries

Slide 18

YouTube

http://www.youtube.com/user/TheCRFM



Slide 19

CARIBBEAN REGIONAL FISHERIES MECHANISM

JICA Activities for the profitability and sustainability of FAD fisheries

Slide 1

Slide 2

contents

- 1, FAD Co-management now
  (in case of St. Kitts and Nevis and Antigua and Barbuda)Tomorrow session
- 2, “Fish In Ice” program (Ice box building on small vessel)
- 3, Fisheries Census 2012 in St. Lucia
- 4, Enhancement of Fisher and Vessel registration
- 5, Standardized CPUE
- 6, Market research and Fish Outlets Program

Slide 3

2, “Fish In Ice” program (Ice box building on small vessel)

Slide 4

Roseau, Dominica

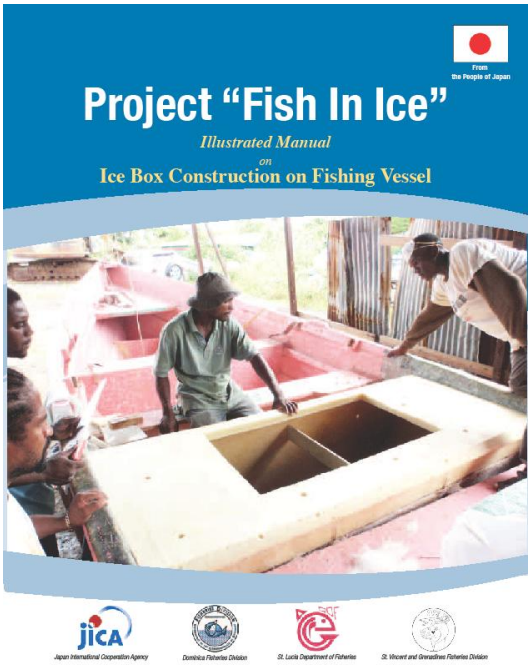
Slide 5

V.F. St. Lucia 39°C—40°C

Slide 6

V. F. at SLU, 39-40°C

Slide 7



Slide 8

Fisher Voice! Castries, St. Lucia

Slide 9

Please use ice and ice box!

St. Kitts fisher

St. Kitts Basseterre F. C.

Slide 10

"Fish In Ice" program
Conclusion 2:

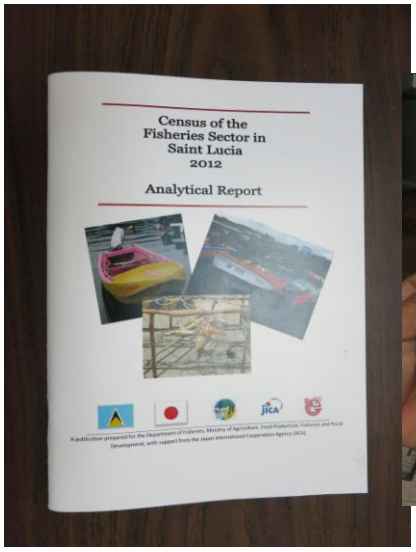
When people die, please give flowers.

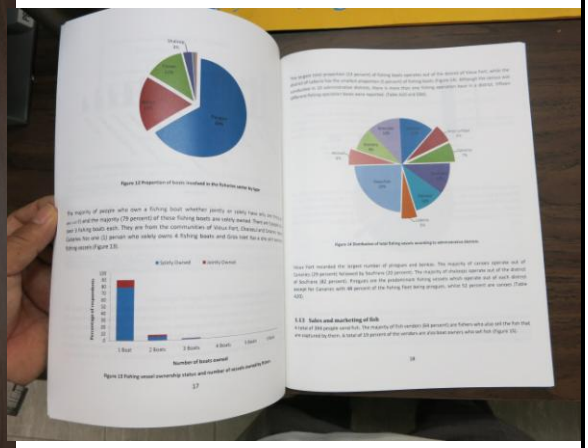
When fish die, please give ICE!

COLD CHAIN

Slide 11

3, Fisheries Census 2012 in St. Lucia





Slide 12

What we have got from Census.

- 2502 fishers registered as of December 31, 2011
- only 1150 individuals
- The number of active fishers and active vessels is MOST important for stock assessment and day-to-day fisheries management. If you don't know the number of active vessels then you can't workout actual fishing effort...registered vessels is only an indicator of potential fishing effort.
- Without this info all the stock assessment done by CRFM is erroneous. We need to get the basic steps right.

Slide 13

AFTER Dominica F. Census 2008 and 2011

- What is going on now?
- Let's look at current Dominica FD activities toward Active Information

Slide 14

4, Enhancement of Fisher and Vessel registration an Essential tool Fish IC card

Dominica FD almost reaching to get day-to day Active Fisher and vessel registration.

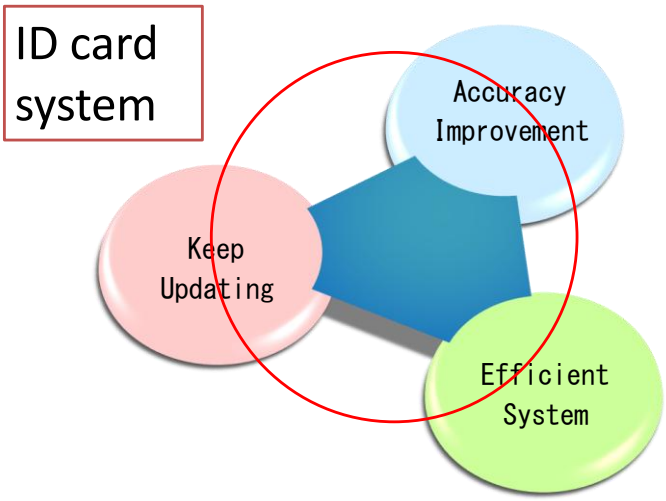
T. Miyahara, T. Matsuura, D. Theophille, etc

Slide 15

Only ID card can be printed after all data set

Slide 16

Essential tool improves the statistic



Slide 17

How to improve and Why Capturing Active Boat Info?

- To estimate total landings at the site.

⇒Capturing active boat info is crucial.

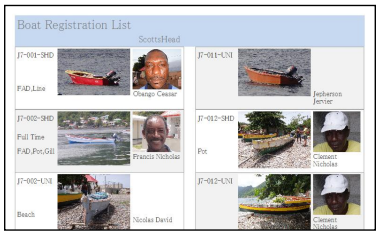
3

Slide 18

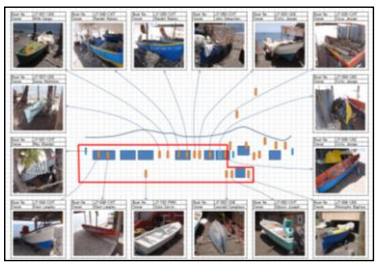
e.g. Essentials tools

Boat owners list and map

- Boats and boat owners list



- Boats map



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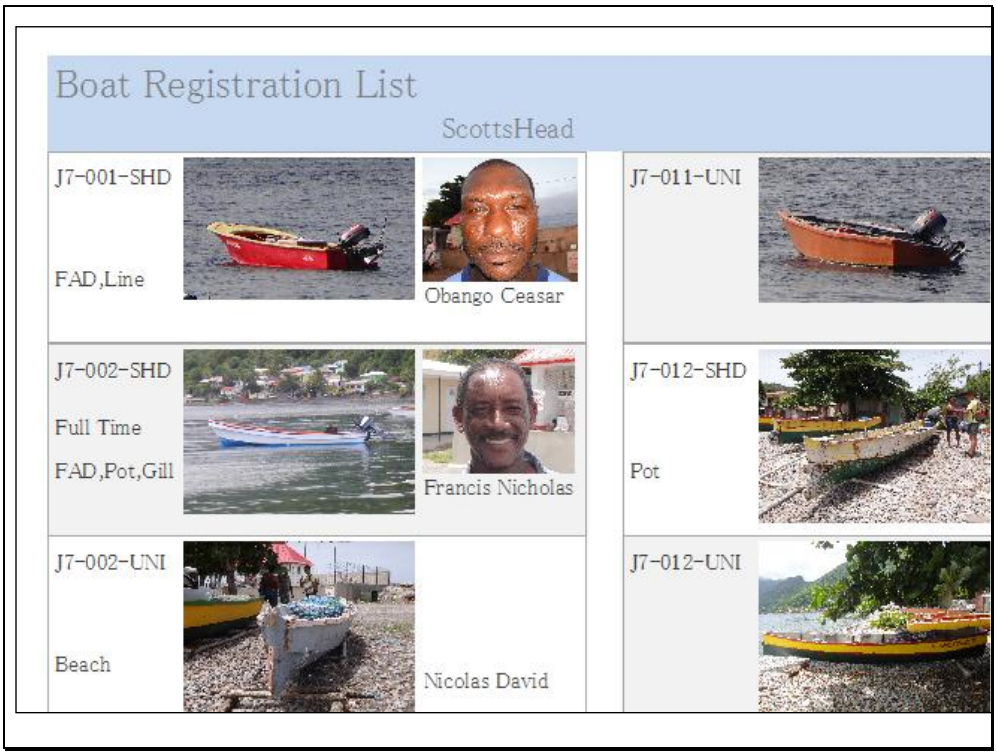
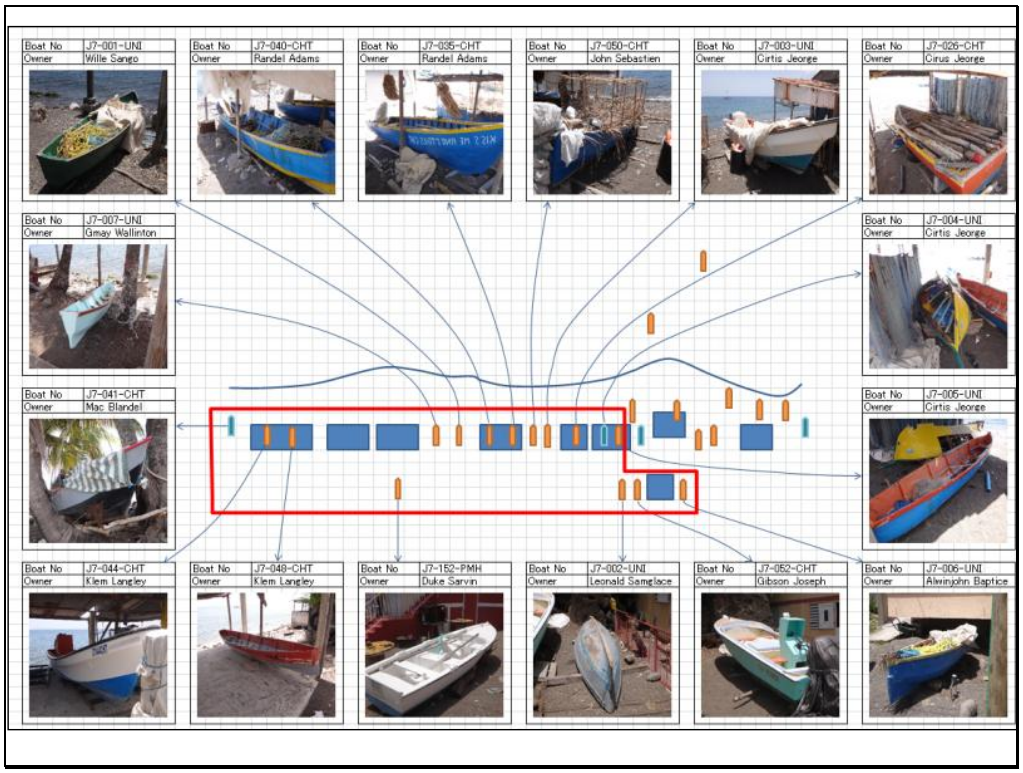


Slide 20



Slide 21

Purposes of the Boat owners list and map

1. Updating the Boat Registration Data
2. Making Data Collectors work easier
3. Making Daily Fish C&E Data better

Sampled Fish Catch Data

Raising Factor

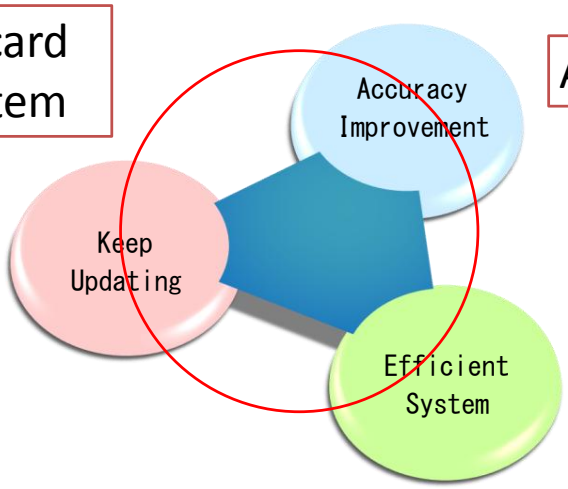
$$\frac{\text{No. of Total Landed Boat}}{\text{No. of Sampled Boat}}$$

Slide 22

Essentials tools improve the statistic

ID card system

Active boat



Slide 23

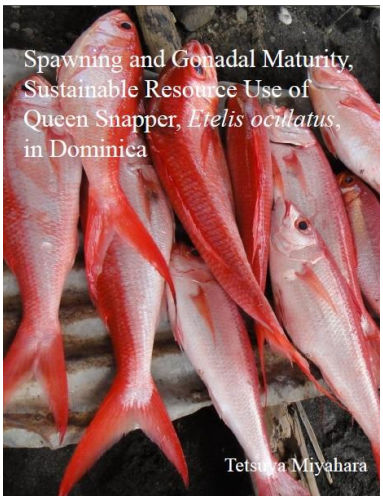
Fisheries Census 2012 in St. Lucia &
Enhancement of Fisher and Vessel registration in Dominica

Conclusion 3 & 4 : After the Census

- Next step (St. Lucia)----------Active boat
- The number of active fishers and active vessels is MOST important for stock assessment and day-to-day fisheries management. If you don't know the number of active vessels then you can't workout actual fishing effort...registered vessels is only an indicator of potential fishing effort.

Slide 24

5, Standardized CPUE



Tetsuya Miyahara, JOCV

Slide 25

What is CPUE?

The more Fish Resources(N) and Effort(E),
The more fish Catch(C) you get.

$$C = q\,E\,N$$

Slide 26

CPUE is the index of abundance

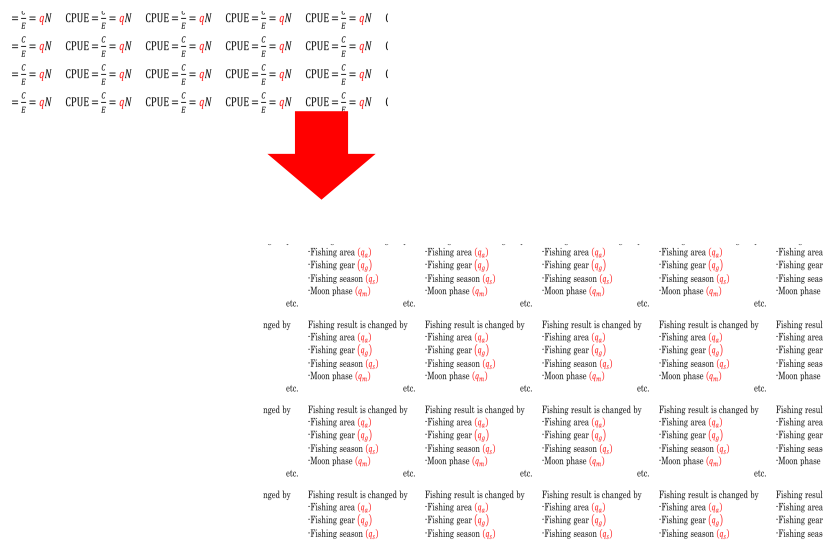
CPUE $\left(\frac{catch}{effort}\right)$ has a proportional relation with fish resources.

Therefore CPUE $\left(\frac{catch}{effort}\right)$ has a proportional relation with fish resources.

$$CPUE = \frac{C = q\,\square\,N}{E}$$

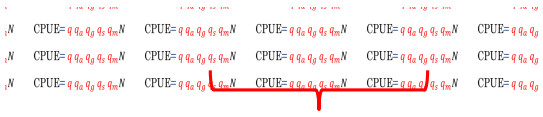
Slide 27

Ok, So…What is q?



Slide 28

How can we handle them??



Remove these effects

Standardized CPUE

Slide 29

Standardized CPUE

- More accurate than Nominal CPUE
- Shows the status of resource

Slide 30

Queen snapper Resource Assessment Conclusion 5:

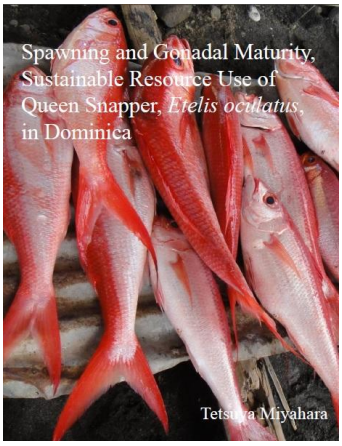
Conclusion from paper by Tetsuya

1, Possible closed season

2, CPUE----R. Assessment

Conclusion from this presentation

3, Use of Data collected



Slide 31

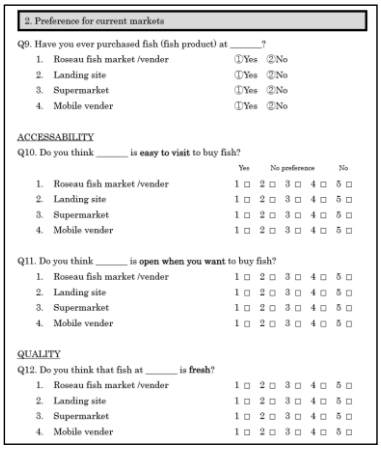
6, Market research and Fish Outlets Program

M. Ishida, Y. kakushita (JOCV), C. Stoute, N. Norris. etc

Slide 32

Questionnaires

- 54 questions, 5 sections
  1. Pattern of eating fish
  2. Preference for current markets
  3. Preference for a new shop
  4. Market preference about other products
  5. Personal information



2. Preference for current markets

Q9. Have you ever purchased fish (fish product) at _____?

1.	Roseau fish market /vender	①Yes ②No
2.	Landing site	①Yes ②No
3.	Supermarket	①Yes ②No
4.	Mobile vender	①Yes ②No

ACCESSABILITY

Q10. Do you think _____ is **easy to visit** to buy fish?

		Yes	No preference	No
1.	Roseau fish market /vender	1 □	2 □ 3 □ 4 □	5 □
2.	Landing site	1 □	2 □ 3 □ 4 □	5 □
3.	Supermarket	1 □	2 □ 3 □ 4 □	5 □
4.	Mobile vender	1 □	2 □ 3 □ 4 □	5 □

Q11. Do you think _____ is **open when you want** to buy fish?

1.	Roseau fish market /vender	1 □	2 □ 3 □ 4 □	5 □
2.	Landing site	1 □	2 □ 3 □ 4 □	5 □
3.	Supermarket	1 □	2 □ 3 □ 4 □	5 □
4.	Mobile vender	1 □	2 □ 3 □ 4 □	5 □

QUALITY

Q12. Do you think that fish at _____ is **fresh**?

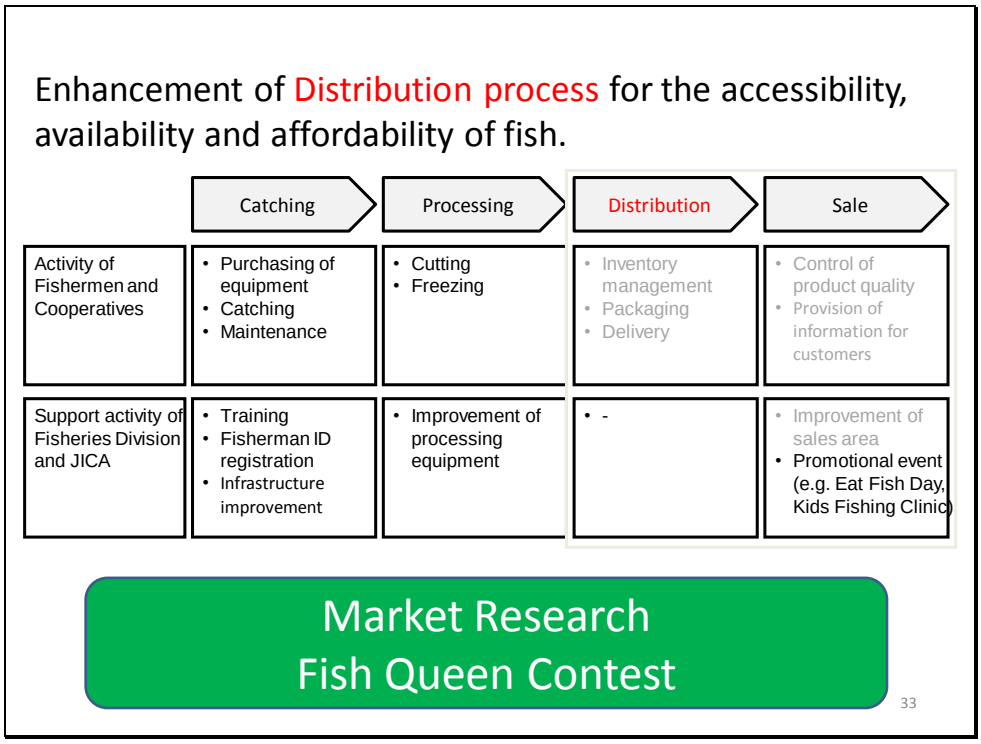
1.	Roseau fish market /vender	1 □	2 □ 3 □ 4 □	5 □
2.	Landing site	1 □	2 □ 3 □ 4 □	5 □
3.	Supermarket	1 □	2 □ 3 □ 4 □	5 □
4.	Mobile vender	1 □	2 □ 3 □ 4 □	5 □

Survey Area

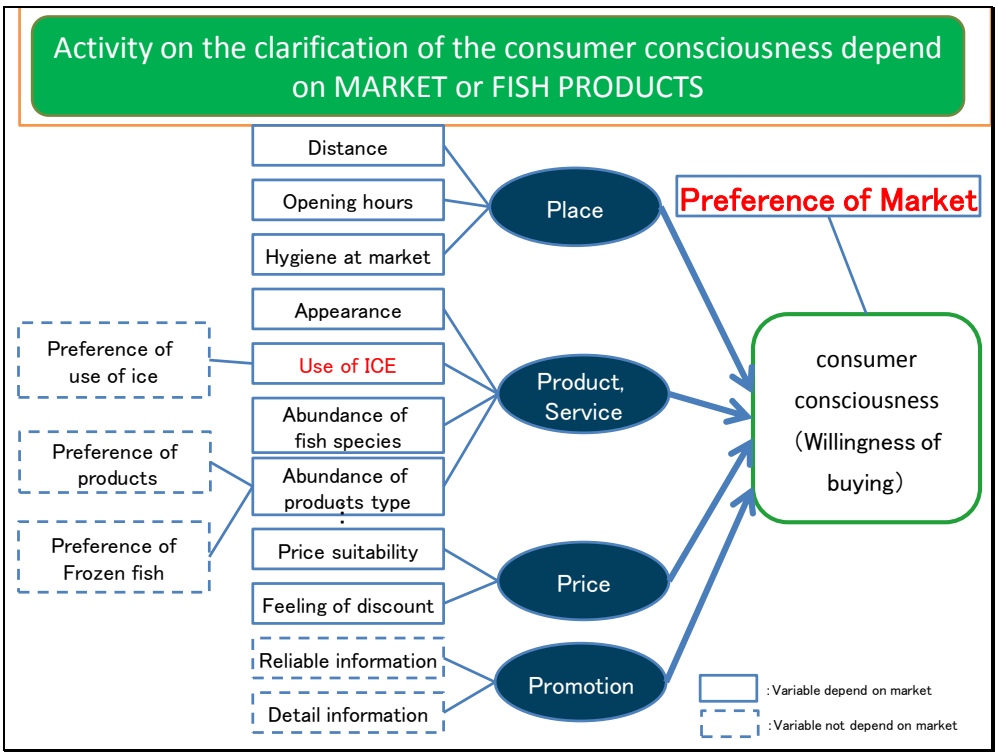
- 3 categories, 6 areas
  - A) Roseau
  - B) 3 Landing sites
  - C) 2 Areas far from landing sites

Yuka Kakushita, JOCV

Slide 33



Slide 34



Slide 35

Fish Queen Contest (held 5th Dec 2013)

DOMINICA Fisheries Division

Slide 36

Market research and Fish Outlets Program

Conclusion 6:

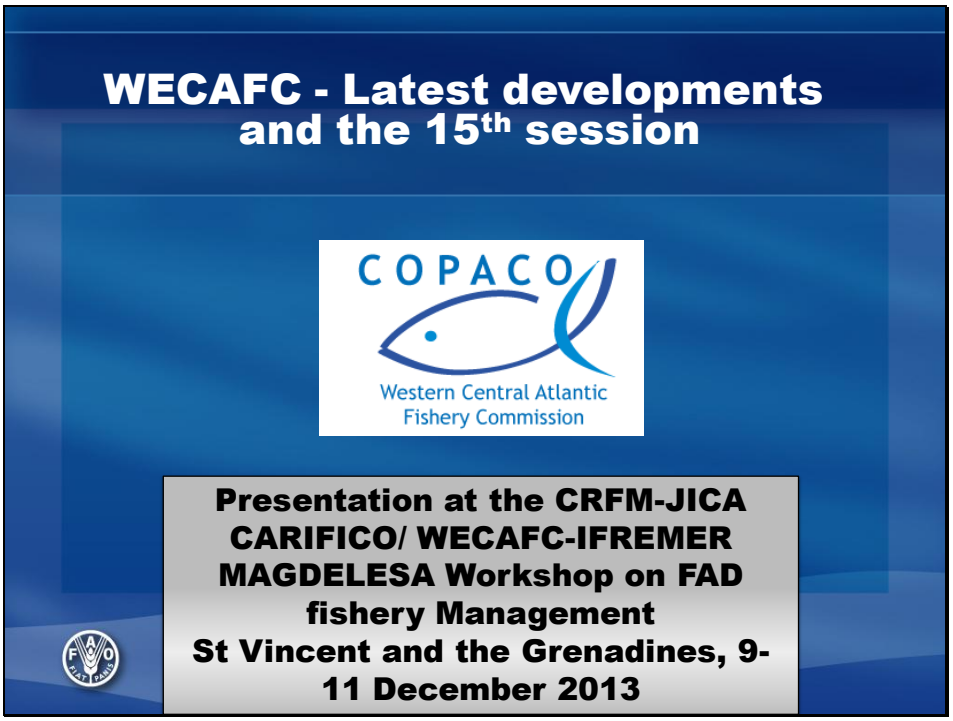
- If you want to increase amount to sell, one solution is suggested enhancement of Accessibility by the research.

Conclusion

- 2, “Fish In Ice” program, please give ICE
- 3 & 4, Fisheries Census, ID card, Fisher Vessel registration,,, day to day
- 5, Standardized CPUE
- 6, Marketing,,, Enhancement of Accessibility

WECAFC – Latest developments and the fifteenth session

Slide 1



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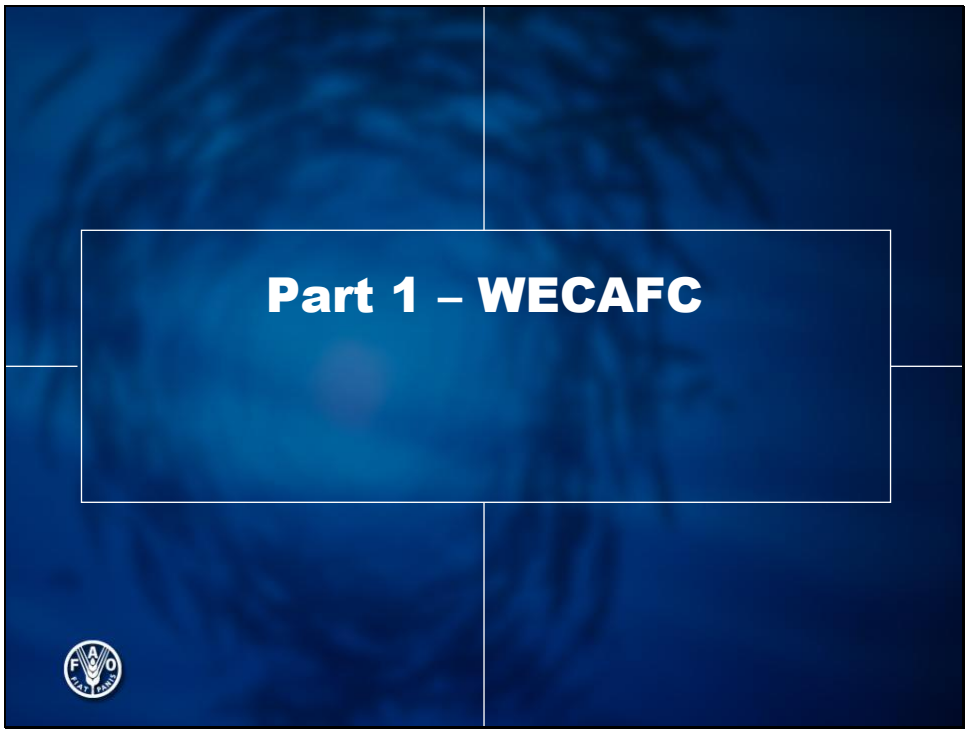


Slide 3

Objetives of the Commission

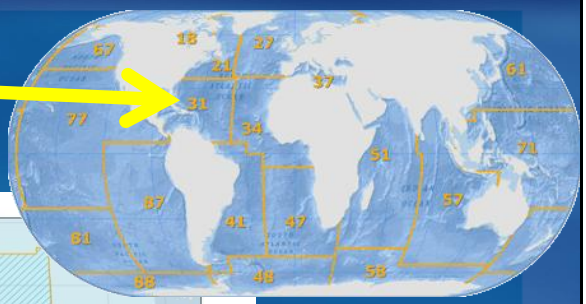
To promote the effective conservation, management and development of the living marine resources of the area of competence of the Commission, in accordance with the FAO Code of Conduct for Responsible Fisheries, and address common problems of fisheries management and development faced by members of the Commission

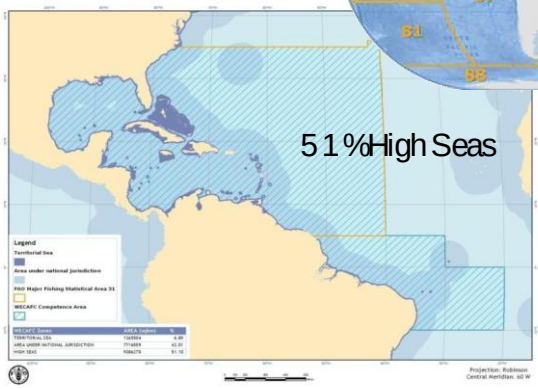
WECAFC is a so called "Regional Advisory Body" and does not have management authority.

Slide 4

Area of competence

WECAFC's mandate area

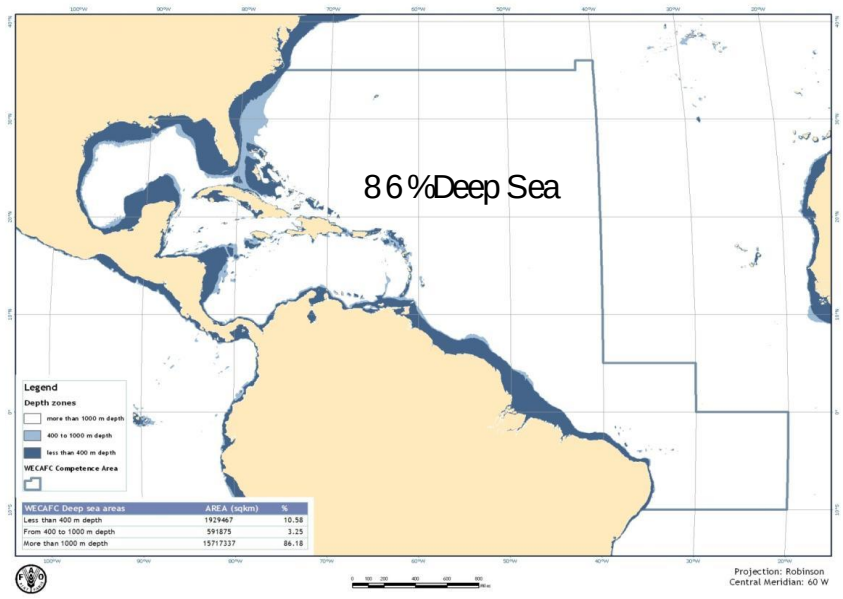




51% High Seas

Slide 5

Area of Competence (2) depths



Slide 6

Institutions

- **Commission**
- **Secretariat**
- **Working Groups**
- **Scientific Advisory Committee (SAG)**

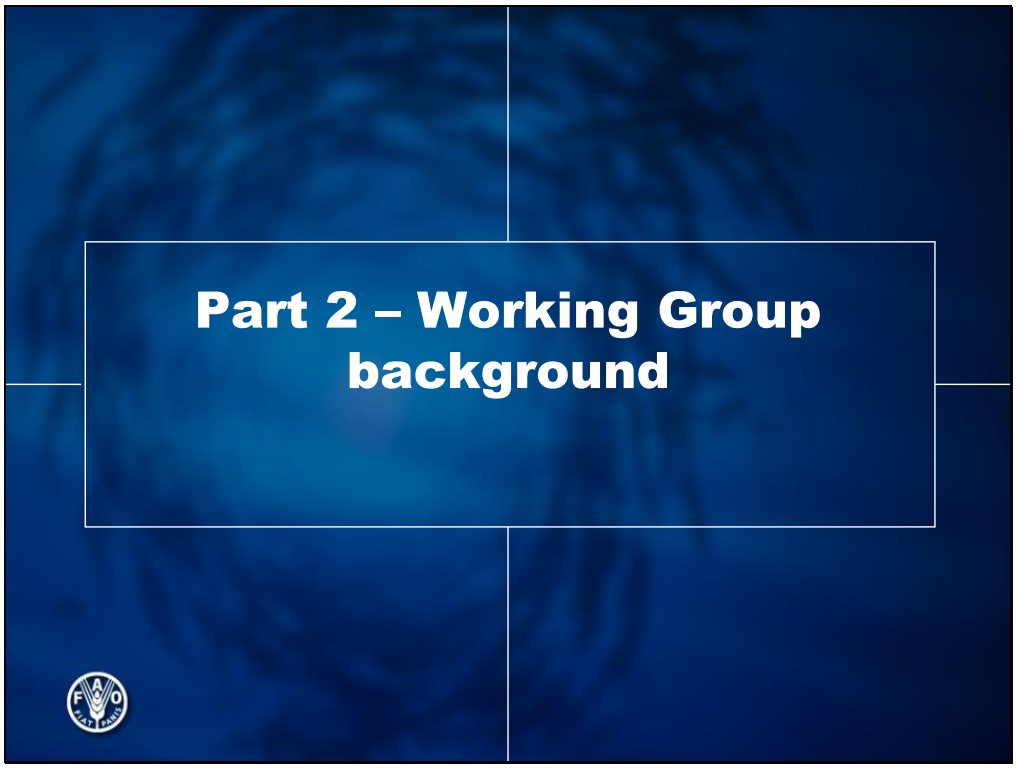
14th Session, Panama City
6-9 February 2012

Most successful session since 1985

Slide 7

Slide 8

Slide 9



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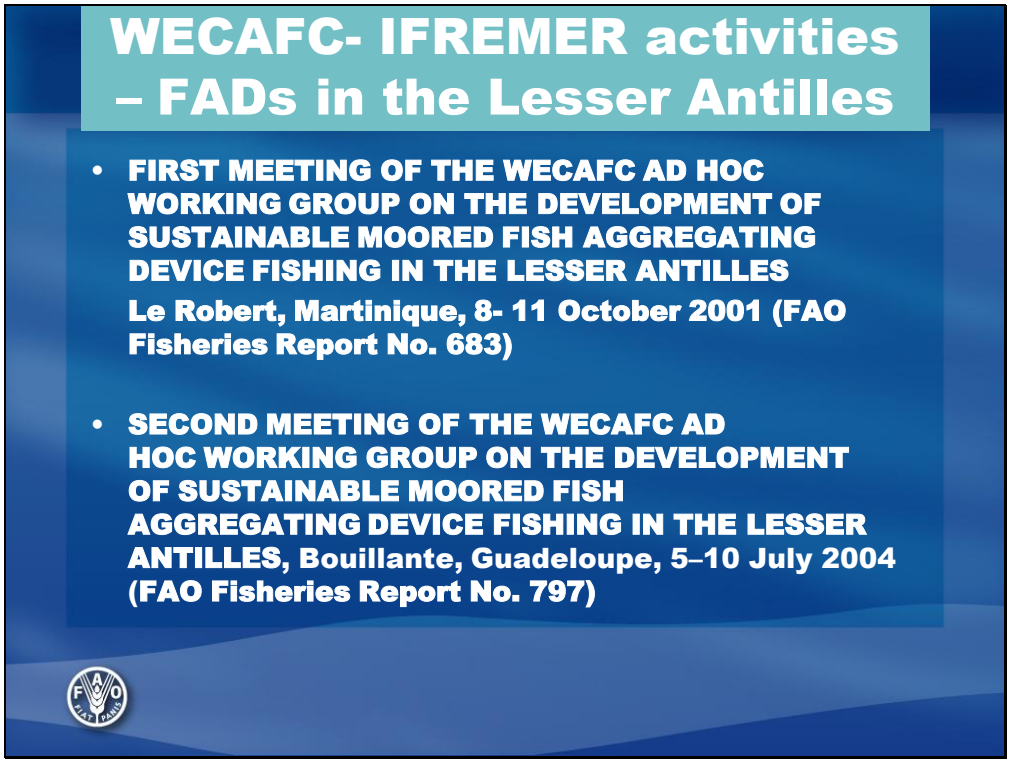
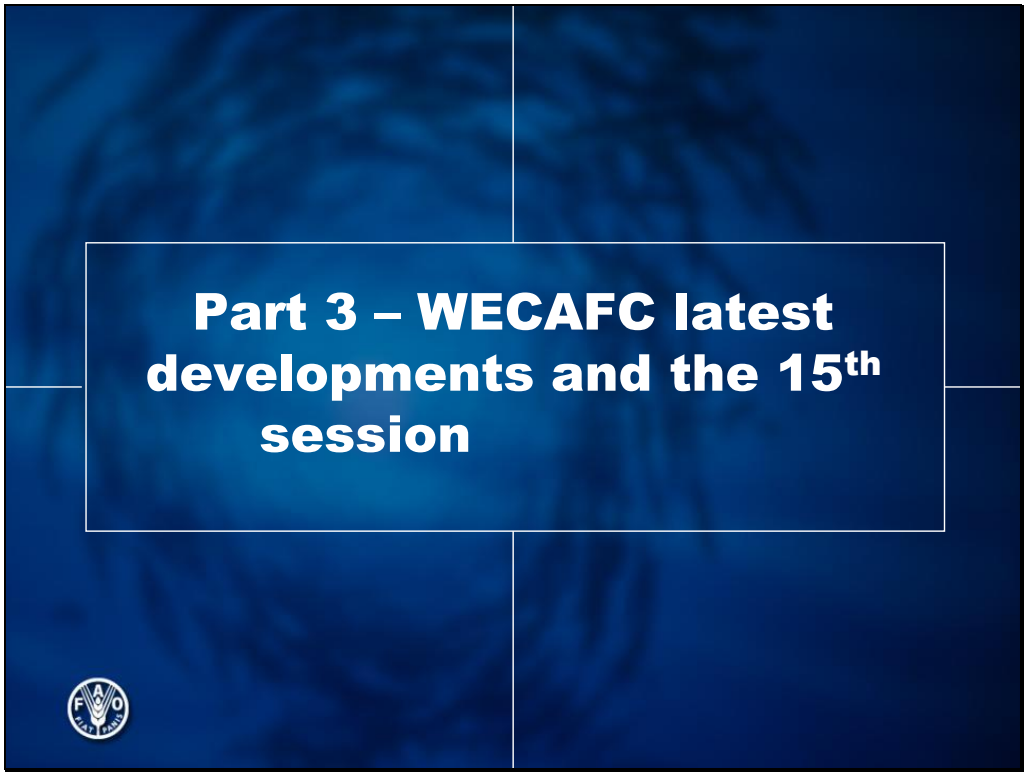


Slide 11

Slide 12



Slide 13

Slide 14

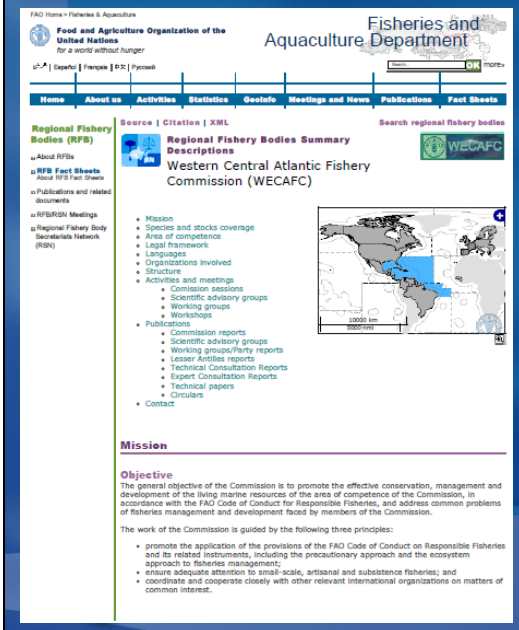
Slide 15

Slide 16

Slide 17

Thank you

More information on WECAFC can be found at our WEBSITE:



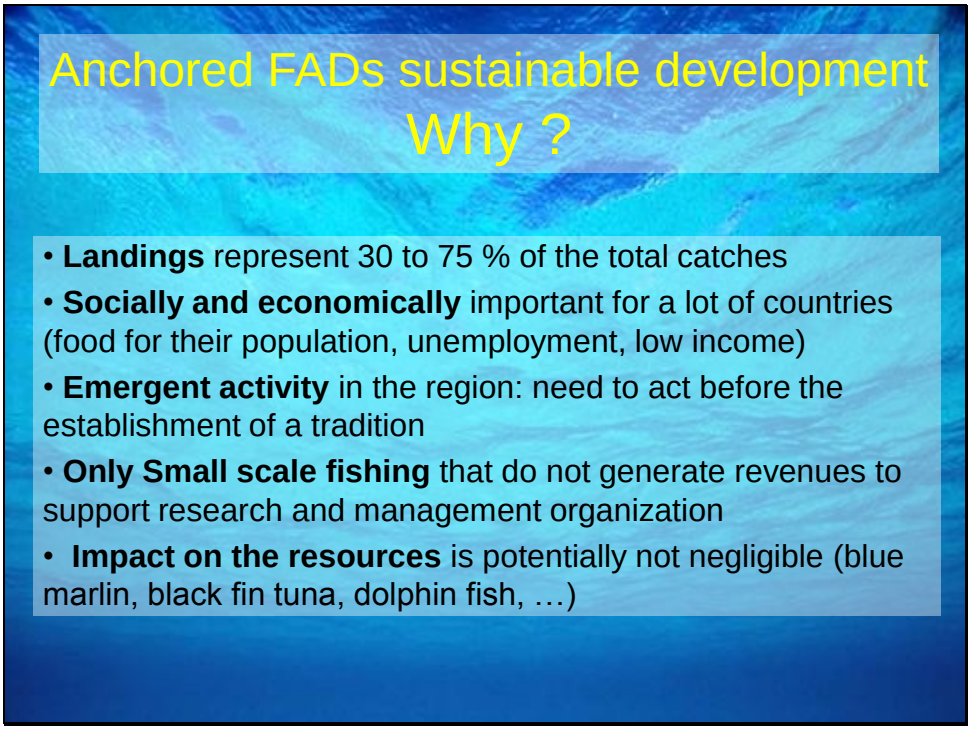
http://www.fao.org/fishery/rfb/wecafc/en

- **Information**
- **3 languages (English, Spanish, French)**
- **Publications – over 50 publications**
- **Statutes**
- **Meetings info**
- **Projects**
- **And more ….**

Objectives and stakes of the MAGDELESA Project

Slide 1

Slide 2



Slide 3

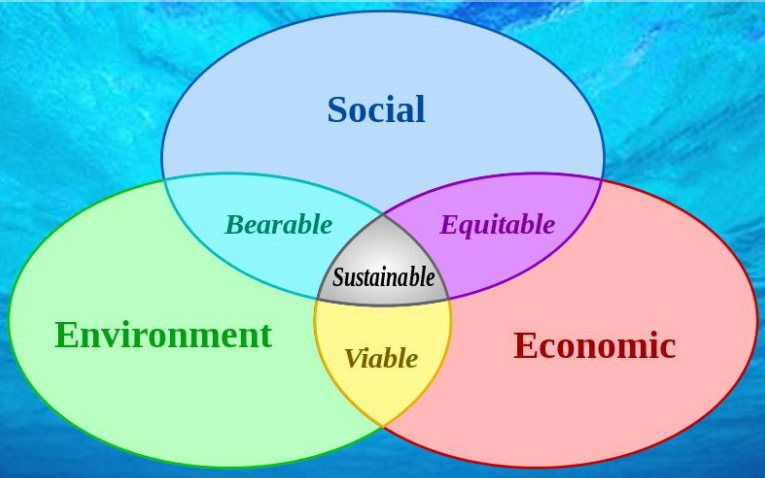
Anchored FADs sustainable development
Why a working Group?

- **Means allocated to fisheries** are not in relation to their need but limited by availability
- **Resources exploited around FADs** are trans-boundary, highly migratory, shared fishes
- **Anchored FADs fishing is developing rapidly**

- **It was imperative that a speedy solution be found to:**
  - Develop and federate the means needed to give the frame favourable to the sustainability of this emergent fishery
  - Facilitate exchanges of data, knowledge and experience between countries

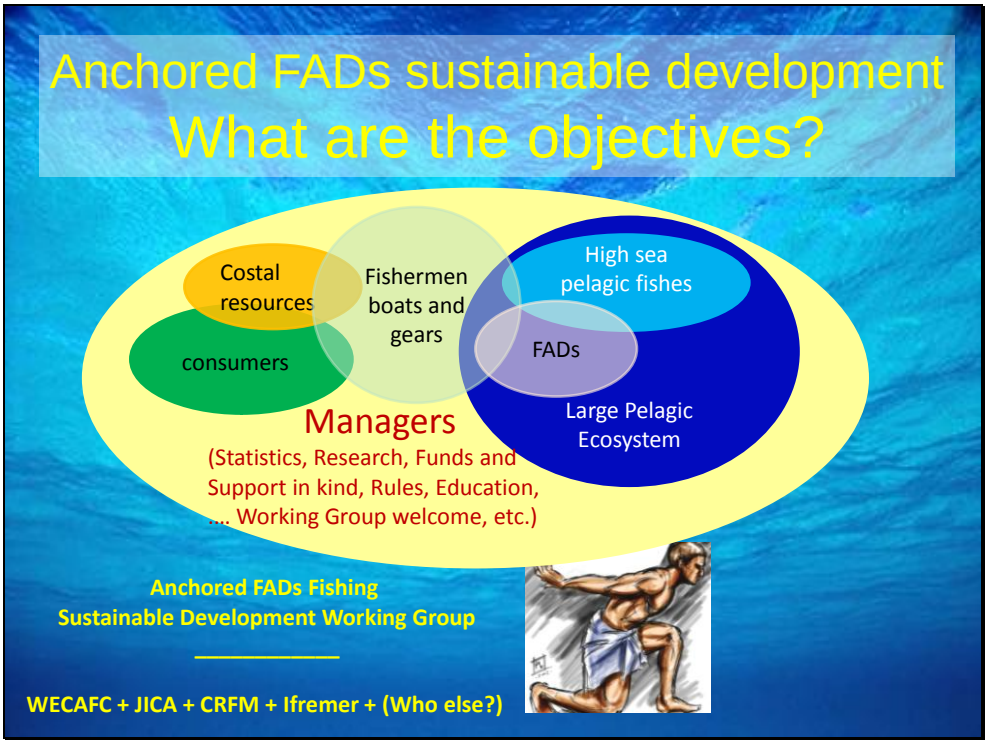
Slide 4

Anchored FADs sustainable development
What question?



Sustainable Development applied to Anchored FADs Fishing

Slide 5



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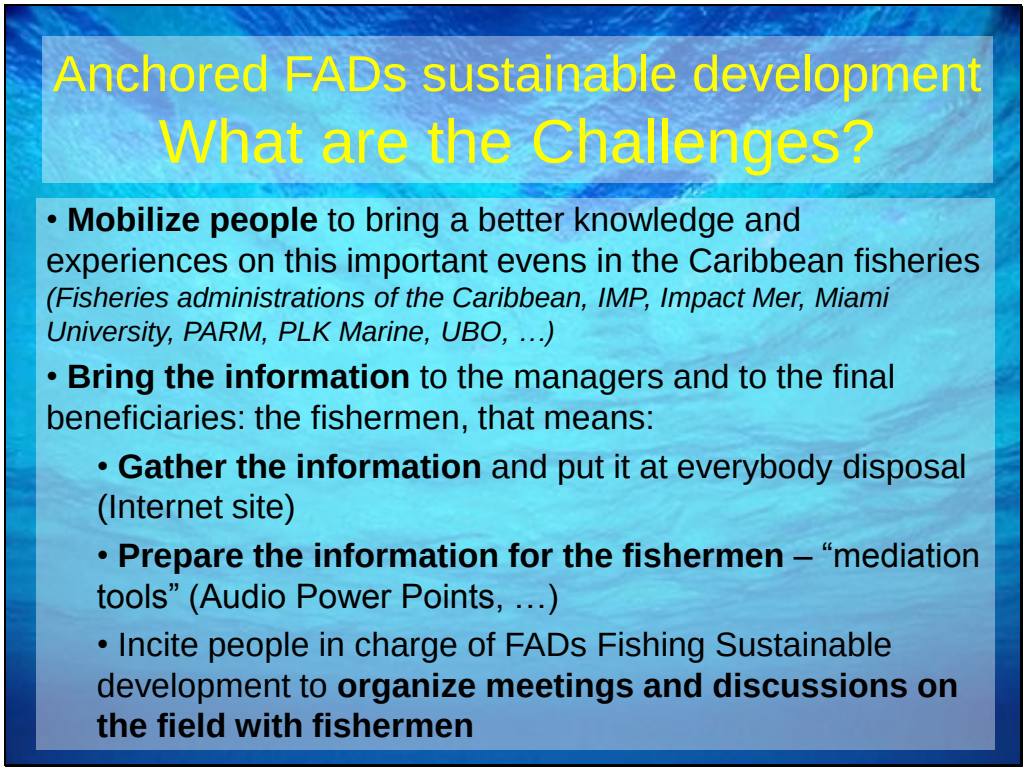
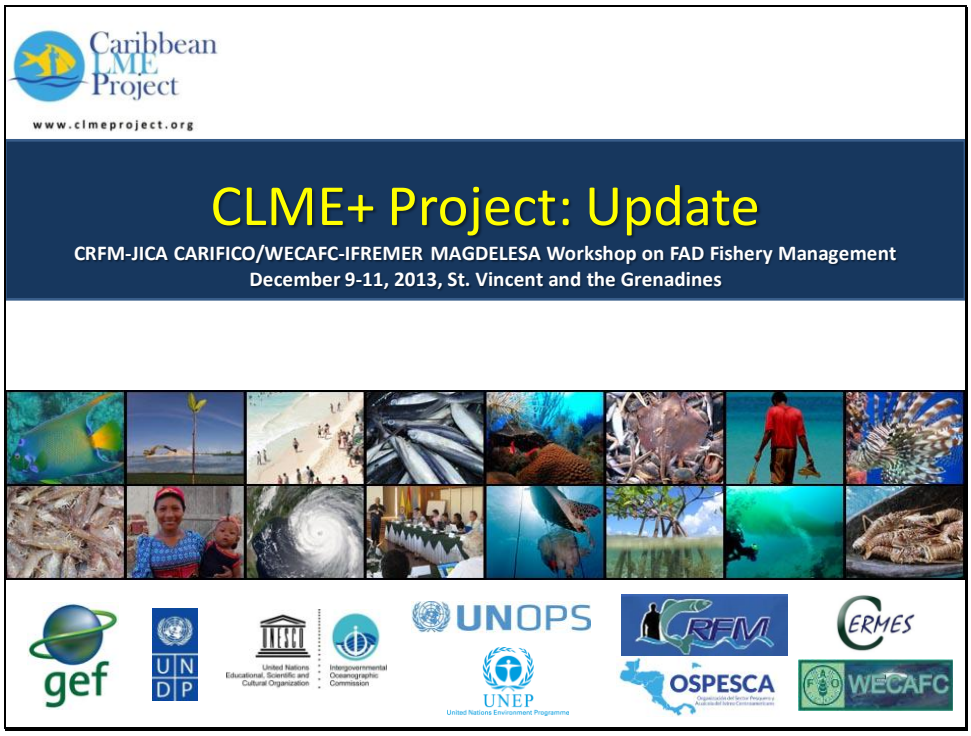


Slide 7

CLME+ project update: Next steps

Slide 1



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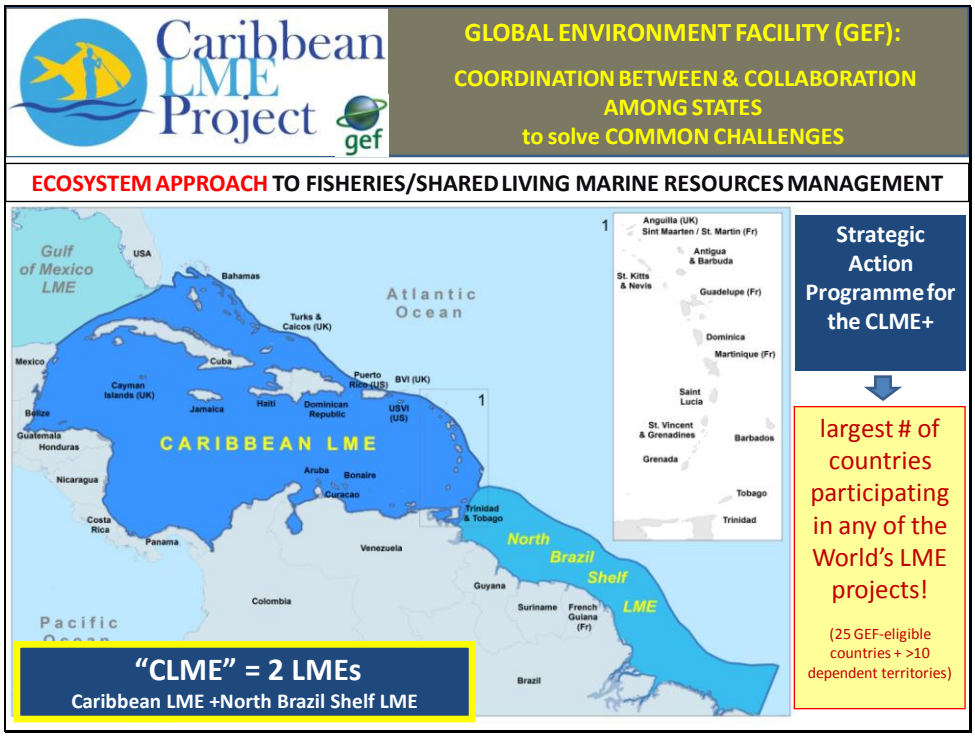
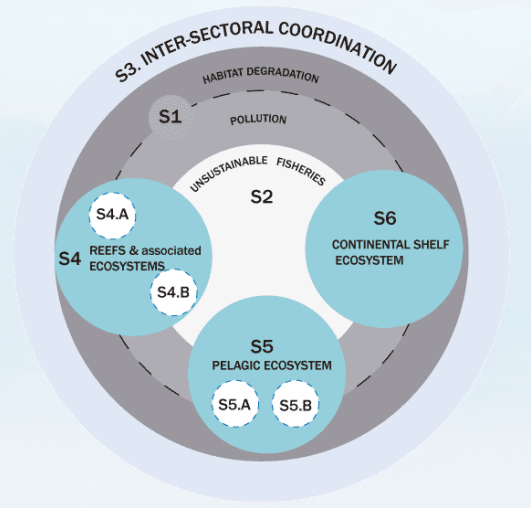


Slide 3

Caribbean LME Project

CLME SAP: 6 main STRATEGIES *and 4 sub-strategies*



S1 – Protection of the Marine Environment
S2 – Sustainable Fisheries
S3 – Inter-sectoral Coordination

S4 – EBM, Reef Ecosystems

S4a Spiny Lobster Fisheries
S4b Queen Conch Fisheries

S5 – EAF, Pelagic Ecosystem

S5a Flyingfish Fisheries
S4b Large Pelagics Fisheries

S6 – EAF, Continental Shelf

Slide 4

CLME SAP: Progammatic Approach to Implementation

- SAP provides a road-map towards improved **broader marine ecosystem governance**
- Initial focus on **shared living marine resources governance** and management
- **Enhance cooperation and coordination** within the region (amongst countries, organisations, ongoing and newly planned projects & initiatives, etc.)
- Promote and establish synergies, avoid overlaps, strive for complementarity
- From SAP to NAPs ……

Financial Mechanism for SAP Implementation:

• GEF co-financing support for priority actions
•Contributions from multi-lateral institutions & bi lateral partners
• Contributions and financial commitments from countries & partner agencies
•Contributions from the Private Sector

Slide 5

ENDORSEMENTS OF THE STRATEGIC ACTION PROGRAMME (SAP)[2]

COUNTRY	MINISTRY	MINISTER´S NAME	DATE SIGNED
Barbados	Ministry of Environment and Drainage	Hon. Dr. Denis Lowe	28/05/13
Belize	Ministry of Forestry, Fisheries and Sustainable Development	Hon. Lisel Alamilla	24/05/13
Brazil	Ministry of Fisheries and Aquaculture of Brazil	Hon. Marcelo Crivella	26/04/13
Colombia	Ministry of Environment	Hon. Juan Gabriel Uribe	17/05/13
Colombia	Ministry of Agriculture and Rural Development	Hon. Francisco Estupinan Heredia	11/06/13
Colombia	Ministry of Foreign Affairs	Hon. Maria Angela Holguin Cuellar	29/07/13
Colombia	National Aquaculture and Fisheries Authority	Dr. Julian Botero Arango (Director)	04/06/13
Costa Rica	Ministry of Agriculture and Livestock	Hon. Gloria Abraham Peralta	06/05/13
Costa Rica	Ministry of Environment, Energy and Telecommunications	Hon. Dr. Rene Castro Salazar	15/05/13
Dominica	Ministry of Environment, Natural Resources, Physical Planning and Fisheries	Hon. Kenneth Darroux	09/05/13
Dominican Republic	Ministry of Environment and Natural Resources	Hon. Dr. Bautista Roja Gomez	30/04/13
Dominican Republic	Dominican Council of Fisheries and Aquaculture	Dr. Francisco Manuel Frias Olivencia	16/05/13
Grenada	Ministry of Agriculture, Lands, Forestry, Fisheries and the Environment	Hon. Roland Bhola	28/05/13
Guatemala	Ministry of Agriculture, Livestock and Food	Hon. Elmer Alberto Lopez Rodriguez	30/04/13
Guyana	Ministry of Agriculture	Hon. Dr. Leslie Ramasammy	07/05/13
Haiti	Ministry of Environment	Hon. Dr. Jean Francois Thomas	24/06/13
Honduras	Secretary of State in the Offices of Agriculture and Livestock	Hon. Jacobo Regalado W.	22/05/13
Honduras	Secretary of State in the Offices of Natural Resources and Environment	Hon. Dr. Rigoberto Cuellar Cruz	27/05/13
Jamaica	Ministry of Water, Land, Environment and Climate Change	Hon. Robert D. Pickersgill	30/05/13
Jamaica	Ministry of Agriculture and Fisheries	Hon. Roger Clarke	27/05/13
Mexico	Ministry of Environment and National Resources	MSc. Rodolfo Lacy Tamayo (VM)	02/09/13
Nicaragua	Nicaraguan Institute of Fisheries and Aquaculture	Hon. Steadman Fagoth Muller	22/05/13
Panama	Ministry of Agricultural Development	Hon. Oscar. A. Osorio C.	15/05/13
Panama	National Environmental Authority	Hon. Silvano Vergara	22/07/13
St. Kitts & Nevis	Ministry of Agriculture, Marine Resources and Cooperatives	Hon. Nigel Carty	03/05/13
Saint Lucia	Ministry of Agriculture, Food Production, Fisheries and Rural Development	Hon. Moses Jn. Baptiste	29/05/13
St. Vincent & the Grenadines	Ministry of Agriculture, Rural Transformation, Forestry and Fisheries	Hon. Saboto Caesar	07/07/13
Suriname	Ministry of Technological Development and Environment	Hon. Michael Miskin	29/05/13
Suriname	Ministry of Agriculture, Animal Husbandry and Fisheries	Hon. Hendrik S. Setrowidjojo	12/08/13
United States of America	National Marine Fisheries Service, National Oceanic and Atmospheric Administration	Dr. Samuel D. Roach	29/05/13

ORGANISATION	ORGANISATIONS' ENDORSING BODY	DATE SIGNED
Caribbean Regional Fisheries Mechanism (CRFM)	Council of Ministers	31/05/13

As of 04/09/2013, 30 ministers in 21 countries have endorsed CLME SAP

Slide 6

Project Title: *Catalysing Implementation of the Strategic Action Programme of shared Living Marine Resources in the Caribbean and North Brazil Shelf Ecosystems*

CLME+ Project Objective: *Facilitating EBM/EAF in the CLME+ for the sustainable and climate resilient provision of goods and services from shared living marine resources, in line with the endorsed CLME+ SAP*

Slide 7

CLME+ Project Information

- Countries that have indicated an interest in follow-up project to date: *Antigua and Barbuda, Barbados, Belize, Brazil, Colombia, Costa Rica, Dominica, Dominican Republic, Guatemala, Grenada, Guyana, Haiti, Honduras, Jamaica, Mexico, Panama, St. Kitts and Nevis, Saint Lucia, St. Vincent and the Grenadines, Suriname, Trinidad and Tobago and United States of America*
- GEF 5 – Focal Area*: International Waters*
- GEF Agency*: UNDP*
- Project Duration: *5 years*
- Project Financing: *GEF US $12.5million, co-financing US $110.5million*

Slide 8

Project Components	***Expected Outcomes***
Component 1: Strengthening and consolidating the institutional, policy and legal frameworks for sustainable and climate-resilient shared living marine resources (sLMR) governance in the CLME+ region	Improved, integrative governance arrangements for sustainable fisheries and for the protection of the marine environment, in-line with the endorsed CLME+ SAP
Component 2: Enhancing the capacity of key institutions and stakeholders to effectively implement knowledge-based EBM/EAF for sustainable shared living marine resources (sLMR) use in the CLME+ *(subsidiarity principle applies)*	Strengthened institutional and stakeholder capacity (human, technical/scientific, technological and financial capacity and knowledge) for sustainable and climate-resilient sLMR management at regional, sub-regional, national and local levels *(with special attention to increased capacity of regional and sub-regional organizations with key roles in SAP implementation)*
Component 3: Piloting the implementation of EBM/EAF including through replication of best practices and the up-scaling of early results, and demonstration of improved/alternative livelihoods	Progressive reduction of environmental stresses, and enhancement of livelihoods demonstrated, across the thematic and geographical scope of the CLME+ SAP
Component 4: (Pre-)feasibility studies to identify major high-priority investment needs and opportunities in the CLME+ region	Financing catalysed for the scaling-up of priority actions for the protection of the marine environment and for ensuring sustainable, climate resilient livelihoods and socio-economic development from sLMR use in the CLME+
Component 5: Monitoring and assessing progress of and results from the overall implementation of the CLME+ SAP, and experience sharing with the global LME practitioners community	Regional socio-economic benefits and Global Environmental Benefits from the SAP implementation are maximised through: a) enhanced coordination and collaboration among shared Living Marine Resources (sLMR) projects and initiatives in the region b) optimised, adaptive management of sLMR-related projects and initiatives in the region c) exchange of best/good practices and lessons learnt among the global LME Community of Practice (CoP)

Slide 9

PPG Phase: PRODOC Development

- Component A: Technical Review
  - Baseline Analysis
  - Risk/opportunities studies during environmental & social prescreening
  - Identify project activities
  - Integrate with existing developing plans, budgets & projects
  - Stakeholder consultations
- Component B: Institutional arrangements, monitoring and evaluation
  - Finalize project results framework
  - Define M&E Plan
  - Define Sustainability Plan
  - Define Management arrangements
  - Stakeholder consultations

Slide 10

PPG Phase: PRODOC Development

- Component C: Financial planning and co-financing investment
  - Prepare multi-year budget
  - Identify co-financing opportunities
  - Secure official support letters
  - Stakeholder consultations
- Component D: Validation exercise
- Component E: Completion of final document

Slide 11

Timeline for PRODOC Development

CLME+ PPG	Timeframe (in months)[1]							
	1	2	3	4	5	6	7	8
	2013		2014					
	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Component A: Technical Review								
Baseline Analyses								
Identify project activities	Prescreening							
Integrate with development plans, policies & complementary projects	Prescreening							
Stakeholder consultations	Meeting*			Meeting*				
Component B: Institutional arrangements, M&E								
Finalise Project Results Framework	Prescreening							
Define Project M&E Plan								
Define Sustainability Plan								
Define project management								
Stakeholder consultations								
Component C: Financial planning & co-financing investments								
Develop mutli-year budget						Meeting*		
Identify co-financing opportunities								
Secure official support letters								
Stakeholder consultations					Meeting+			
Component D: Validation Exercise								
Component E: Finalise PRODOC								

Slide 12

CLME SAP Annex II Analysis Methodology

- Regional and Sub-regional partners asked to identify actions that will be implemented with and without CLME+ Project Support
- Review the CLME SAP Action Timeframe in Annex II
- Link SAP Actions to CLME PIF outputs
- Link SAP Actions to CLME SAP Annex 7 “Selected Key Process Indicator”

Slide 13

Analysis Process

	STRATEGY 4A Enhance the governance arrangements for implementing an ecosystem approach for spiny lobster fisheries	CRFM Support for Implementation		OSPESCA Support for Implementation		WECAFC Support for Implementation					SAP TIMELINE KEY
		Without CLME+ support	Requires CLME+ Support	Without CLME+ support	Requires CLME+ Support	Without CLME+ support	Requires CLME+ Support	SAP Timeline	PIF Objectiire	Priority Level	0-5 years
4A.1(A)	Establish, strengthen, and coordinate arrangements between the FAO-WECAFC, OSPESCA, UNEP-SPAW, and CRFM for harmonizing the spiny lobster fishery governance and management throughout the CLME* region		X	X		XX	XX	1	1.1	H	0 - 10 (intense first 5 years)
4A.2 (A)	Evaluate and expand, as applicable, the geographic scope of the governance arrangement operated by OSPESCA, taking into consideration both the perspectives of species range (ecosystem approach) and of common markets		X	x		XX	XX	1	1,1	H	0-10 (intense all ten
4A.3 (A)	Strengthen and achieve full implementation of policy cycles under the existing sub-regional governance arrangements for the management of the spiny lobster fisheries, including linkages with organizations working on the environmental protection of reefs and associated ecosystems		x	X	x		X	3	3,3	H	0-10 (intense in the last 5 years)
4A.4 (A)	Operationalise and strengthen a DSS for the spiny lobster fisheries (including linkages to the DSS for the protection and sustainable management of reefs and associated living marine resources)		x	X	x		X	3	2,2	H/M	

Slide 14

		STRATEGY 2 Enhance the regional governance arrangements for sustainable fisheries	Priority
ACTIONS	2.1 (A)	Establish an interim arrangement for sustainable fisheries coordinated by FAO-WECAFC and including CRFM; OSPESCA; and OECS	H
	2.2 (A)	Review, and reform WECAFC as needed to clarify and strengthen its mandate and relationships with Regional Fisheries Bodies such as CRFM, OSPESCA and ICCAT	H
	2.3 (A)	Evaluate the needs and the options, agree on the mandate & operationalise a Regional Fisheries Management Organisation (RFMO) or alternative arrangement for the management of shared living marine resources (as applicable*)	M
	2.4 (B)	Establish and/or enhance the capacity of the regional, sub-regional and national governance arrangements for the broader involvement of society in the implementation of the EBM/EAF approach (IGOs, NGOs, CBOs, private sector…)	M
	2.5 (B)	Establish and/or enhance the capacity of the regional, sub-regional and national fisheries institutions to develop and implement harmonized management and conservation measures, with special focus on Illegal, Unreported and Unregulated Fishing (IUU) and Monitoring, Control & Surveillance (MCS)	H
	2.6 (C)	Coordinate the development and implementation of fisheries-specific initiatives for IUU and MCS	H
	2.7 (C)	Coordinate the development and implementation of regional, sub-regional and national initiatives for sustainable small scale fisheries (including capacity building and pilot initiatives)	L
	2.8 (C)	Coordinate the development and implementation of regional, sub-regional and national initiatives to improve welfare and livelihoods through the provision of Decent Work(including through the development of alternative livelihoods, capacity building and pilot initiatives)	M
	2.9 (C)	Coordinate the development and implementation of regional, sub-regional and national initiatives to enhance safety and reduce risk factors (including at sea) for fishers, with particular focus on risk management	M/L
	2.10 (B)	Establish and/or enhance the capacity to manage knowledge and to mainstream findings from monitoring, science and research in regional, sub-regional and national decision-making and policy development for sustainable fisheries	H/M
	2.11 (B)	Establish and/or enhance the capacity to undertake and mainstream valuation of ecosystem goods and services in regional, sub-regional and national decision-making and policy development for sustainable fisheries	H/M
	2.12 (B)	Strengthen the capacity of the regional and sub-regional arrangements to support countries in becoming parties to relevant international and regional agreements and complying with their global and regional commitments towards the sustainable use and conservation of the marine environment and associated living resources (including the support to update and harmonize national legislation and regulations)	H/M
	2.13 (B)	Establish and/or enhance the data and information quality and collection and management capacity of the regional, sub-regional and national fisheries governance arrangements, including through the establishment of public-private partnerships	M
	2.14 (B)	Establish and/or enhance the capacity of the regional, sub-regional and national fisheries governance arrangements for the monitoring, assessment & reporting on the state of fisheries	L

Slide 15

		STRATEGY 4A Enhance the governance arrangements for implementing an ecosystem approach for spiny lobster fisheries	Priority
ACTIONS	4A.1 (A)	Establish, strengthen, and coordinate arrangements between the FAO-WECAFC, OSPESCA, UNEP-SPAW, and CRFM for harmonizing the spiny lobster fishery governance and management throughout the CLME+ region	H
	4A.2 (A)	Evaluate and expand, as applicable, the geographic scope of the governance arrangement operated by OSPESCA, taking into consideration both the perspectives of species range (ecosystem approach) and of common markets	H
	4A.3 (A)	Strengthen and achieve full implementation of policy cycles under the existing sub-regional governance arrangements for the management of the spiny lobster fisheries, including linkages with organizations working on the environmental protection of reefs and associated ecosystems	H
	4A.4 (A)	Operationalise and strengthen a DSS for the spiny lobster fisheries (including linkages to the DSS for the protection and sustainable management of reefs and associated living marine resources)	H/M

		STRATEGY 4B Enhance the governance arrangements for implementing an ecosystem approach for queen conch fisheries	Priority
ACTIONS	4B.1 (A)	Establish, strengthen and coordinate the arrangements for the management and conservation of queen conch between all relevant organizations such as CFMC,FAO-WECAFC, CRFM, UNEP-SPAW, OSPESCA and CITES	H
	4B.2 (A)	Develop and adopt a regional framework and management and conservation plan for the queen conch with regional-level harmonized regulations (including trade issues)	H
	4B.3 (C)	Develop, adopt and implement the sub-regional agreements for the management of the queen conch resource	M
	4B.4 (A)	Strengthen and achieve full implementation of policy cycles under the existing sub-regional governance arrangements for the management of queen conch fisheries, including linkages with organizations working on the environmental protection of reefs and associated ecosystems (EAF)	M
	4B.5 (A)	Operationalise and strengthen a DSS for the queen conch fisheries (including linkages to the DSS for the protection and sustainable management of reefs and associated living marine resources)	M

Slide 16

Thank you

www.clmeproject.org

CLME Project Coordination Unit
Cartagena, Colombia
(57) (5) 664 09 14
info@clmeproject.org

UWI research and training activities relevant to FADs

Slide 1

Conservation, Sustainable Use & Management of Pelagic Fisheries:

Research and capacity building at CERMES

Hazel A. Oxenford

CRFM / WECAFC-IFREMER-MAGDELESA / CARIFICO
Workshop on FAD Fishery Management
9-11 December 2013, Kingstown, St. Vincent & the Grenadines

Centre for Resource Management and Environmental Studies,
University of the West Indies, Cave Hill Campus, Barbados

Slide 2

Centre for Resource Management and Environmental Studies

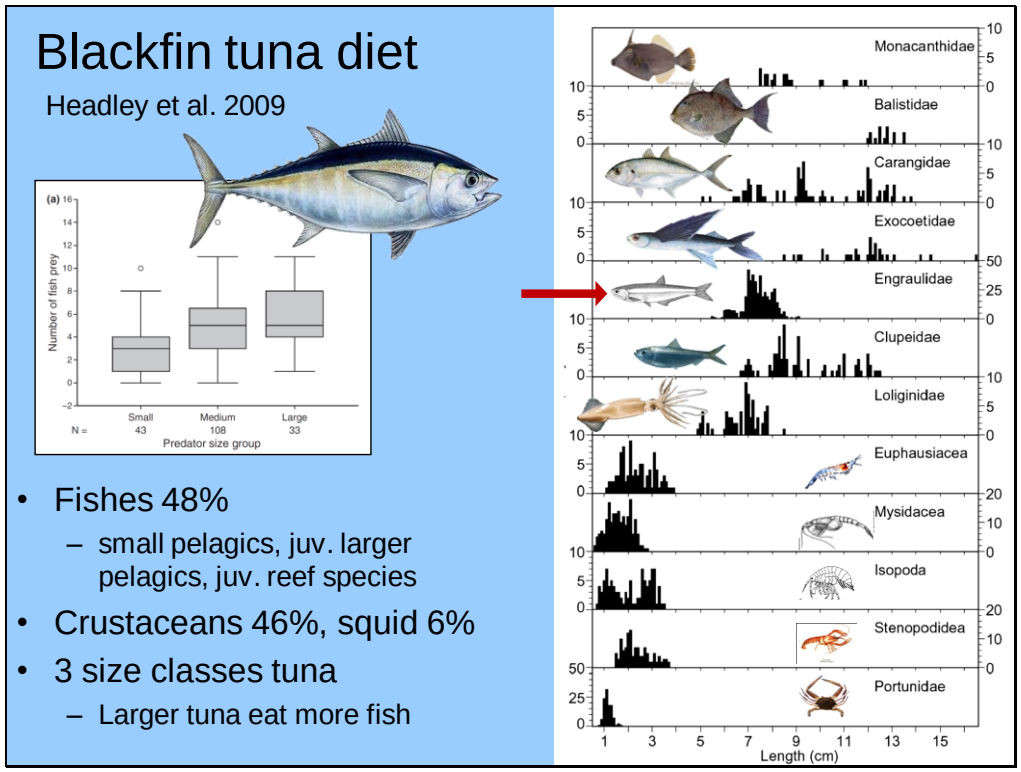
The University of the West Indies (UWI)
Cave Hill Campus, Barbados

Teaching, Outreach & Research

- MSc Programme
  - Coastal and Marine
  - Climate Change
  - Water Resources Management
- Public Outreach
  - Short courses, workshops, co-management partnerships, Advisory boards/working groups
- Research
  - 2-3 month MSc research
  - 2-3 year MPhil / PhD research
  - Faculty research, projects, consultancies

Slide 3

Slide 4

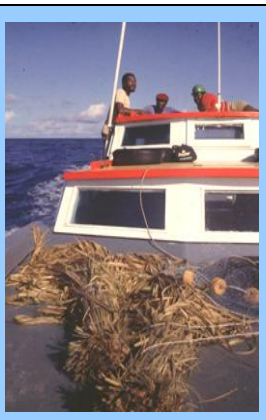


Slide 5

Role of drifting FADs in eastern Caribbean

Gomes et al. 1998

- Tobago, Grenada, Barbados, St. Lucia
  - All pelagic fishers target floating objects opportunistically (most prevalent Jan-Mar)
  - Vessels deploy constructed FADs for flyingfish

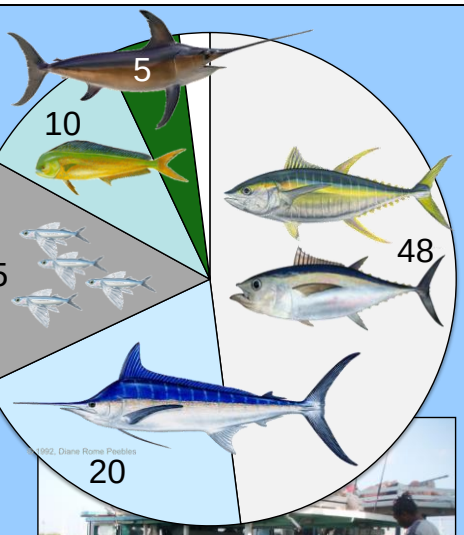


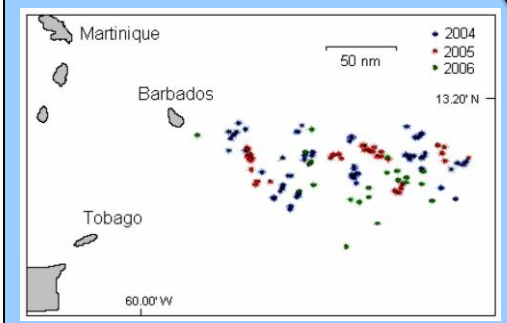
Slide 6

Longline fishery in Barbados

Walcott et al. 2009

- Fishing grounds
  - 6-21 day trips, east of the island up to 550 km
- Target tuna & billfishes





Slide 7

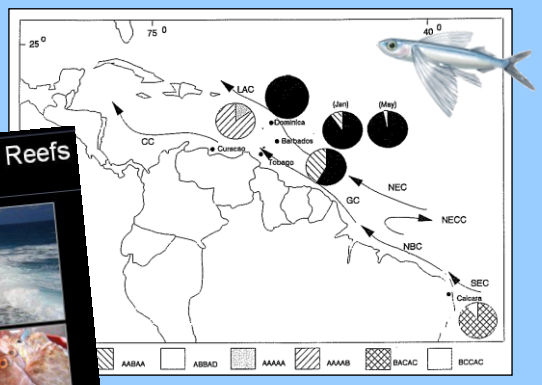
Pelagic Fisheries Research

- **PhD & MPhil programme**
  - 2-3 year research projects

Population structure

Livelihood dependency

David Gill PhD



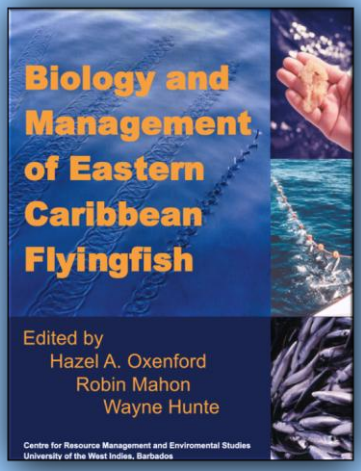
Gomes PhD

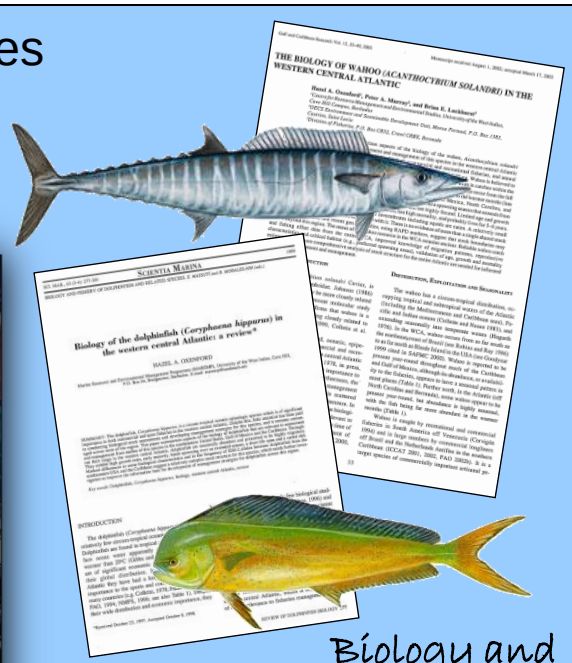
Slide 8

Pelagic Fisheries Research

- **Faculty research**

  Oxenford et al





Biology and management

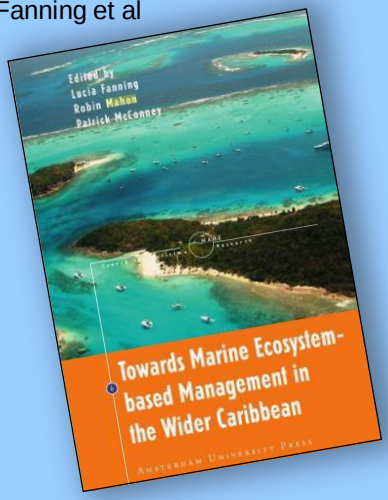
Slide 9

Pelagic Fisheries Research

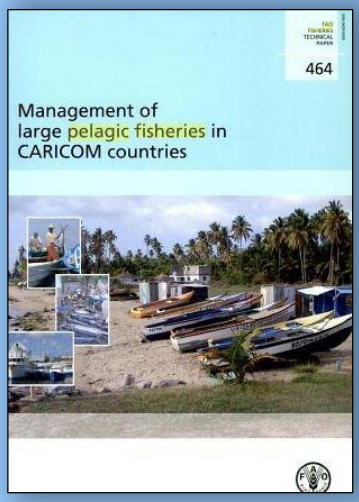
- **Faculty research**

Management

Fanning et al



Mahon and McConney



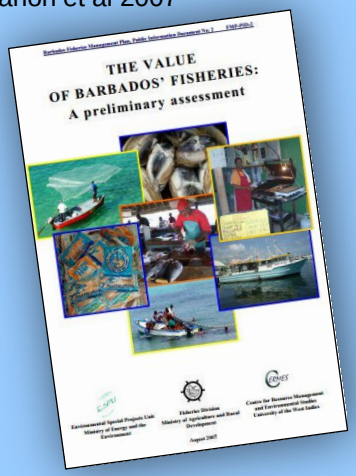
Slide 10

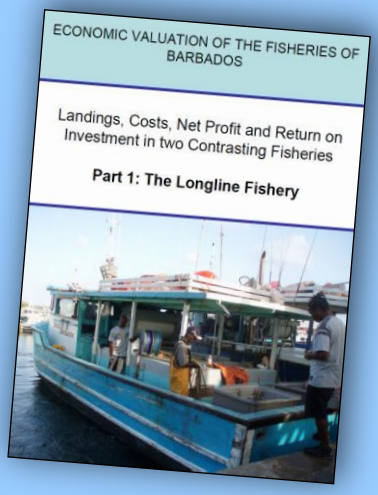
Pelagic Fisheries Research

- **Faculty research**

Economic valuation

Mahon et al 2007





Schuhmann et al 2010

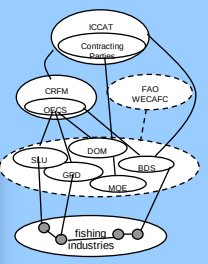
Slide 11

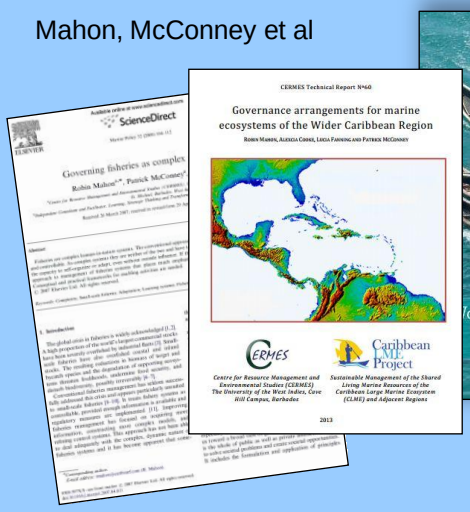
Pelagic Fisheries Research

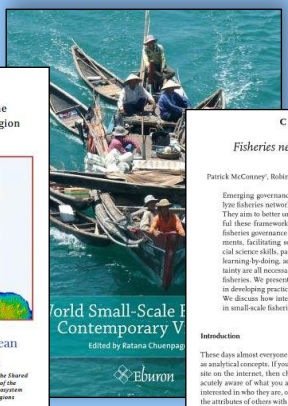
- **Faculty research**

Mahon, McConney et al

Governance and networks



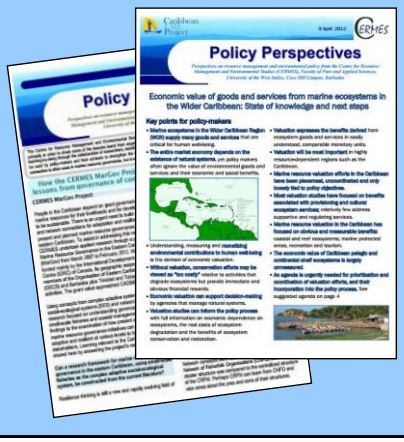




Slide 12

Capacity Building

- Teaching programme
- Fisher discussion groups
- CERMES policy briefs

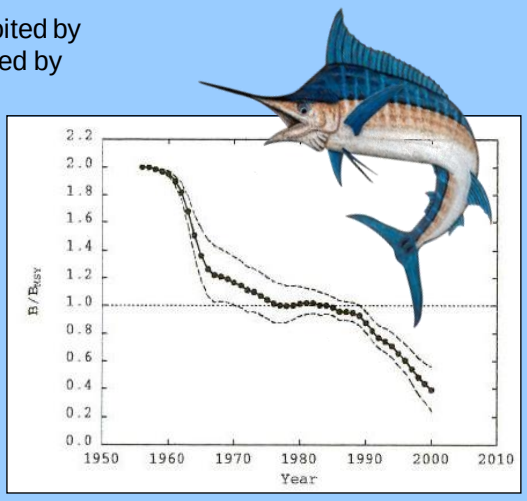


- Involvement of fishers in research / workshops
- Advisory Committees / Working groups
- Training workshops
  - SocMon Caribbean
  - Ecosystem-based management
  - EAF toolbox

Slide 13

Fixed FADs - Issues to consider:
Environmental / biological / social / management

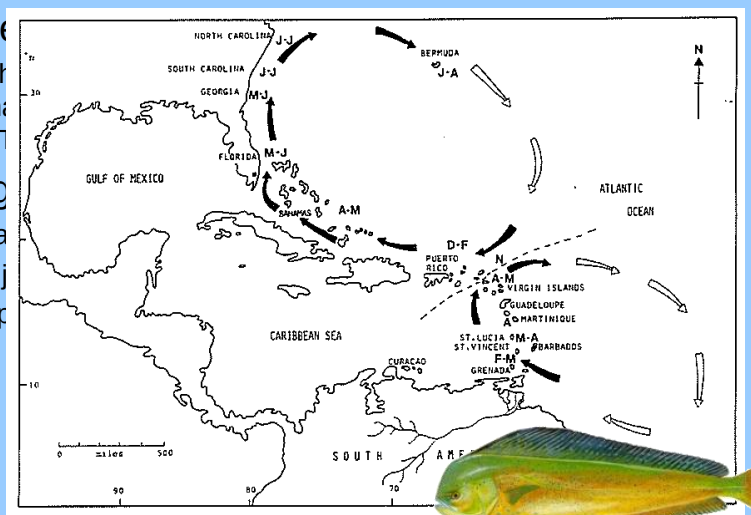
- Depleted resources
  - Billfishes fully or over-exploited by international fleets (controlled by ICCAT through quotas)



Slide 14

Fixed FADs - Issues to consider:
Environmental / biological / social / management

- Deplet
  - Billfish
    interna
    ICCA
- Aggreg
  - Increa
  - More j
  - Disrup



Slide 15

Fixed FADs - Issues to consider:
Environmental / biological / social / management

- Conflicts
  - Intra fishery conflicts (access arrangements)
  - Inter-fishery competition (longline vs FAD, recreational vs commercial, market impacts)
  - Space use – navigational hazard?
- Shared resource
  - Regional management responsibilities
  - Regional policy on FAD fishery?
- Relieve pressure on reefs?
  - Need to monitor impact

Testing an engagement strategy to support co-management of the Caribbean FAD Fishery

Slide 1

Testing an Engagement Strategy to Support Co-management of the Caribbean FAD Fishery

Project Team

Kai Lorenzen
Charles Sidman
Riviere Sebastien
Andrew Magloire
Joy Hazell
June Masters
Hyrone Johnson

Project Partners

Slide 2

Project Design

Goal: Evaluate FAD fishing governance arrangements, productivity and profitability to guide participatory decision-making.

Phase 1. Rapid Appraisal

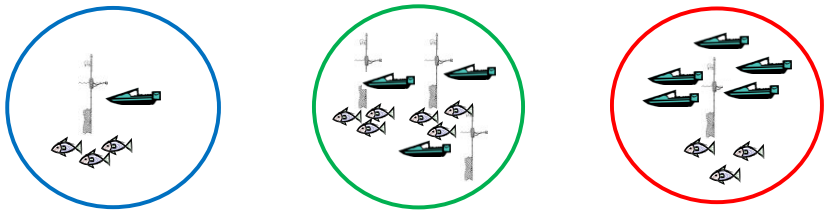
Phase 2. Data Collection and Analysis

Phase 3. Stakeholder Engagement

Slide 3

Phase 1. Rapid Appraisal

- Identify and characterize FAD governance arrangements.



Restricted Access → Open Access

Private

- FADs deployed by individuals
- Fishing restricted to individuals

Small groups

- FADs deployed by small groups of fishers
- Fishing restricted to group members, who cooperate

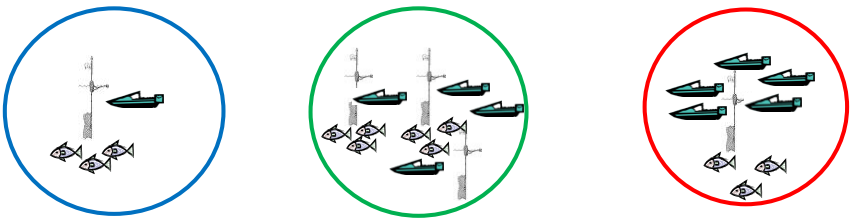
Public

- FADs deployed by government
- Fishing open to all, but may require license

Slide 4

Phase 2. Data Collection and Analysis

- Determine which governance arrangement produces the best FAD fishing results.



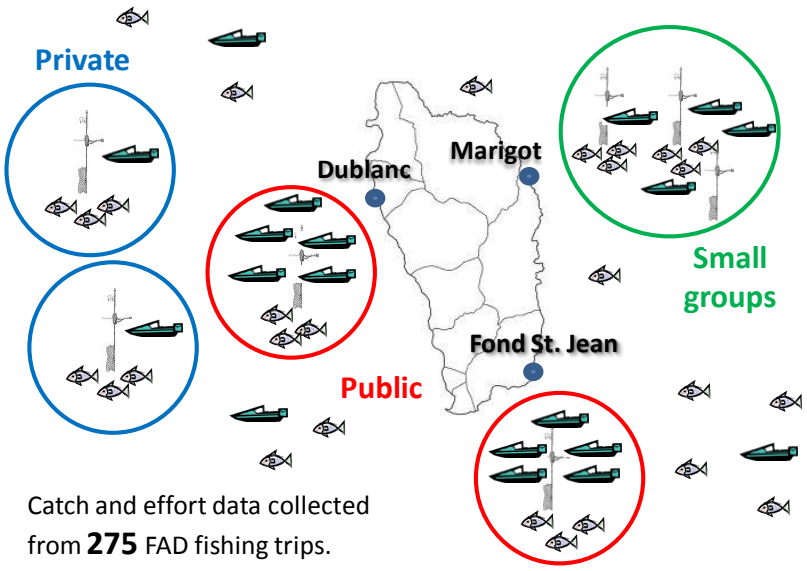
Private | **Small groups** | **Public**

Compare

catch per trip and profit

Slide 5

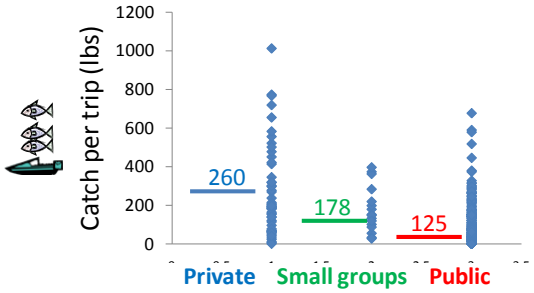
Dominica Study Locations



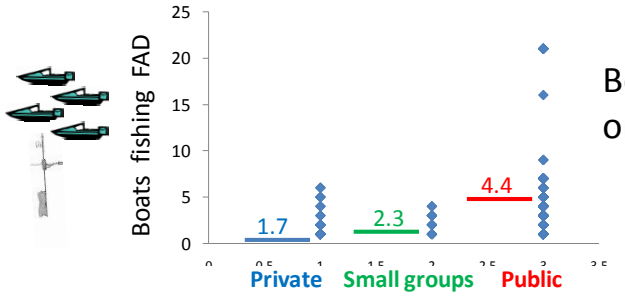
Catch and effort data collected from **275** FAD fishing trips.

Slide 6

Data Analysis: trips (and averages)



Catch per trip (pounds)

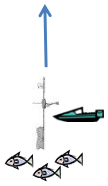


Boats fishing on FAD

Slide 7

Economic Return

Revenue
= Catch x Price (~ 6 EC$ per pound)

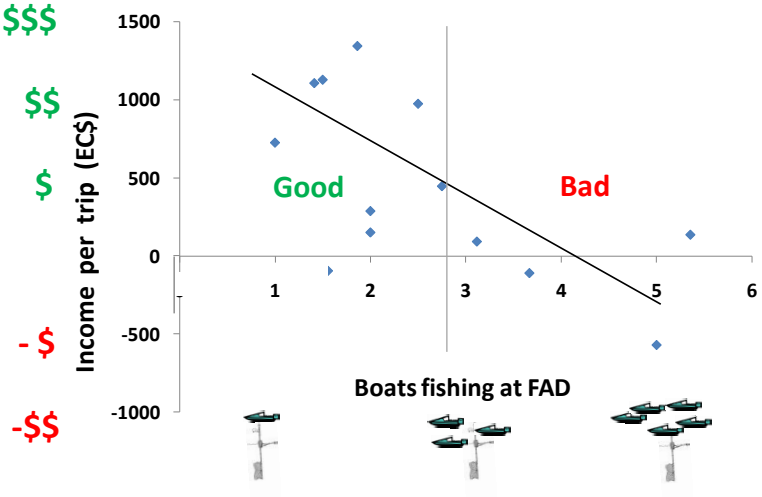


Skipper income
= Revenue – costs

Costs
= Fuel cost (4.3 EC$ per mile traveled)
+ Crew share (25% of Revenue – Fuel cost)
+ Boat & engine loans (135 EC$ per trip)

Slide 8

Economics: Skipper income per trip



Slide 9

Data Analysis Conclusions

- How well a FAD produces for an individual fisher depends on how many boats of fishers are using it at any given time.
- It is best if FADs are used by no more than 2-3 boats of fishers at one time on average.
- Public FADs attract too many boats of fishers.
- Being able to use multiple FADs on a trip may result in more stable catches for fishers.

Slide 10

Phase 3. Stakeholder Engagement

1. FAD Fisher Workshops

- Share the data analysis results.
- Discuss ways to improve FAD fishing success.

  - challenges and options to reach 2-3 boats per FAD

  - role of fishers, the fisheries division, and cooperatives in co-managing FAD fishing

Slide 11

2. FAD Fisher Focus Groups

- Increased information sharing and cooperation was identified by FAD fishers at workshops as a primary co-management need.
- Activity Planner allows FAD fishers to share information about daily fishing trips.
- Activity Planner is being used by focus groups of FAD fishers at two landing sites on Dominica.

Slide 12

Tips for Successful Engagement

- Data collection and analysis was an integral element of the stakeholder engagement process.
- Project partners each played an active role in the planning and implementation of the stakeholder meetings.
- A helpful tool (Daily Activity Planner) was introduced to support longer-term information sharing and cooperation among stakeholders.

CNFO's Activities relevant to FADs

Slide 1

Caribbean Network of Fisherfolk Organisations (CNFO) Dec 2013

FAD Fishery Management Meeting
9-11 December 2013

St. Vincent and the Grenadines

Slide 2

CNFO

- Network of National Fisherfolk in Caricom
- Involving NFOs, NFO steering Committees, representatives of fishers
- Participation, Antigua and Barbuda, Anguilla, Bahamas, Barbados, Belize, Dominica, Grenada, Guyana, Haiti, Jamaica, Montserrat, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Surinam, Trinidad and Tobago and Turk and Caicos.
- Interest from Dominican Republic, Dutch and French Caribbean
- Focus on EAF
  - Networking, Capacity Development, Advocacy and Representation

Slide 3

JICA and CNFO

- Masterplan Dissemination – Jan 2012 –St. Lucia
- Promoting the Development of Good Practices for Fisheries Management and Development – July 2012-St Vincent and the Grenadines
- FAD Management – March 2013-Dominica
- FAD Management – December 2013-St. Vincent and the Grenadines

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Slide 4

Notes from the CNFO

- CARIFICO – Sub-regional OECS project
  - CNFO participation not at decision-making level
  - National fishers involvement
- Co-management model not collaborative co-management
  - Decision-making participation from "Concept to Conclusion".
- Issues of rights including human, tenure, food
  - Fishers right to access resources
- Policy interactions – CCCFP, SSF
- EAF and Caribbean Fisheries –multi-gear, multi-species

Slide 5

Notes from the CNFO

- Research and Development
  - Stocks
  - Harvesting
  - Markets and regional trade
- Communication and Publicity
  - National
  - Regional

Slide 6

Thank You

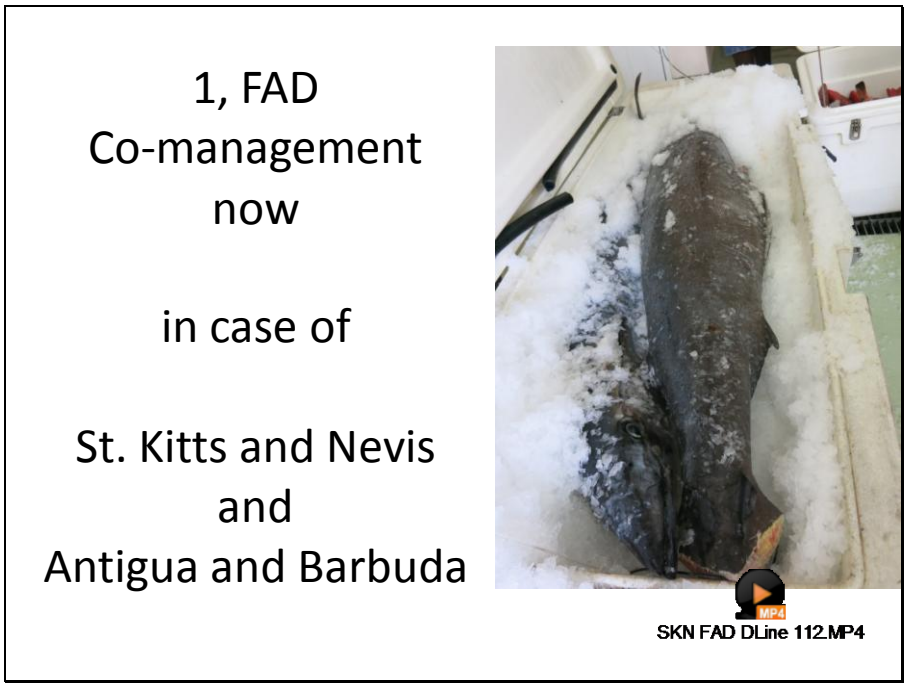
CARIBBEAN NETWORK OF FISHERFOLK ORGANISATIONS

APPENDIX 6: TECHNICAL DISCUSSIONS – FAD TECHNOLOGY

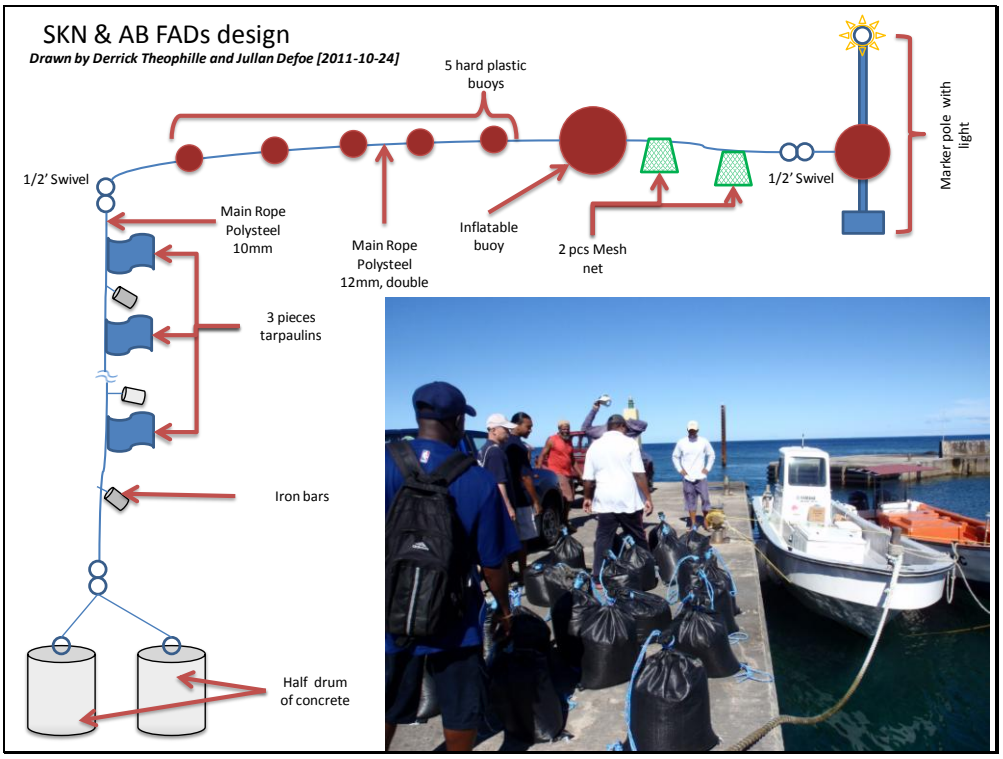
Design of FAD – CARIFICO

Slide 1

Slide 2



Slide 3



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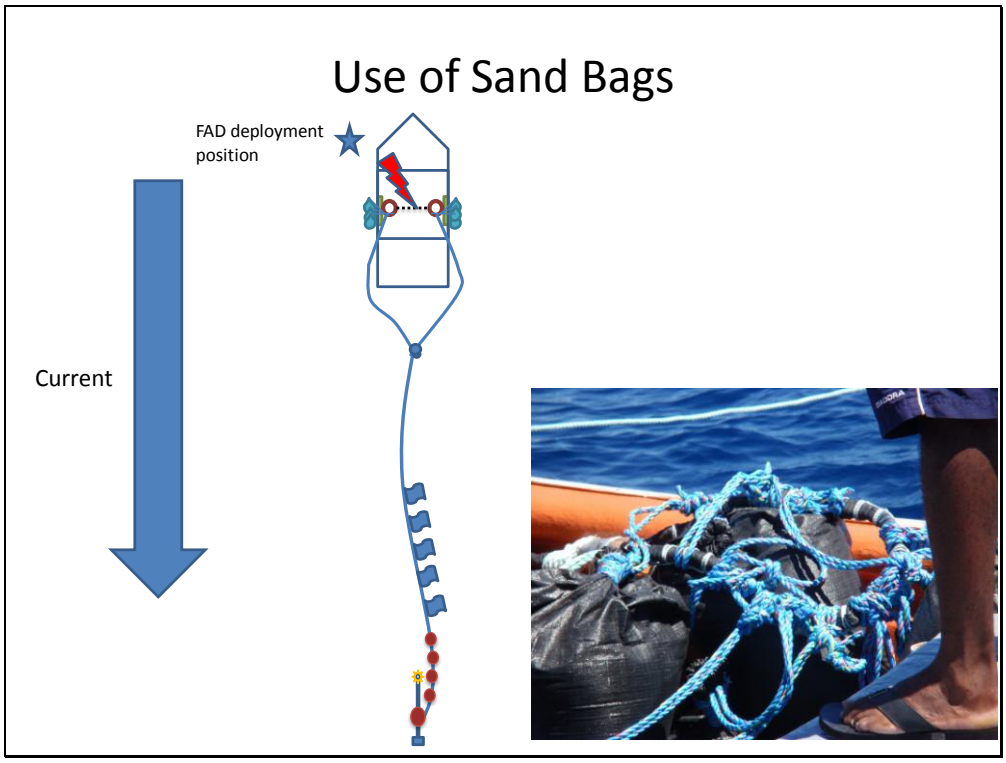
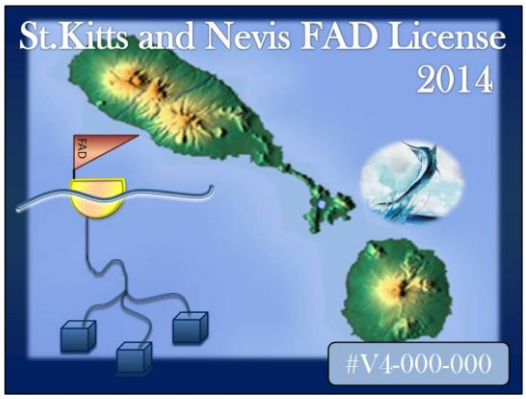


Slide 5

St. Kitts and Nevis

- 500XCD
- 1000XCD, 2000XCD
- Amendment
- FAD license sticker



- Three FADs set, Oct.
- Two FADs set, Nov.

Slide 6

Antigua and Barbuda

- Three FADs in water
- Other FADs are being set now.
- Guadeloupe ? illegal FADs

Slide 7

FAD Co-management now Conclusion 1:

CARIFICO can help

your activities and initiative

Technically and financially..

Slide 8

Conclusion

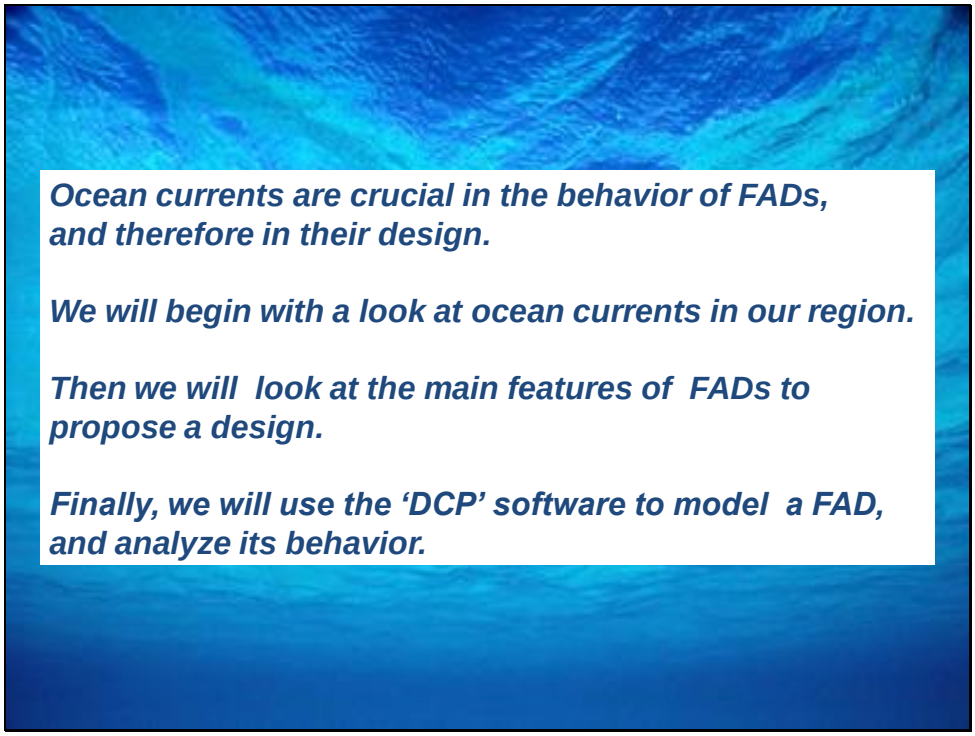
- **1, FAD Co-management and CARIFICO: you are the key person.**

- 2, “Fish In Ice” program, please give ICE
- 3 & 4, Fisheries Census, ID card, Fisher Vessel registration,,, day to day
- 5, Standardized CPUE
- 6, Marketing,,, Enhancement of Accessibility

The currents in the region and the use of FADs equipped with GPS for currents observation

Slide 1

Slide 2



Slide 3

1. Ocean currents

The ocean currents data are from Mercator Ocean

they are taken from:

Global Ocean Physics Analysis and Forecast updated Daily

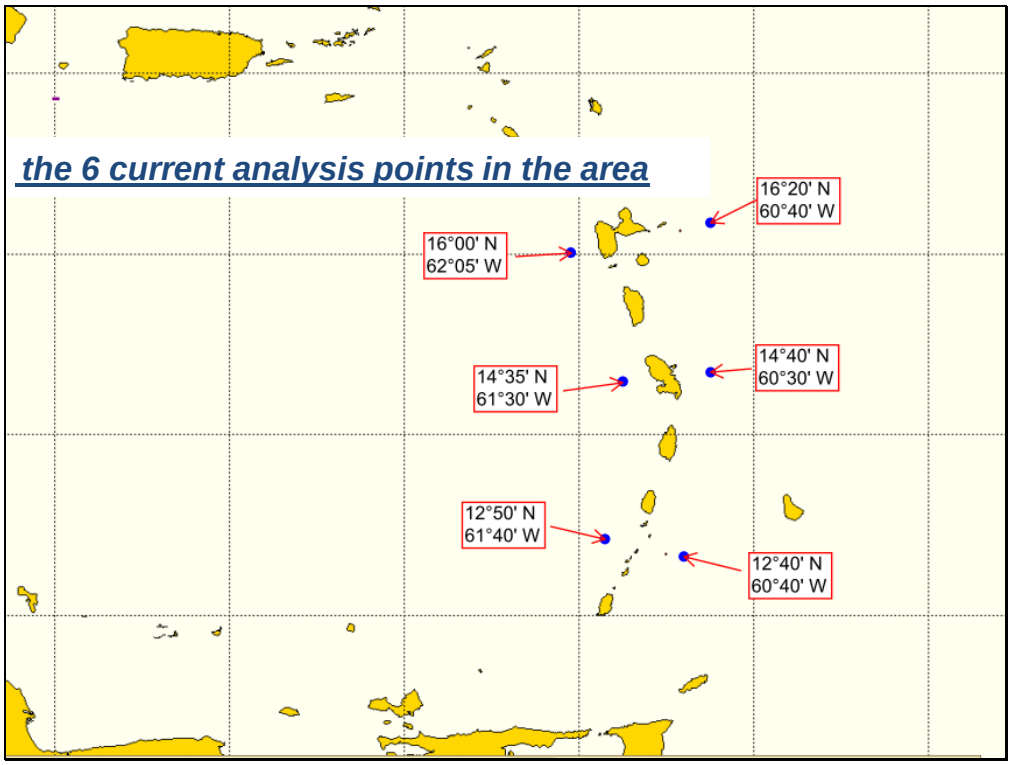
Mercator Ocean
Ocean Forecasters

Ocean monitoring and forecasting

Mercator Ocean is owned by these agencies

cnrs Ifremer IRD Institut de recherche pour le développement METEO FRANCE Toujours un temps d'avance

Slide 4



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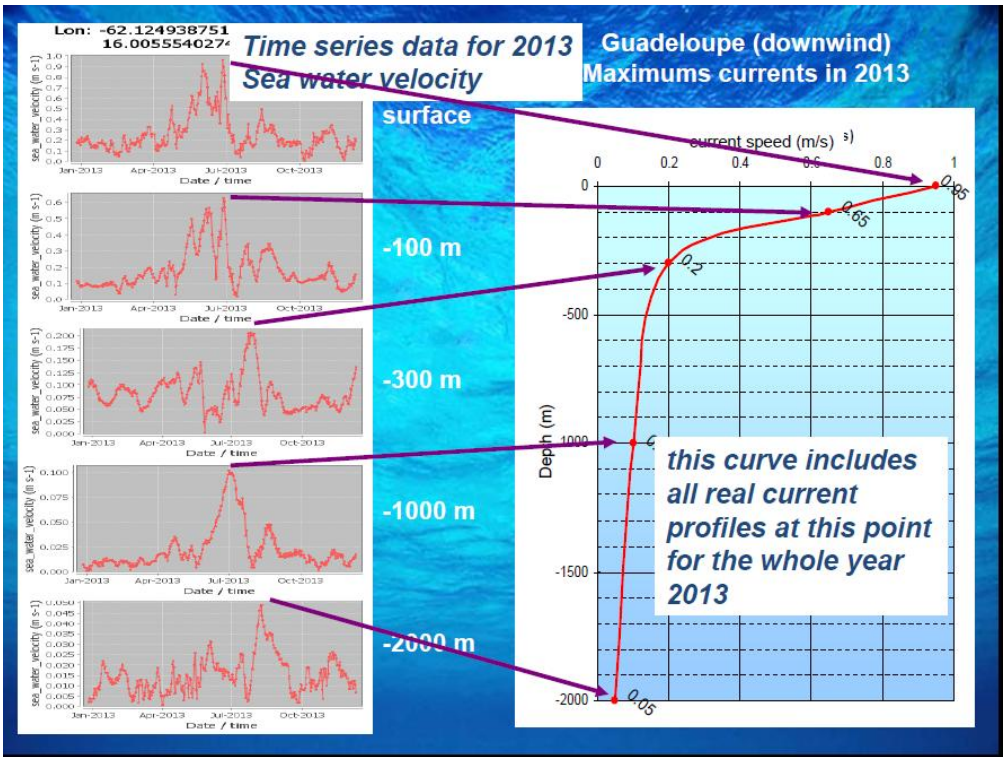

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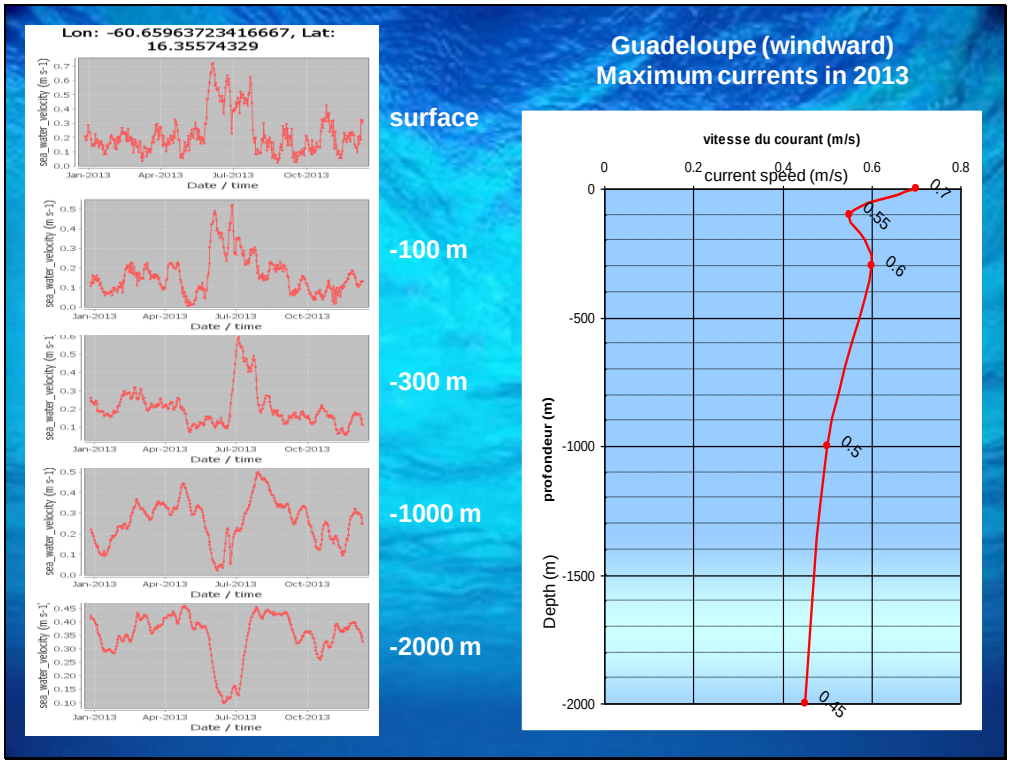

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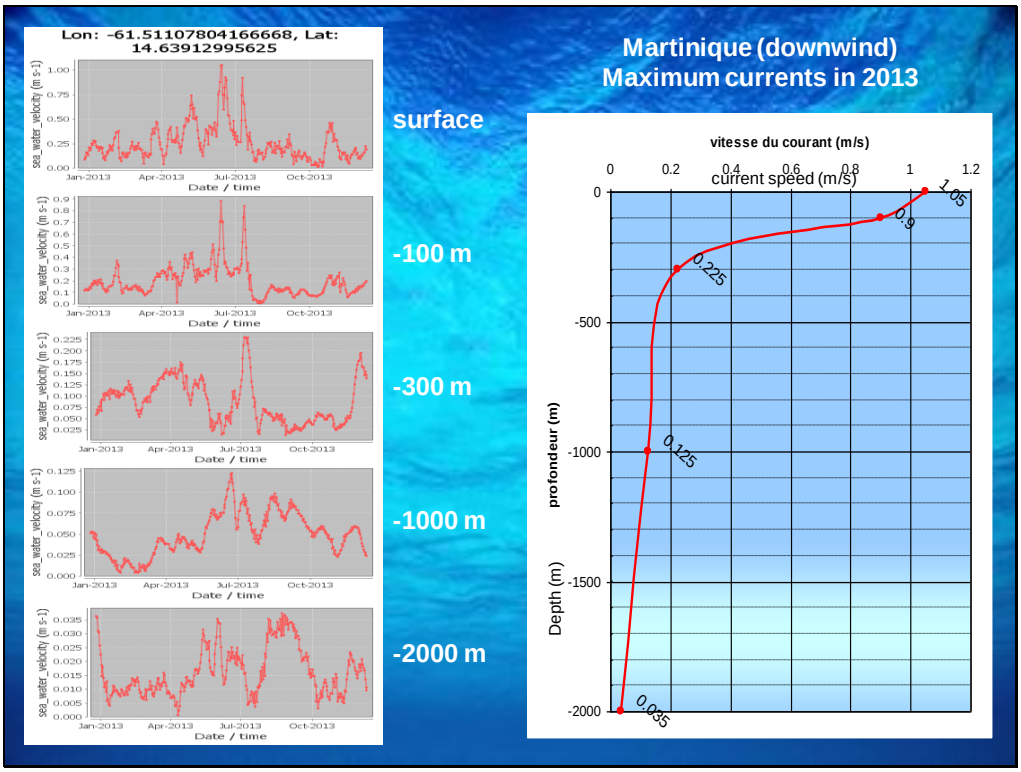

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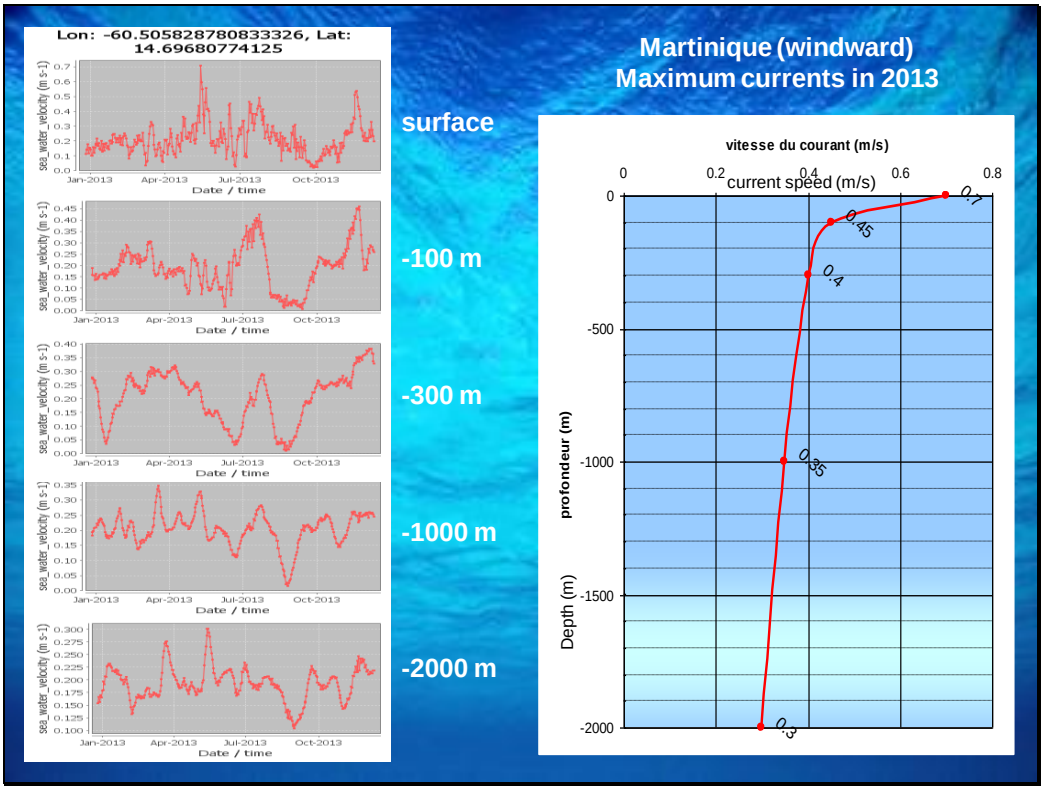
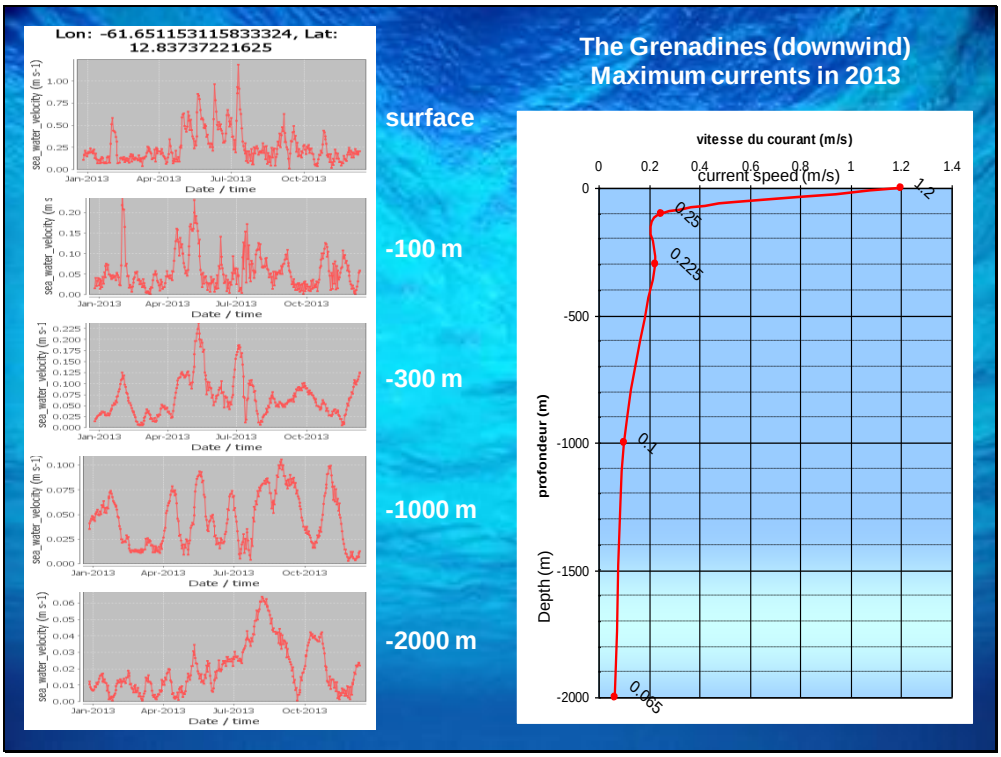


Slide 9



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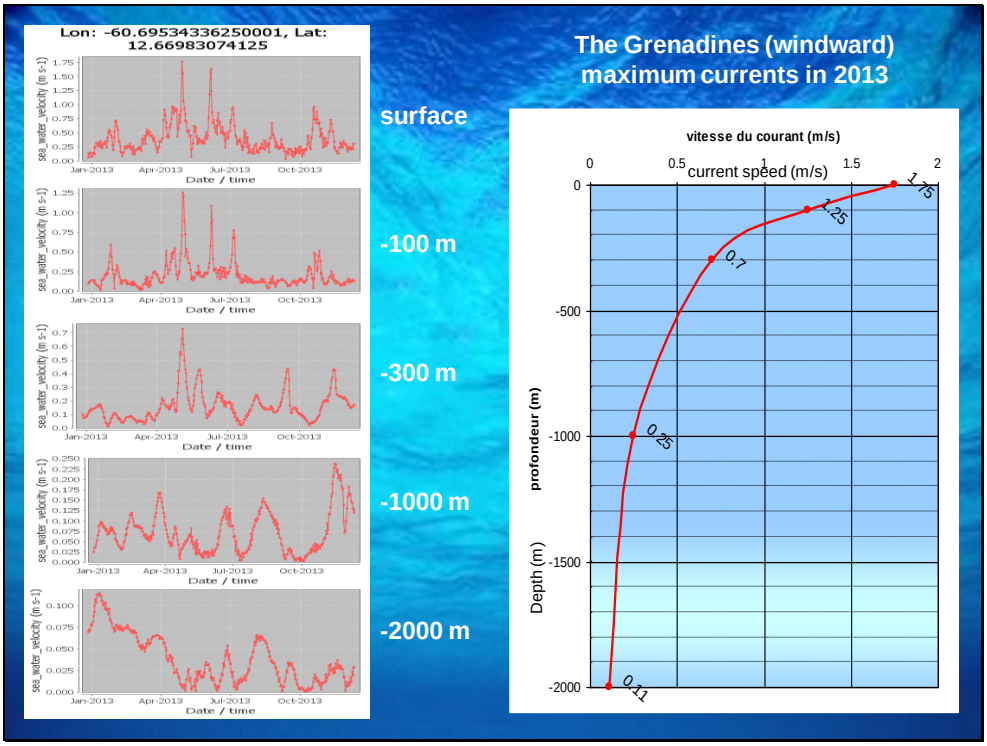
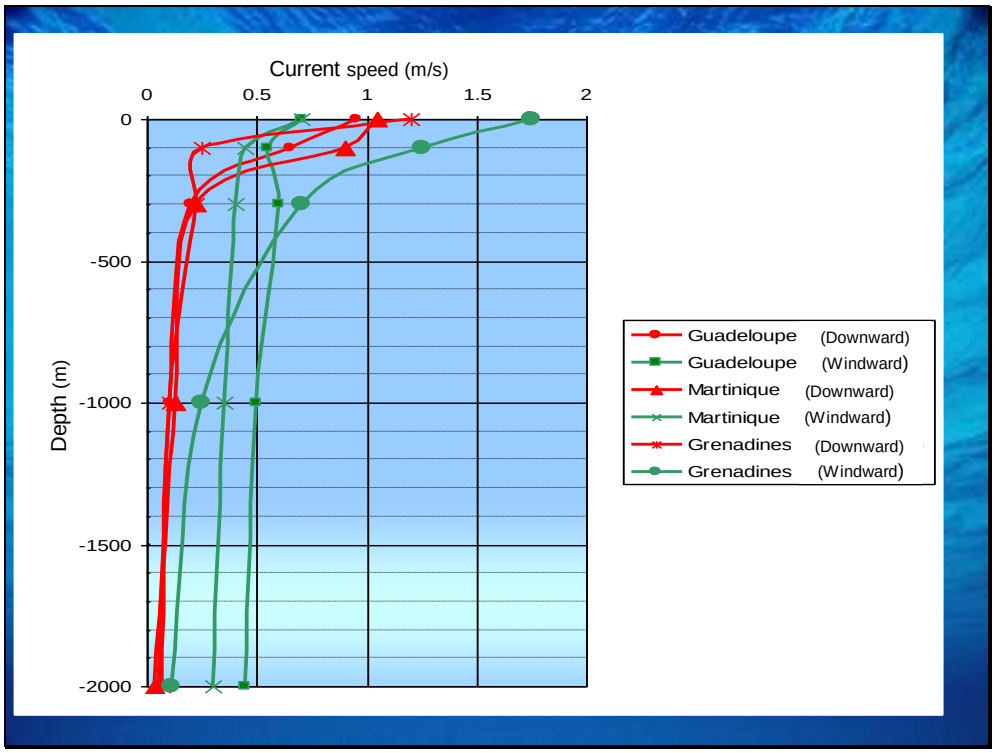
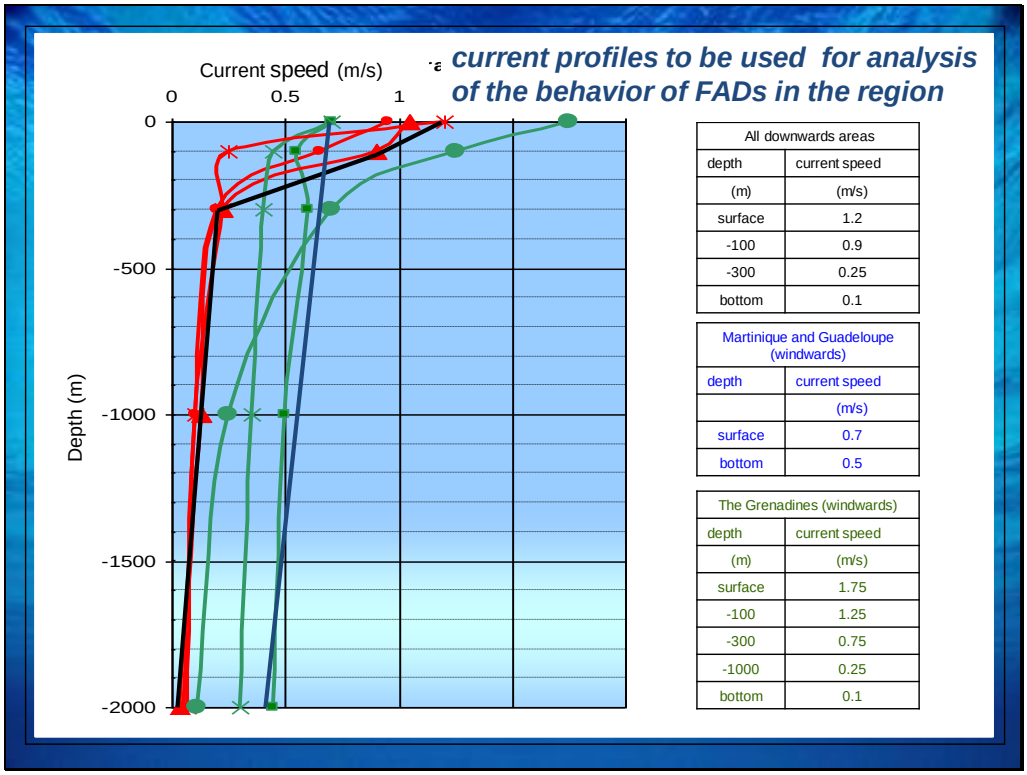


Slide 11



Slide 12



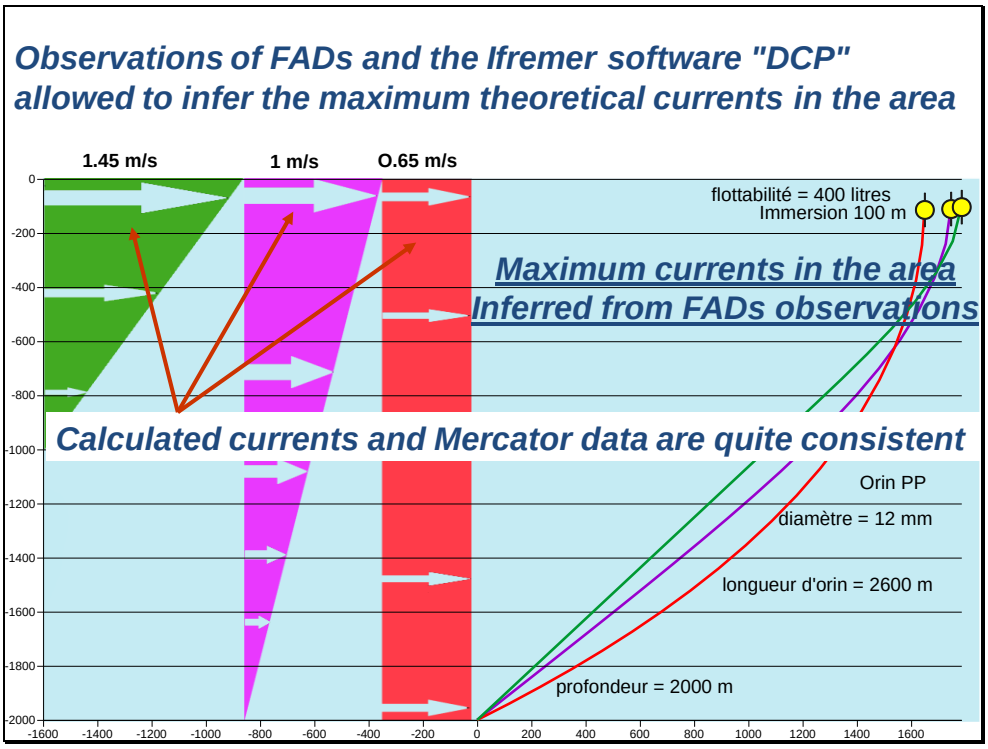
current profiles to be used for analysis of the behavior of FADs in the region

All downwards areas	
depth	current speed
(m)	(m/s)
surface	1.2
-100	0.9
-300	0.25
bottom	0.1

Martinique and Guadeloupe (windwards)	
depth	current speed
	(m/s)
surface	0.7
bottom	0.5

The Grenadines (windwards)	
depth	current speed
(m)	(m/s)
surface	1.75
-100	1.25
-300	0.75
-1000	0.25
bottom	0.1

Slide 13



Slide 14

2.main features of FADs

Main features of FADS are:
A. Buoyancy
B. Weight of anchoring
C. Length and characteristics of the mooring line

A. Buoyancy
It is the capacity of a body to stay afloat (or not)

It's a force* which must be expressed in Newton .... Let us simplify !

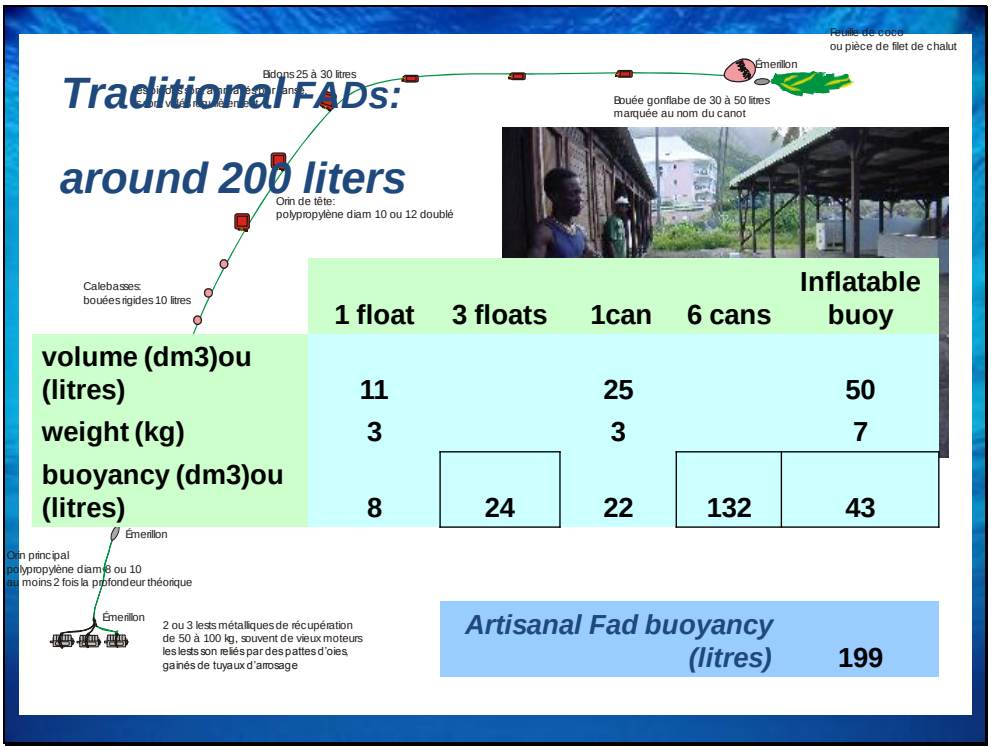
We will express buoyancy in liters and establish it as the difference of body volume in dm3 and weight in kg.

Let us remember that a body of one liter of buoyancy can keep on the surface a load of one kilogram

some examples :

**see Archimedes*

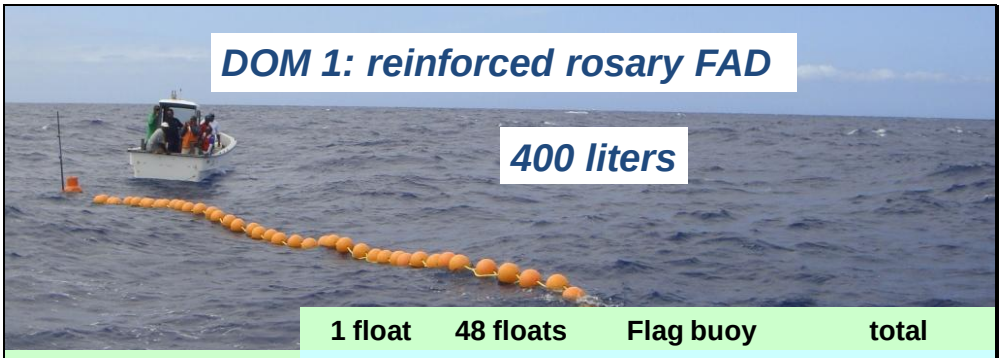
Slide 15



	1 float	3 floats	1can	6 cans	Inflatable buoy
volume (dm3)ou (litres)	11		25		50
weight (kg)	3		3		7
buoyancy (dm3)ou (litres)	8	24	22	132	43

Artisanal Fad buoyancy (litres)	199

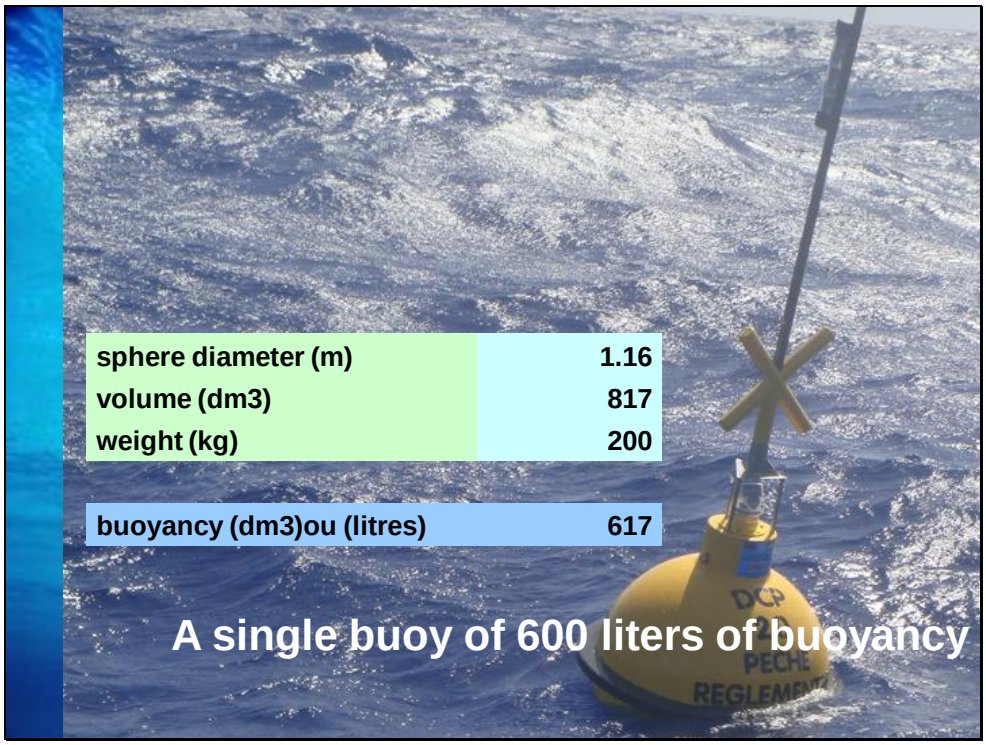
Slide 16



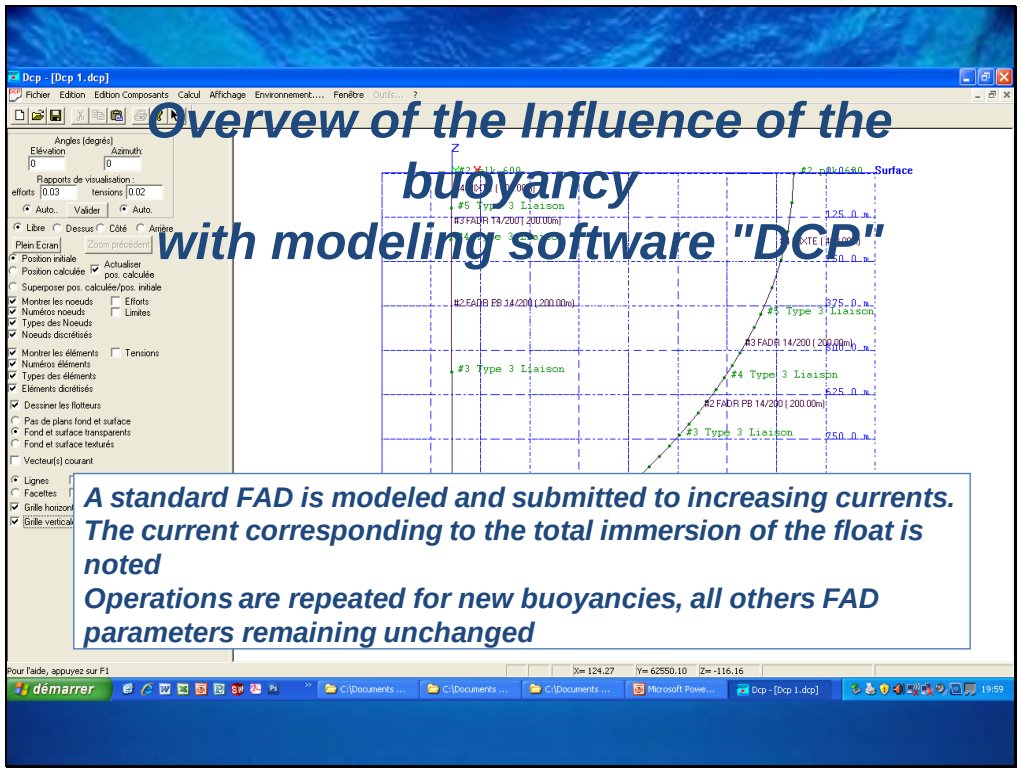
	1 float	48 floats	Flag buoy	total
volume (dm3) or (liters)	11		80	
weight (kg)	3		50	
buoyancy (dm3) or (liters)	8	384	30	414

Weight in water of the cable between floats (kg)	9
DOM 1 buoyancy (litres)	405

Slide 17



Slide 18



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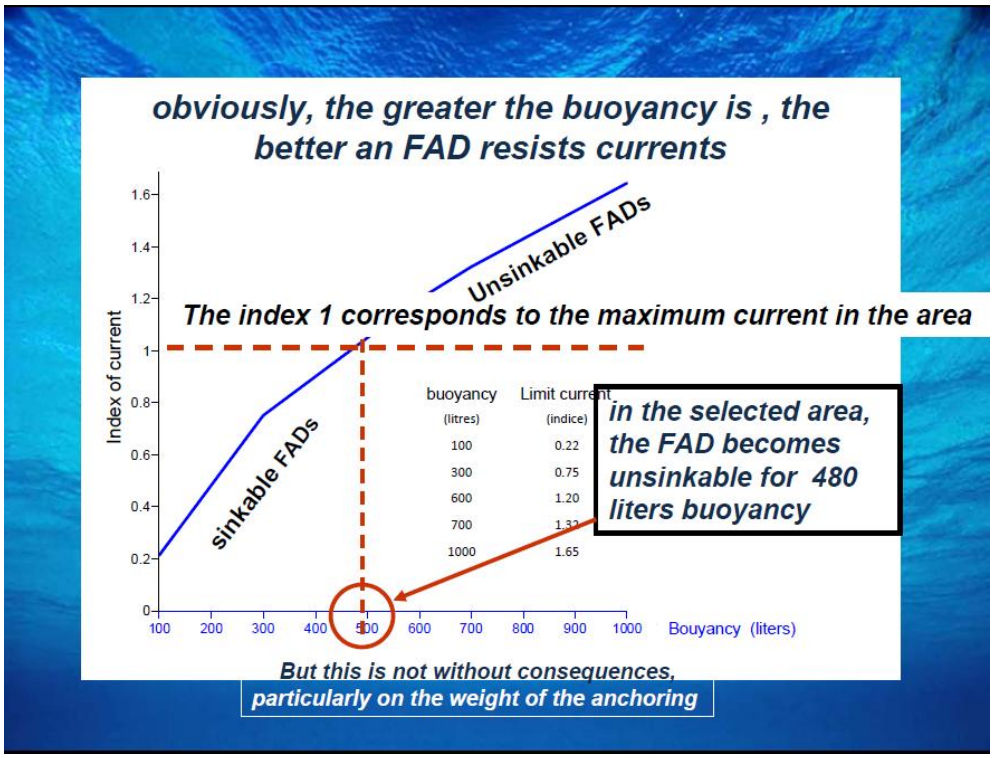

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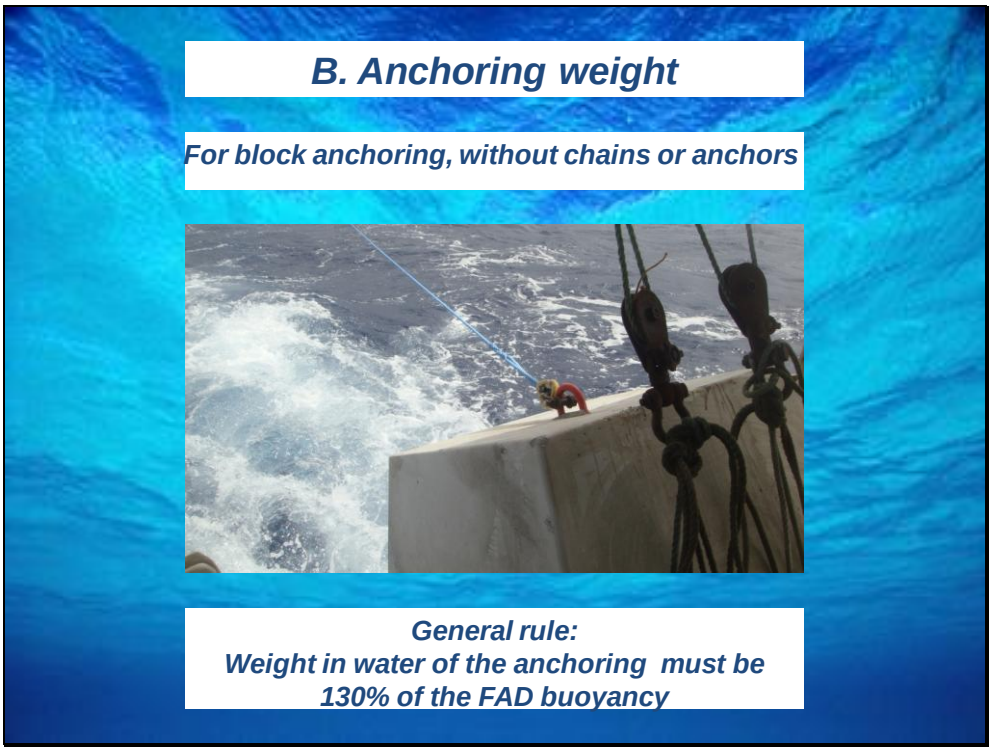


Slide 21

weight in water : Ww

The weight in water of à body is the body weight decreased by the buoyant force

the buoyant force = body volume (V) multiplied by sea water density (Dw)

body weight(W) =its volume(V) multiplied by its density (Dmat)

Therefore **Ww= (V*(Dmat))-(V*(Dw))**
Ww=V*(Dmat-Dw)

Or **Ww= W(1-(Dw/Dmat))**

Slide 22

characteristic	formula	type of FAD			
		PLK600	DOM1	artisanal FAD	small artisanal FAD
FAD bouyancy (liters)		600	400	200	120
anchoring block weight in water (kg)	= buoyancy * 1.3	780	520	260	156
anchoring block weight in air (concrete density = 2.1) (kg)	= buoyancy * 1.3 / (1-(1.025/2.1))	**1524**	**1016**	**508**	**305**
block volume (m3)	= weight in air / 2100	0.726	0.484	0.242	0.145
block side (cm)	= (ROOT(volume /height)) * 1000	110	90	70	60
block height (cm)		60	60	50	40
anchoring block weight in air (steel density = 7.8) (kg)		898	599	299	180

Slide 23

C. Length and characteristics of the rope

The excess length ratio is the ratio of length of the rope and depth
Ex: 2000 m of rope for 1000 m depth, ratio is 2

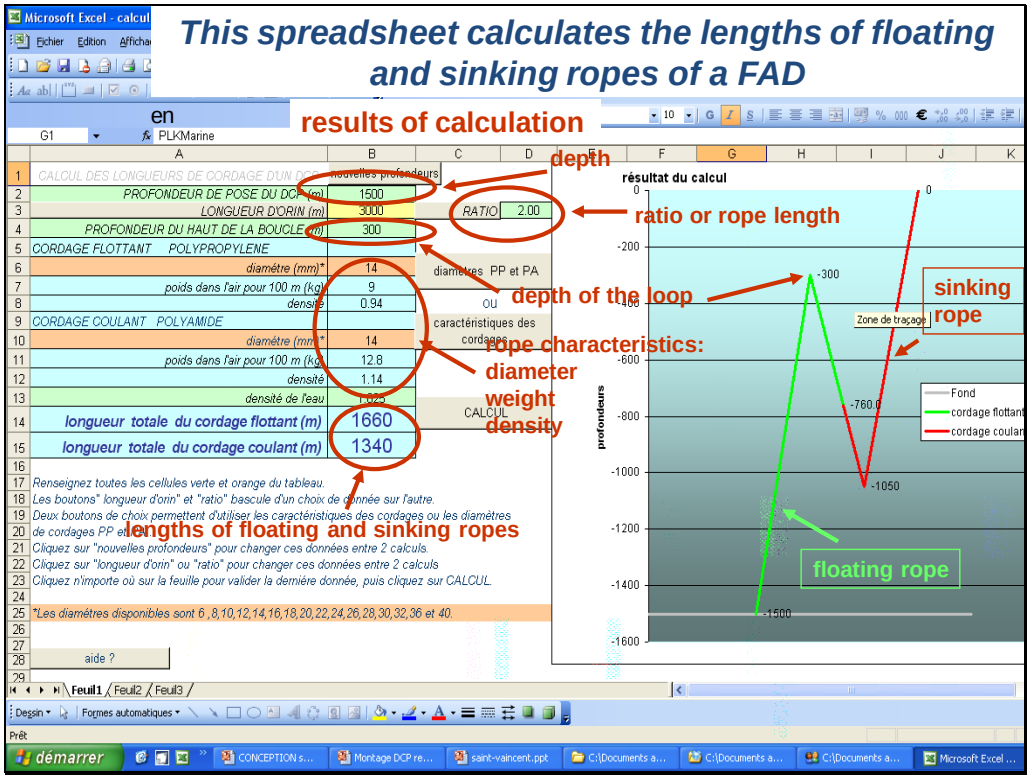
Basic rule
When there is no current:
no length of rope should come floating on the surface
no length of rope should come touching the bottom

This rule necessarily implies :
The buoyancy of the lower part of the mooring line is positive (floating rope)
The buoyancy of the upper part of the mooring line is negative (sinking roope)
The ratio of excess length should be between 1 and 3

Usually 1.2 < ratio < 2

Slide 24

This spreadsheet calculates the lengths of floating and sinking ropes of a FAD



Slide 25

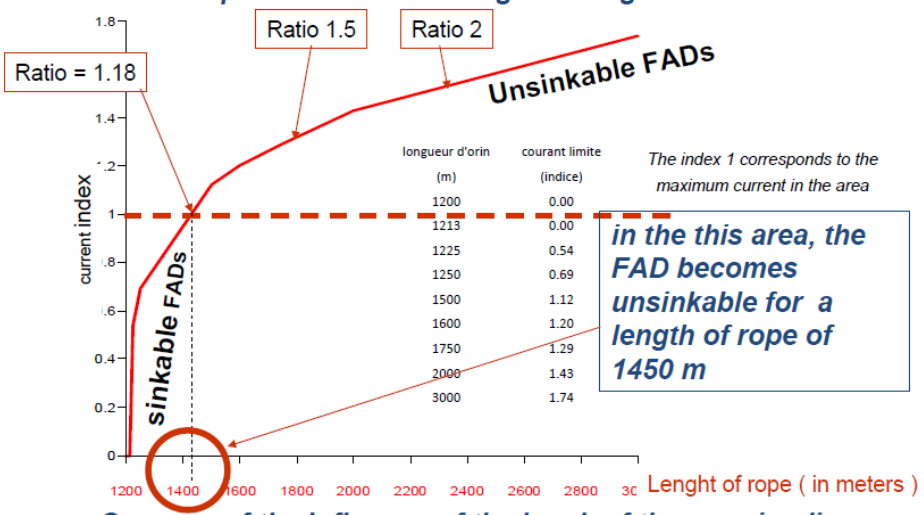
			notations	formules
1				
PROFONDEUR DE POSE DU DCP (m)		1500	P	
2				
LONGUEUR D'ORIN	(m)	3000	LT	
3				
DENSITE DE L'EAU		1.025	De	
4				
RATIO DE SURLONGUEUR		2		
(rapport entre la longueur d'orin et la profondeur)				
(usuellement entre 1.3 et 3 pour un)				
5				
PROFONDEUR DU HAUT DE BOUCLE	(m)	300	Phb	
(sans courant)				
6				
LONGUEUR DE LA BOUCLE	(m)	1500		= LT-P
LONGUEUR DU BRAS DE BOUCLE	(m)	750	Lb	= (LT-P)/2
7				
CARACTERISTIQUE DES CORDAGES				
A. CORDAGE FLOTTANT				
poids dans l'air pour 100 m (PP de 14 mm)	(kg)	9	PAf	
densité		0.94	DMf	
B. CORDAGE COULANT				
poids dans l'air pour 100 m (PA de 14 mm)	(kg)	12.8	PAc	
densité		1.14	DMc	
7				
POIDS DANS L'EAU DU METRE DE CORDAGE FLOTTANT	(kg)	-0.0081383	pf	= (Paf*(1-(De/DMf)))/100
POIDS DANS L'EAU DU METRE DE CORDAGE COULANT	(kg)	0.01291228	pc	= (Pac*(1-(De/DMc)))/100
8				
REPARTITION DES CORDAGES DANS LE BRAS DE BOUCLE				
longueur de cordage flottant dans le bras de boucle	(m)	460.044863	Lf	= Lb*(pc/(-pf+pc)) car on a : - Lf*pf = Lc*pc et Lf+Lc = Lb
longueur de cordage coulant dans le bras de boucle	(m)	289.955137	Lc	= Lb*(-pf/(-pf+pc)) (dans le bras de boucle, la flottabilité du PP égale le poids dans l'eau du PA)
9				
LONGUEUR TOTALE DE CORDAGE FLOTTANT (m)		1660		= P-Phb+Lf
LONGUEUR TOTALE DE CORDAGE COULANT (m)		1340		= Phb+Lb+Lc

details of calculations and formulas

thanks again to Archimedes

Slide 26

For the standard FAD, and increasing currents ,the current corresponding to the total immersion of the float is noted
Operations are repeated for <u>new lengths</u> of the anchoring rope, all other FADs parameters remaining unchanged

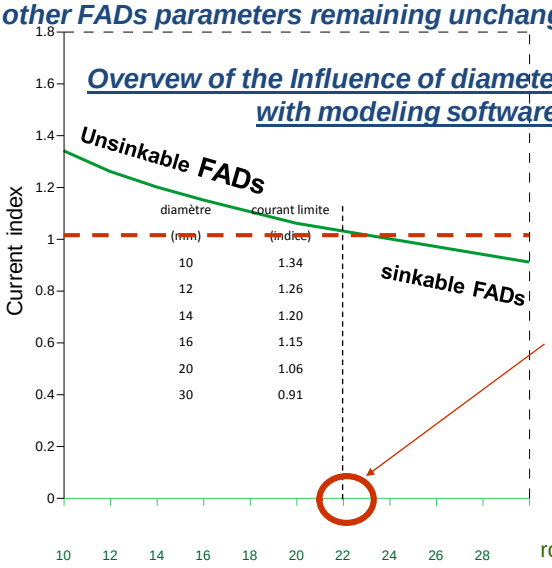


<u>Overvew of the Influence of the lengh of the mooring line with modeling software "DCP"</u>

Slide 27

For the standard FAD, and increasing currents ,the current corresponding to the total immersion of the float is noted. Operations are repeated for <u>new diameters</u> of the anchoring rope, all other FADs parameters remaining unchanged.

<u>Overvew of the Influence of diameter of the mooring line with modeling software "DCP"</u>

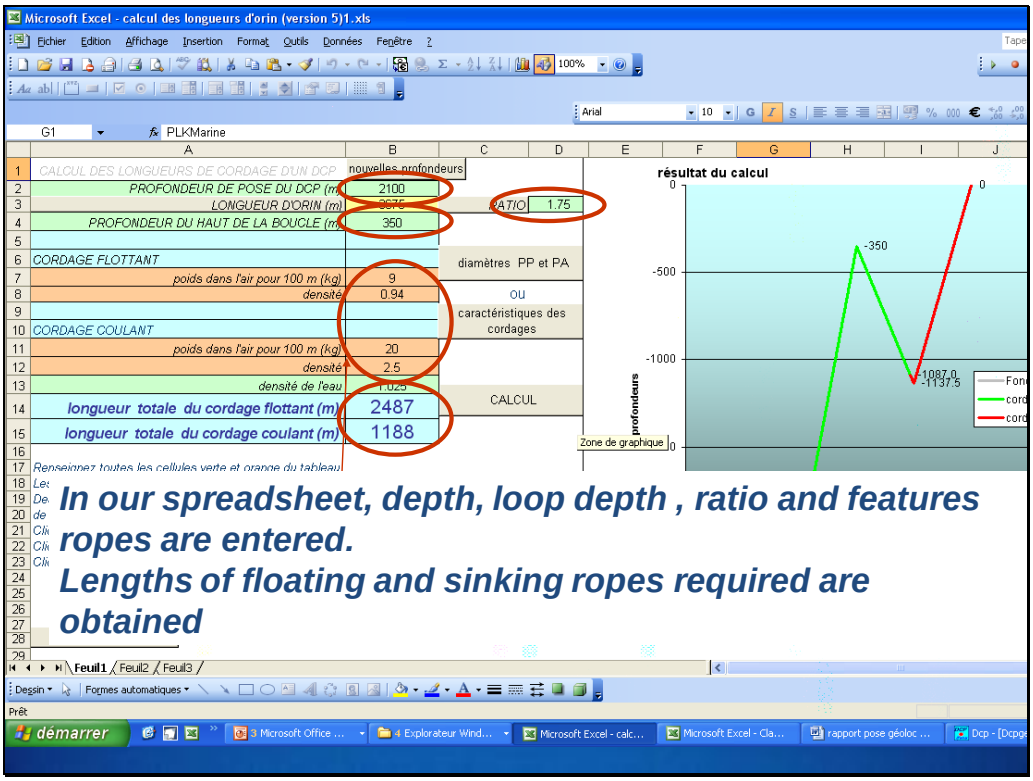


diamètre (mm)	courant limite (indice)
10	1.34
12	1.26
14	1.20
16	1.15
20	1.06
30	0.91

in this area, the FAD stays unsinkable for rope diametre up to 22 mm

Slide 28

Slide 29



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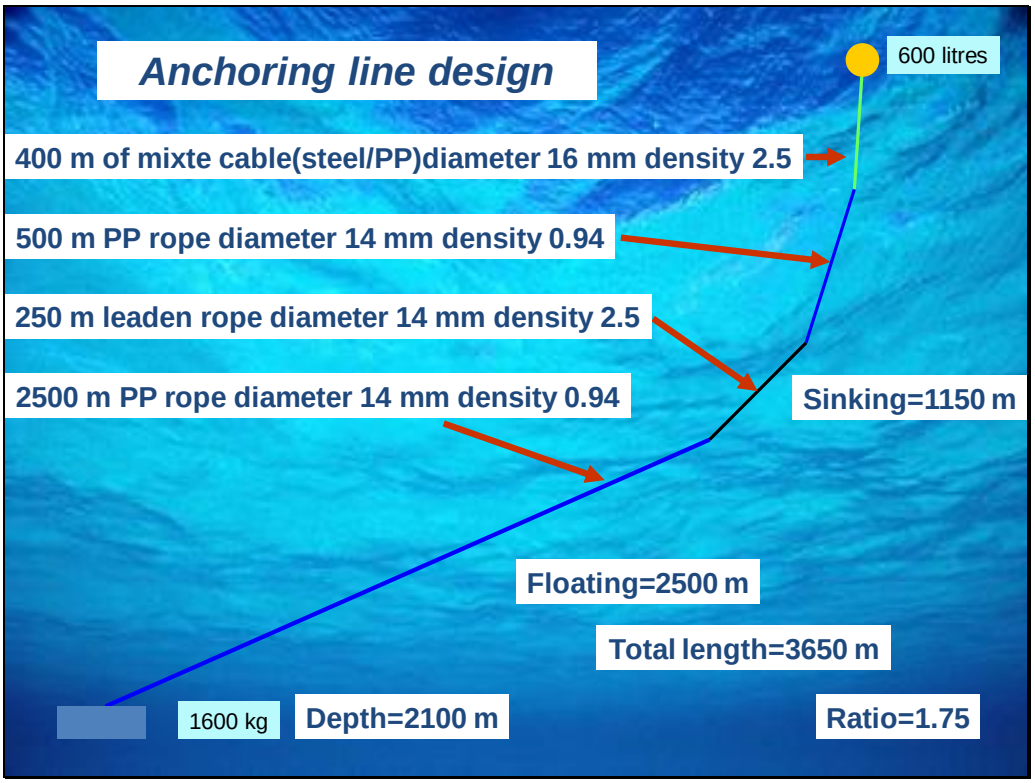
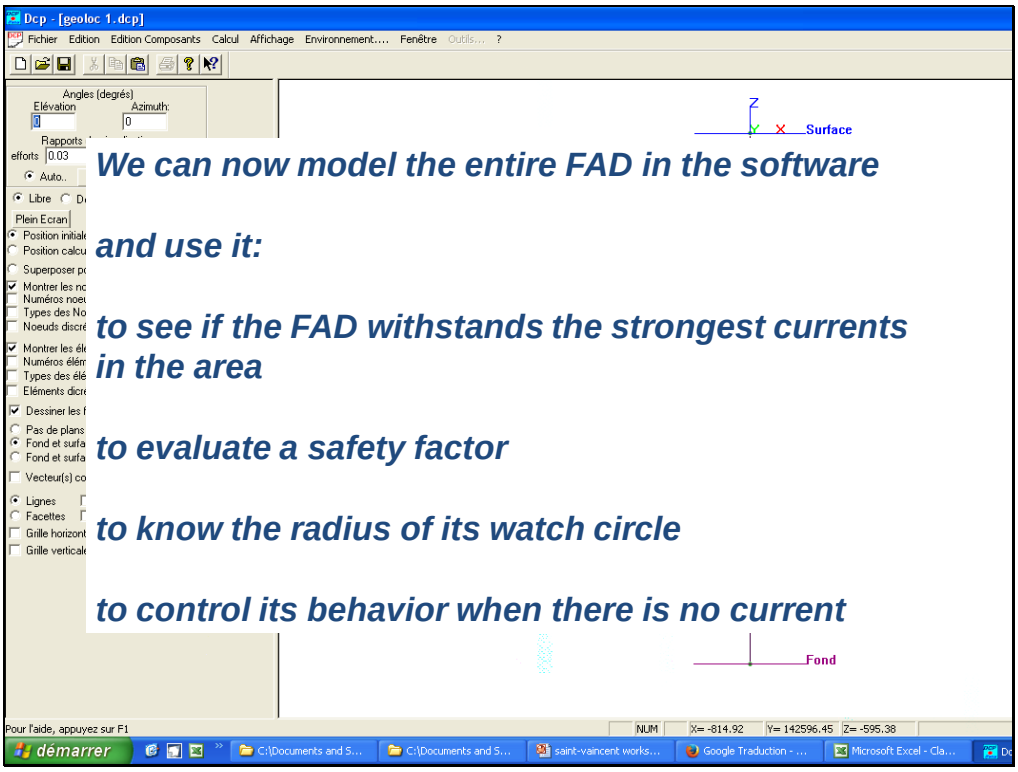


Slide 31



We can now model the entire FAD in the software

and use it:

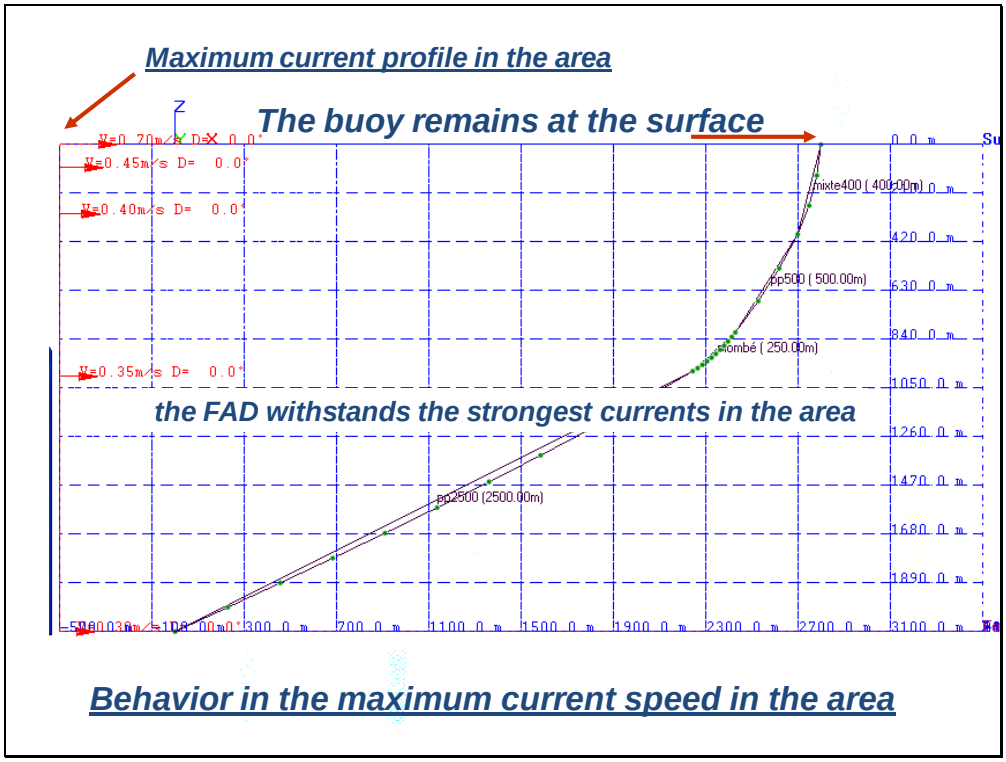
to see if the FAD withstands the strongest currents in the area

to evaluate a safety factor

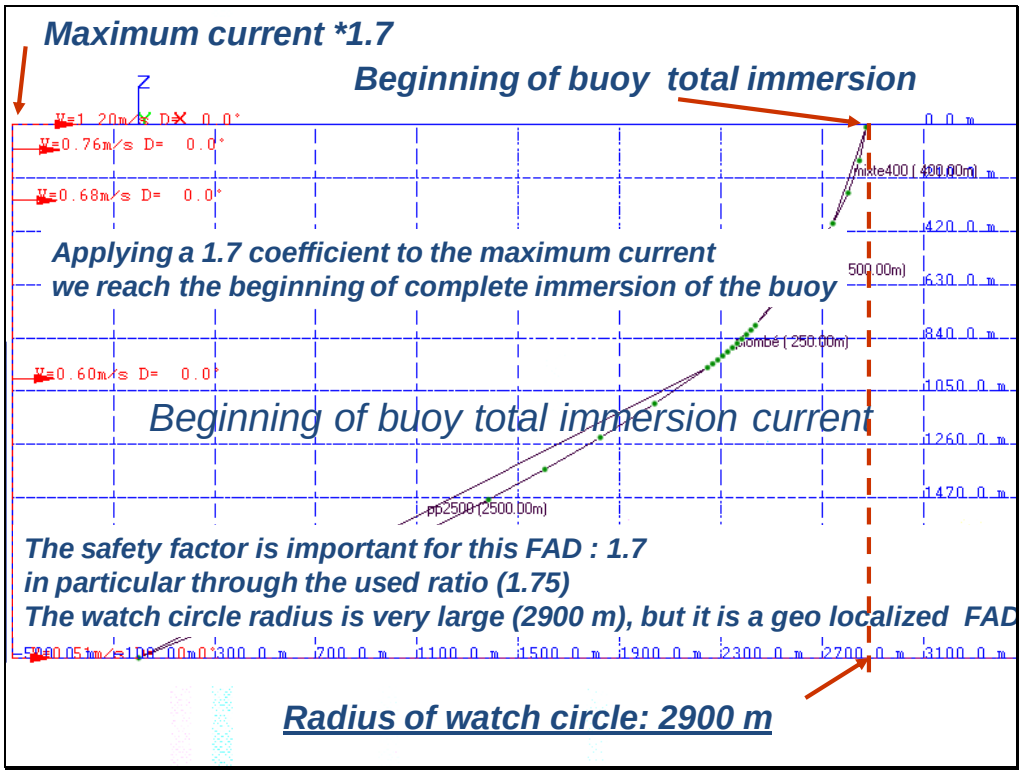
to know the radius of its watch circle

to control its behavior when there is no current

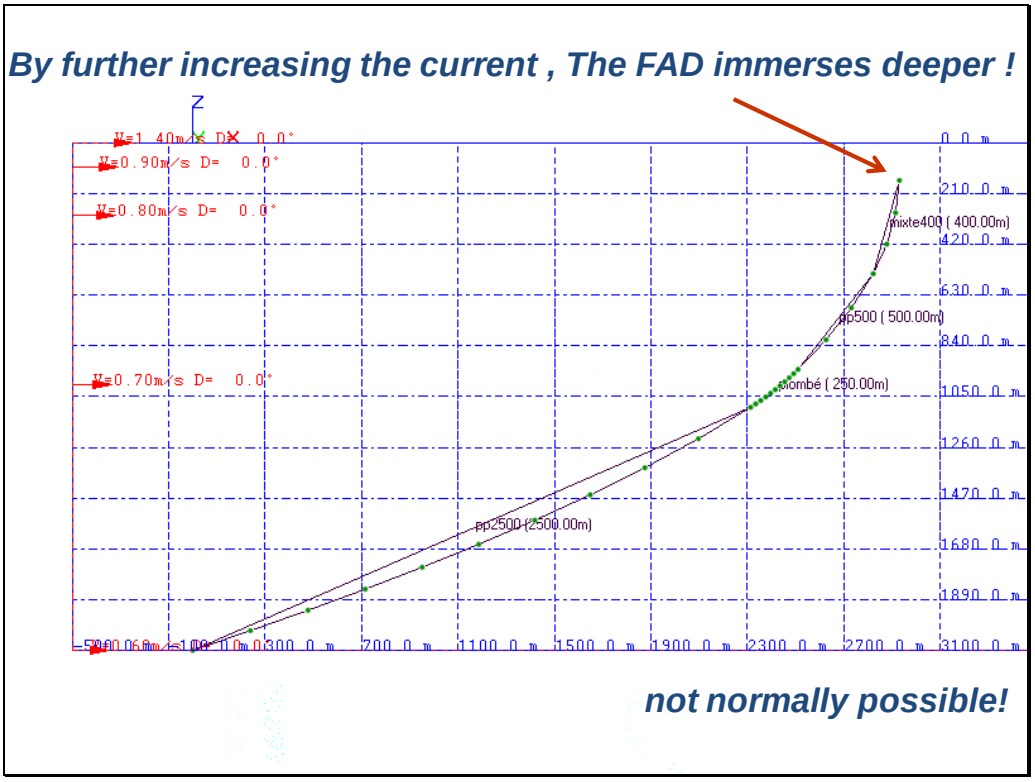
Slide 32



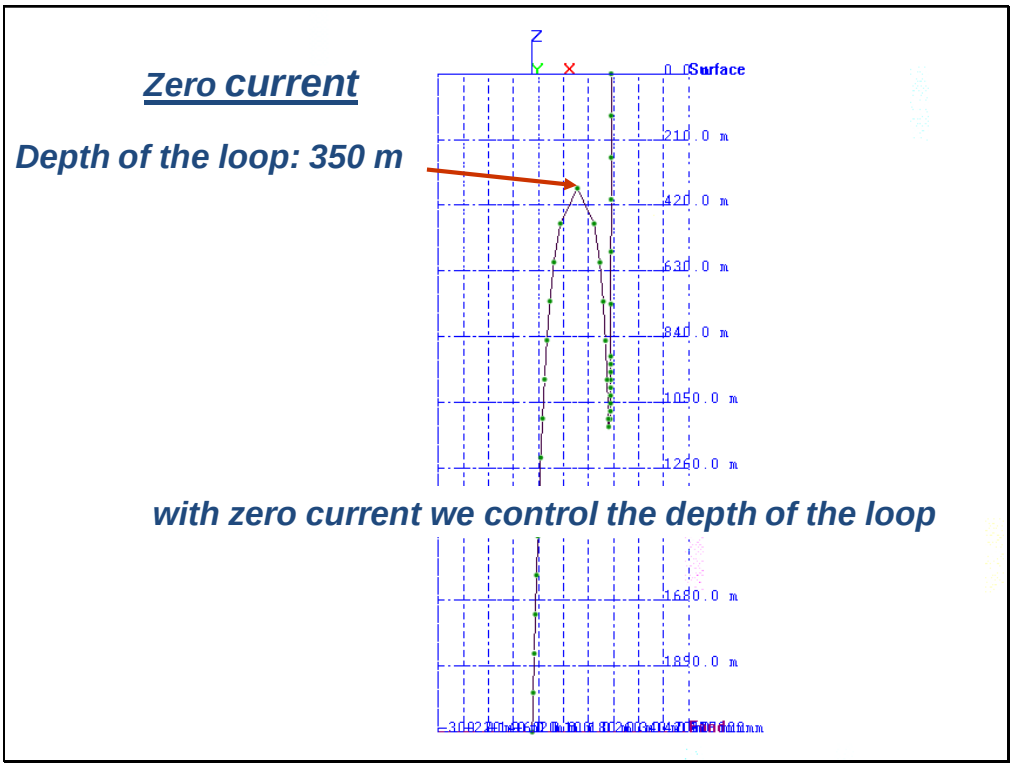
Slide 33



Slide 34



Slide 35



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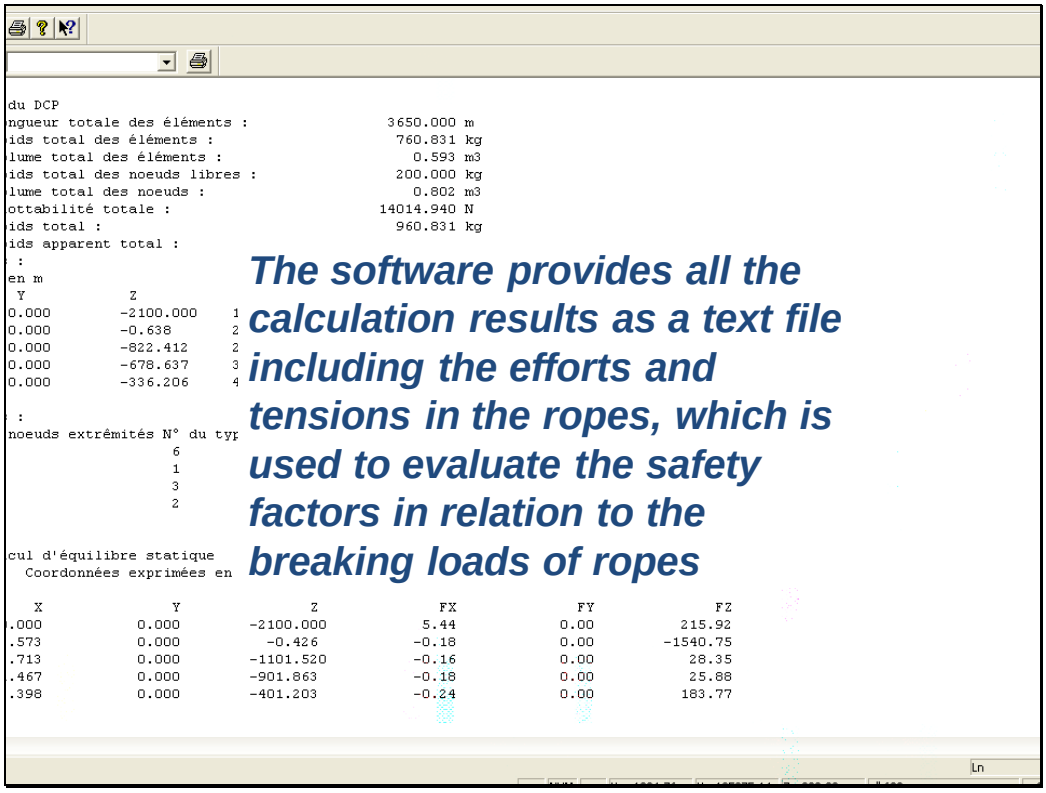


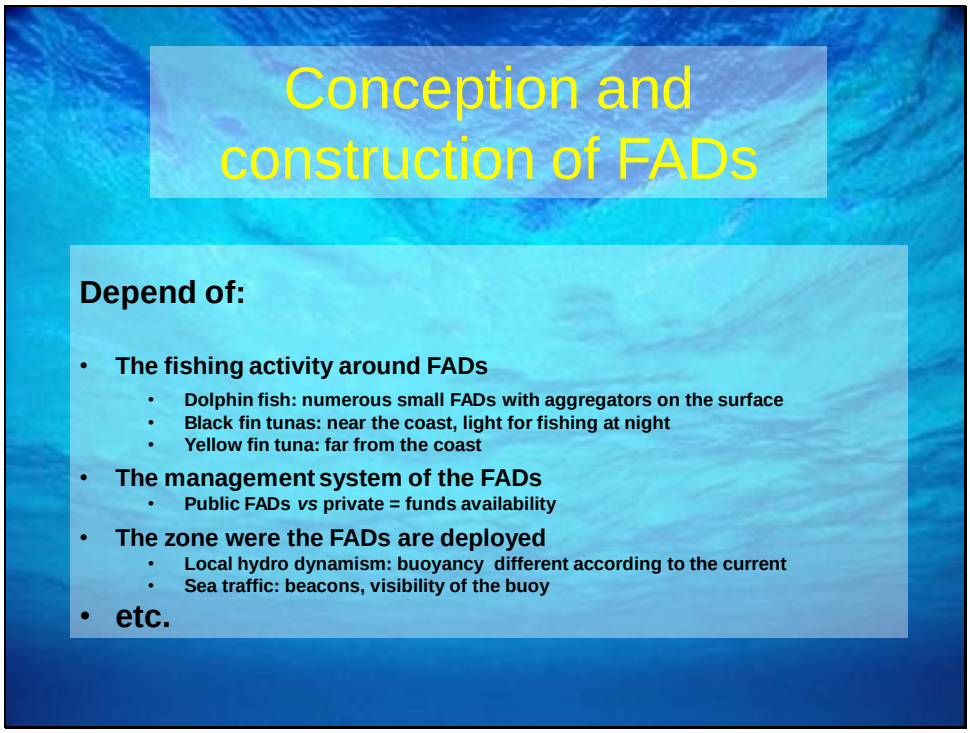
Slide 37


workshop for training in using the DCP software
this afternoon at 16:45
Thank you
A modeling tool:
IFREMER software DCP
RFM
JICA
FAO
COPACO
Western Central Atlantic Fishery Commission
l'Europe s'engage
avec les Antilles-Guyane dans la Grande Caraïbe
Ifremer
PROGRAMME INTERREG CARAÏBES

FAD Construction: Basic Rules

Slide 1

Slide 2



Slide 3

FAD's improvement objectives

- Avoid collisions with ships
- Reduce debris
- Reduce the risk of damage to submarine facilities (submarine cables, ...)
- Maintain the FADs on the surface all year round
- Find the best compromise between cost and longevity of FADs
- Provide a choice between multiple devices and in particular seek inexpensive devices accessible to a greater number
- Establish maintenance/replacement plans based on the lifespan of the various FADs components (to be assessed by the observation of a sufficient number of devices)
- Estimate the maintenance/replacement costs to develop more rational practices

Slide 4

Review of FADs construction

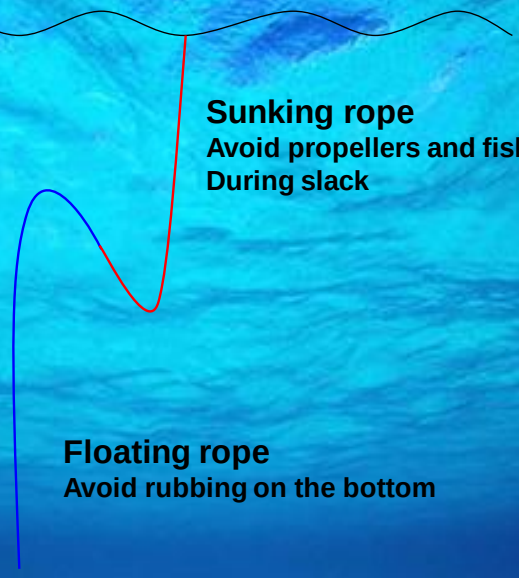
- **FAD general shape**

- **Anchor**
- **Metallic links**
- **Ropes**
- **Aggregators**
- **Buoys**
- **Beacons (night and day)**

- **How to estimate the average duration of the FADs?**

Slide 5

General shape of the FADs



Sensitive part:
first 200 – 400 m

Sunking rope
Avoid propellers and fishing gears
During slack

Floating rope
Avoid rubbing on the bottom

5

Slide 6

FADs Anchor

- Total Weight:

•Weight in the water at least **20 % more than the buoyancy of the FAD**

- WW = WA * (1-(DW/DM))

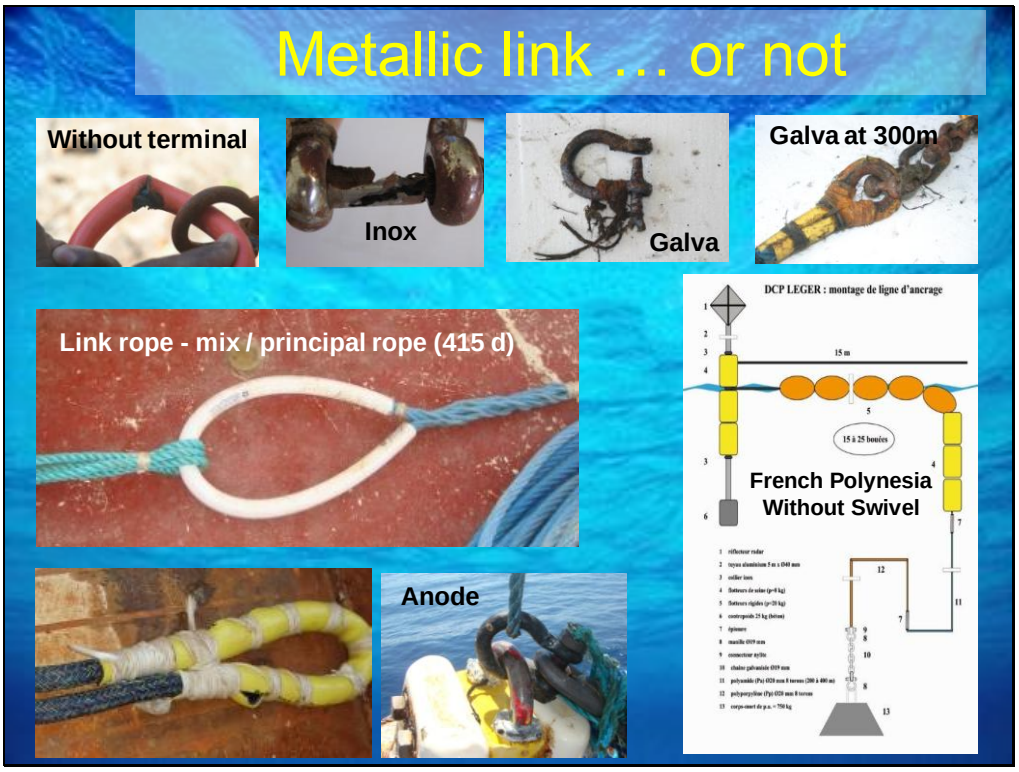
•[WW = Weight in the water, WA = weight in the air, DW = density in sea water=1.026, DM = density of the material]

•Nature : concrete (WW # WA/2), metal (WW # WA) – different densities

- Number of bloc(s), one or two or: …

•Anchor with limited height,
•important contact on loose ground

Slide 7



Slide 8

Slide 9

Ropes

- **Maximum of current in the zone ?**
- **Different parts of the rope**:

	Nature	Diam.	braided/stranded
High part :	PA, PES, Mix ?	12,14, 16 ?	No strands?
Low part:	PP, PE ?		

- **Total length according to**:
- Depth
- Maximum of current
- Diameter of the rope
- Buoys volume

- **Protect the first 200-400 m of the rope** against fishing lines and beats of fishes (mix, …)
- Don't use a weight moored alongside the rope risk of rubbing and then breaking-off the rope

Slide 10

Aggregators

Take care to

- Catch the hooks
- Marks: clean-up or not?
- Depth
- Number
- Life span / maintenance (take the buoy on board or use of a "kit")

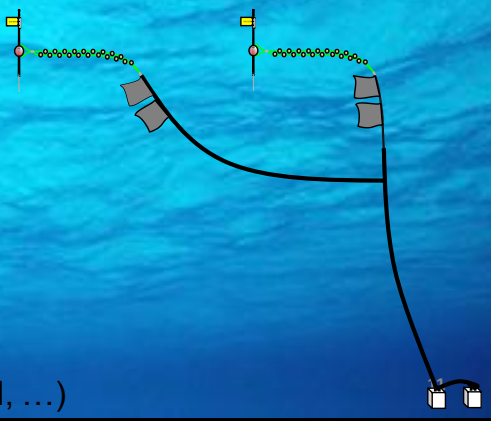
Tarpaulin

Strap

Slide 11

Buoys

- Nature (can, openig buoys,…)
- One or two heads
- Buoy(s) splited or not
- Single buoy interest:
  - Visibility
  - Hydrodynamism
  - Cost / availability
- Resistance to the pressure
- Volume
- Shape (cylindrical, spherical, …)



Slide 12

Le balisage

- Flagpole
- Solar ligth
- Flag (black)
- Radar reflector
- St Andrew's cross

Proposed beacons

Slide 13

Statistics of lost of light FADs

4 FADs with 2 heads (3.5 years - 167 moths/FAD)

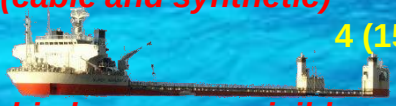
Average :

1 heads/6 months

- **Fishing lines** — **15 (58 %°)**

Mix (cable and synthetic)

- **Cargo** — **4 (15 %)**



One big buoy more visible

- **Metallic part, …** — **4 (15 %)**

Limited use of metal+ anode

- **Others** — **3 (12 %)**

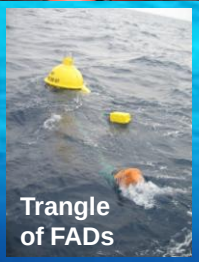
To be identified

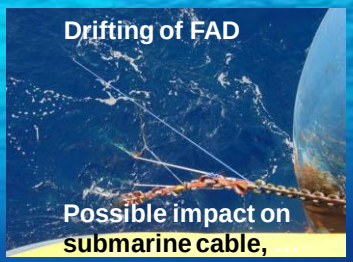
Slide 14

Impacts of currents

Due to lack of buoyancy according to the local currents

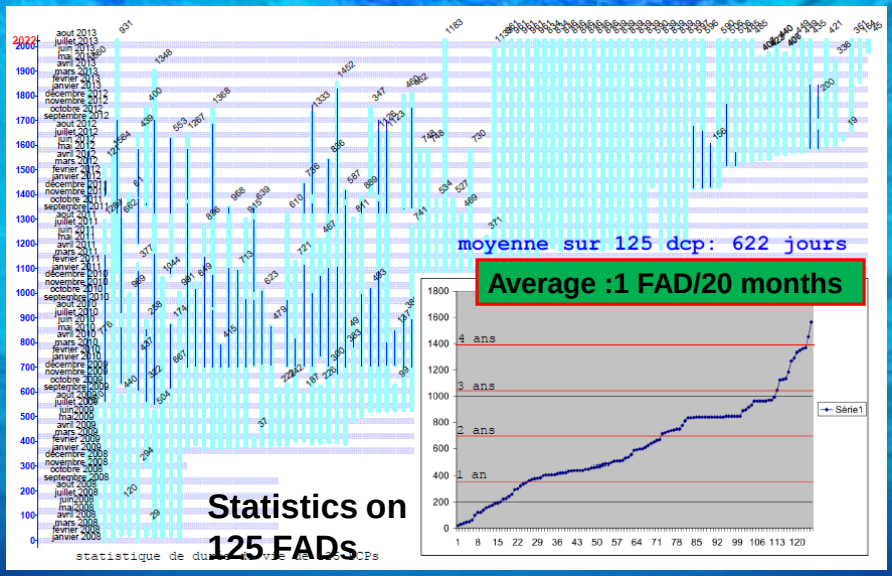
Two seasons of strong currents:
2nd quarter of the year
in the lesser Antilles





Slide 15

Statistics of lost of heavy FADs



Maintenance limits

Slide 16

Next step

- **Improve FADs conception**
  - **Good day & night visibility for the cargos with reliable beacons**
    - **One buoy more visible**
    - **Solar panel, Battery, Light, transponder,…**
  - **More buoyancy to avoid submersion**
- **Is this heavy FAD better ?**
  - **Maintenance schedule**
  - **Maintenance by specific boat**
  - **Cost (15 000 € *vs* 5 000 €)**
- **Share the cost with other users !**

How to limit the debris ?

Slide 17

FADs without rope ?

http://plkmarine.com/

- Electric engine
- GPS + Transmission device
- Solar panel & Battery

- Reduce the debris
- No trip for maintenance or deployment

Species composition around this FAD ?

Slide 18

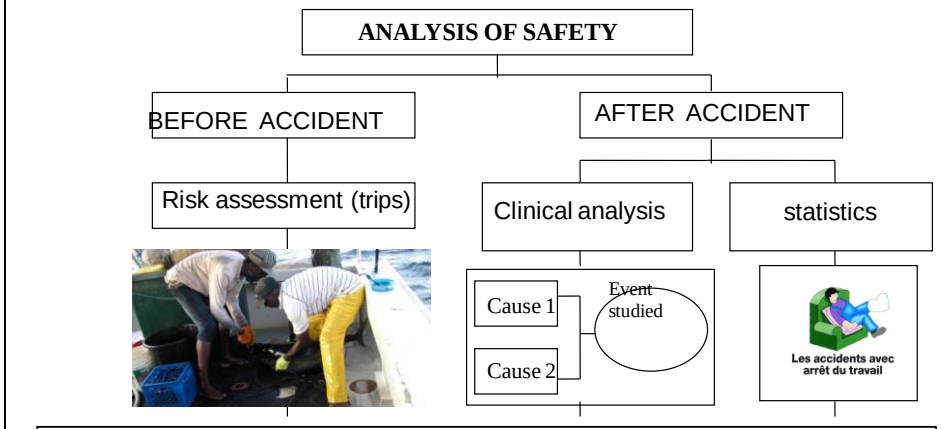
Analysis of work and of safety conditions in anchored FAD fishing

Slide 1

Health and safety at work on fishing vessels from Martinique and Guadeloupe islands using long lines around FAD's

Yvon Le Roi
Institut Maritime de Prévention,
Lorient, France

Slide 2



Proposals to improve working situations in terms of health/safety

The results can also be used for improvements in terms of working conditions, of productivity, of quality

Slide 3

Data from the maritime rescue cordination centre Guyan-Antilles last 3 years

2010 : Not any case recorded

2011 : 2 injured rescued (scorpion fish sting, hook in the hand) main)

2012 : 1 person deceased: capsize

2013 : 1 person deceased: quit fishing boat and felt unwell and 1 person disappeared at sea: fail in sea

Slide 4

Data of the French Social System for seafarers
(2011-2012-2013)

60 occupational accidents were registered

12 of them related to lines or long lines used

- 1 when handling the weight of a FADs ashore

- 8 when handling the catch at sea

  3 after a strong effort
  2 after a fall
  3 cuts

Slide 5

Interviews with fishers
“The long line is coming around the arm, the leg or the neck when there is a big catch”.
For fishers the most dangerous situation is not fishing but carrying FAD’s (weight, head and rope in the yole)

Slide 6

Participated at 6 days at sea with a crew of 3 at 250 km in the West of Martinique

Boat of 8 m:2 trips of one day With 1 and 2 men

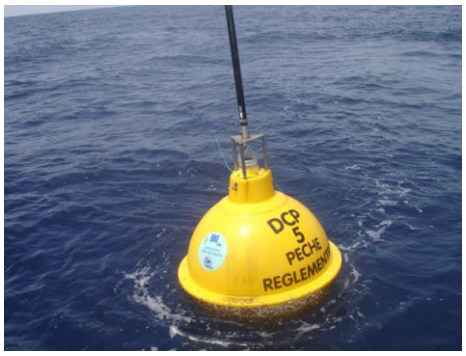
Slide 7

RESULTS

1. Biger boat and adaptation of the French regulation concerning the safety of fishing vessels

2 .New boats with facilities but crew must accept to spend the week at sea.

3. for yôles: Establish collective FADs near the coast (prevention of back pain)

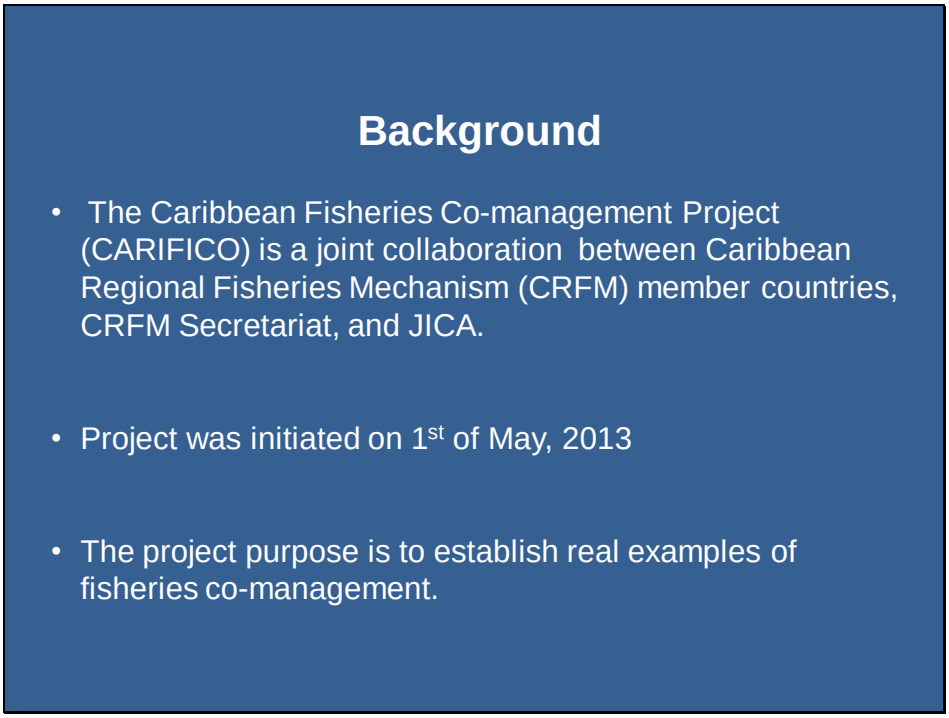


APPENDIX 7: TECHNICAL DISCUSSIONS – CO-MANAGEMENT

CARIFICO approach to co-management

Slide 1

Slide 2



Slide 3

Background

- Although Co-management is considered an effective way of fisheries management, there are very few good practices in the Caribbean region.
- Social cohesion among fishers is identified as an important attribute contributing to the success of co-management.
- CARIFICO will adopt suitable experiences of Okinawa, Japan, where economic activities of fisher organizations strengthen social cohesion, hence their capacity of fisheries management.

Slide 4

Fishers' needs

- Safe fishing operation
  ⇒**Services by fishing port**
- Escaping from hard labour
  ⇒**Services by fishers' locker and workshop**
- Selling the catch by higher price
  ⇒**Marketing business**
- Buying Ice, fuel and fishing materials at lower price
  ⇒**Supply business**
- Borrowing money for the purchase of fishing vessel
  ⇒**Financial business**
- Covering the loss of accident and natural disaster
  ⇒**Insurance business**

Slide 5

Business of fisheries cooperative vs private company

Fishers are Clients, Shareholders, and Managers

- Business of the fishers, by the fishers, for the fishers
- Not necessary if the needs will be satisfied by private companies
- Not appropriate if the business will satisfy the non-fishers needs

Slide 6

Business of Fisheries Co-operatives: Marketing

Options for Marketing

- Providing ice, freezer, refrigerator, and fish selling stand
- Buying from fishers and selling at the cooperatives shop
- Buying from fishers for use at cooperatives' shop & restaurant
- Buying from fishers for processing
- Buying from fishers and re-selling to supermarkets and consumers
- **Marketing on consignment basis**

Slide 7

Business of Fisheries Co-operatives: Marketing

Marketing on consignment basis

Methods

Auction: Buying price is yelled out to other bidders

Tender: Buying price is kept secret until highest bidding price is confirmed

Merits

Fishers
- Concentrate on fishing
- Good prices resulting from competition among buyers

Buyers
- Stable supply
- Quality assurance

Cooperatives
- No risk
- Source of income

Slide 8

Business of Fisheries Co-operatives (FC): Supply

Supply Business

- Supply business is small relative to marketing business.
- Members needs vary across different commodities, specifications, and quality, etc. and the members can buy them at private retailer shops.
- Fuel is the best commercial product because FC can buy it in bulk.
- In Japan, the national federation collect annual estimates of fuel demand from each FC, then buy fuel in bulk and well planned manner.

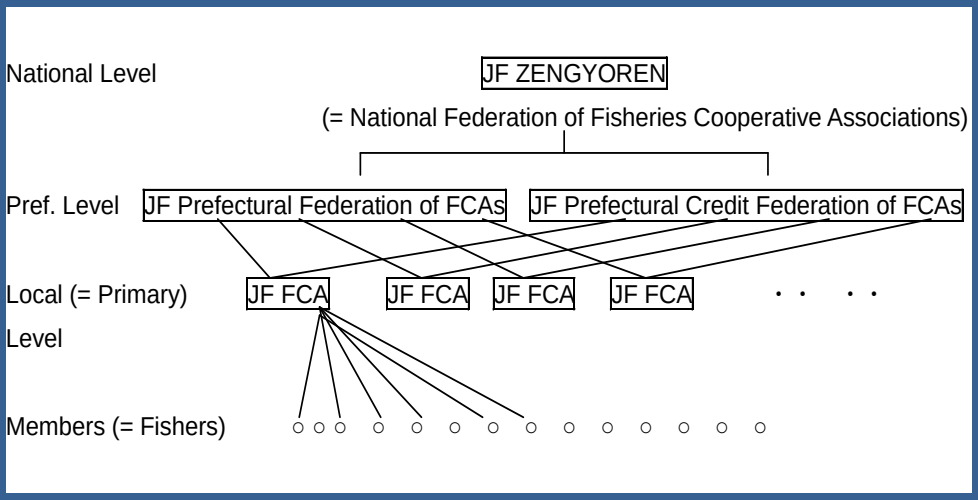
Slide 9

Okinawa Experience

Business of Fisheries Co-operatives: Supply

Organizational Structure of JF Group

JF: logo for organizations of fisheries cooperative sector



Slide 10

Okinawa Experience

Business of Fisheries Co-operatives: Financial

Financial Business

- Marketing of catch is consigned to fisher's Co-operative
- Proceeds from catch is transferred to said Co-operative
- Income is assigned to sub-accounts as follows:
  - Loan repayment for vessel
  - Payment for fuel oil
  - Payment for supplies
  - Daily living expenses of family

Slide 11

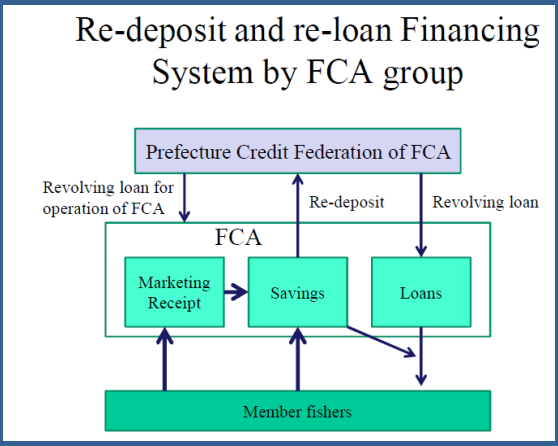
Business of Fisheries Co-operatives: Financial

Financial Business

- Fisheries Co-operative can collect receivables automatically
- Operating fund of the Fisheries Co-operative is strengthened through income deposits
- Fisher earns credit limit based on the past record of the income deposits

Slide 12

Business of Fisheries Co-operatives: Financial



Slide 13

Questionnaire survey at Kunigami, Okinawa

Priority	1 st	2 nd	3 rd	4 th	5 th	6 th	7 th	8 th
Insurance		1			6	4	2	5
Supplying	1	1 2	4	1				
Marketing	1 0	2	3	3				
Ice	6	1	2	2	5	1	1	
Facility		2	2	1 2	1	2		
Radio				1	2		6	8
Finance	1		6	1	1	5	2	2
Fisheries Management					2	6	7	2

Slide 14

1. Why do you use the supply business?	
6	The price is cheaper
3	The shop is nearby and staff are kind
1 2	I would like to contribute the management of fisheries cooperatives
2. Why do you use the marketing business?	
7	It is convenient
3	The price of the catch is high
1 2	I would like to contribute the management of fisheries cooperatives
3. Why do you use the financial business?	
1	The interests rate of saving is high
2	The bank is nearby and staff are kind
1 5	I would like to contribute the management of fisheries cooperatives
4. Do the economic activities of FC realize the common interests of the members?	
1 2	YES
1	NO
4	I don't know
5. Do the economic activities strengthen the social cohesion among the members?	
1 3	YES
	NO
4	I don't Know
6. Will you use the economic activities of FC even if the price or conveniences are not better than private shops?	
1 4	YES
	NO
3	I don't Know

Slide 15

Questionnaire survey at Barrouallie, St. Vincent and the Grenadines

	I want it **very much**	I want it **if possible**	I don't need it
Selling of ice	18	2	5
Selling of gasoline	21		2
Selling of fishing gear and materials	24	1	
Rental of fishermen's locker	16		9
Workshop facility for maintenance of engine and boat	21	3	1
Marketing of your catch at a higher price	23	2	
Fisheries management to prevent overfishing	16	1	8

15

Slide 16

1. Will you join to the cooperatives if you can get the services above?

Yes, I will join	17
No, I don't need to join	
I don't know	8

2. Will you support the cooperatives with other fishermen to implement the activities above?

Yes, I will support	21
No, I will not	
I don't know	4

16

Slide 17

Legal classification of Japanese marine fisheries

Marine Fisheries

Fishing Right Fisheries
Fishing right is granted by The Governor of Prefecture mostly to FCAs. (valid for 10 years, and renewable)

- **Common fishing right**
  - Type 1 Right to harvest sedentary animals and plants such as abalone, top shell, Bivalves, sea cucumber, sea urchin, kelp, Undaria, etc
  - Type 2 Right to operate small scale set net and bottom gill net
  - Type 3 Right to operate beach seine, boat seine ans artificial fish reef fishery etc
- **Large scale set net**
- **Aquaculture**

Licensed Fisheries
Fishing license is issued to an individual or a juridical person. (valid for 5 years and renewable)

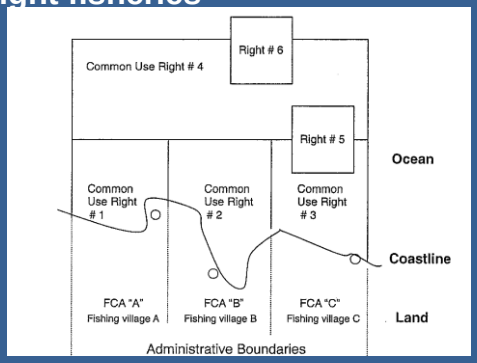
- National fishing license
  Licensed by the Minister
  Of the Central Government
- Prefectural fishing license
  Licensed by the Prefectural
  Governor

Free Fisheries
Neither I fishing right nor a fishing license is required: for example, sport fishing.

Note: Fishing right is an inalienable/non-transferable property.

Slide 18

Fishing right fisheries



#1,2,3: Common fishing right

#5: Aquaculture

#6: Large scale set net

Slide 19

Licensed Fisheries

- National government delegates responsibility for fisheries management to prefecture goernments
- The fisheries department of the prefecture is responsible for formulating marine fishery regulations and issuing licenses
- Fisheries Law requires the prefecture to seek advice of **Regional Fishery Adjustment Commission** when issuing licenses.
- More than half of the members of the Commission are representatives of fisher.

Slide 20

Order by Okinawa commission
Re: Deployment of and fishing around FAD

Mar. 29, 2013
Mr. Yamakawa
Chairman

- To establish councils for the coordination of deployment of FAD in each region
- Only members of the council are authorized to deploy FAD
- Deployed FADs are limited to 200
- The owner of the FAD should maintain the light and radar reflector of FAD
- Owner should report lost FAD to marine authority
- Fisher and FAD owner should agree on its use

Slide 21

Unique factors in Okinawa to make co-management workable

- By Fisheries Law, only active fishers can be members of the FC
- Fisheries department support and supervise the FC
  - Specific laws for FC
  - Subsidies
  - Roles of agent for the Fisheries Department

Slide 22

Project purpose

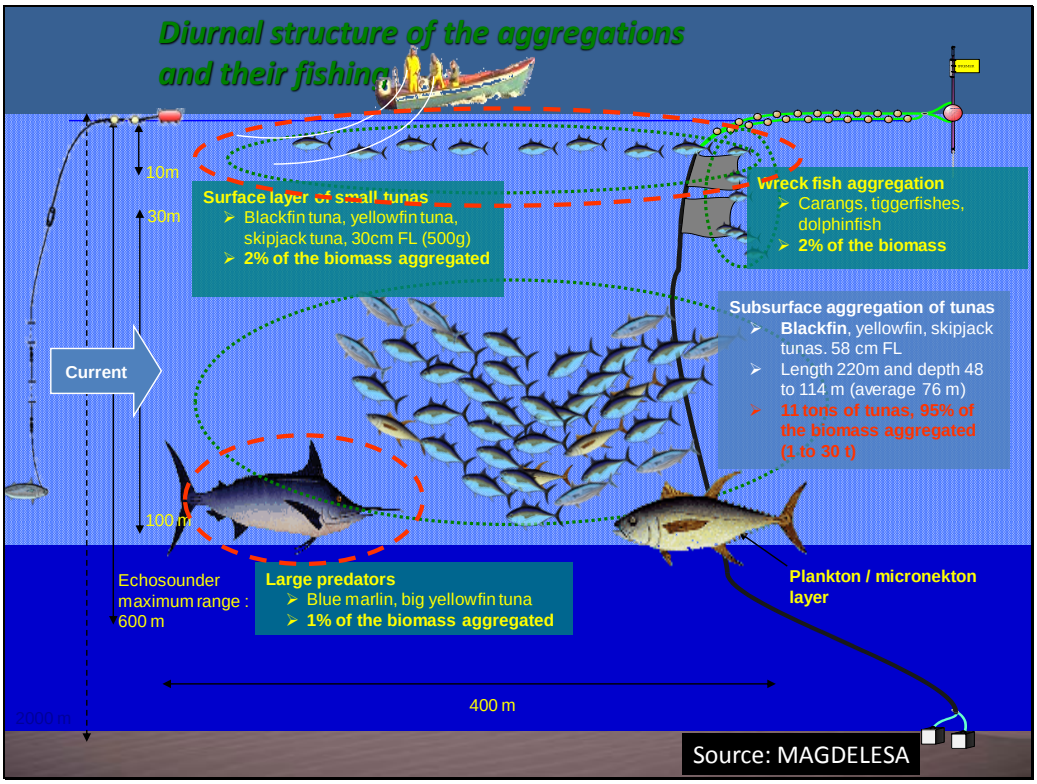
To establish real fisheries Co-Management examples

Project period:
1May2013～30Apr2018

WHY FADs ?

- FADs is relatively new and the vested interests are not strong.

Slide 23



Slide 24

Outputs of CARIFICO

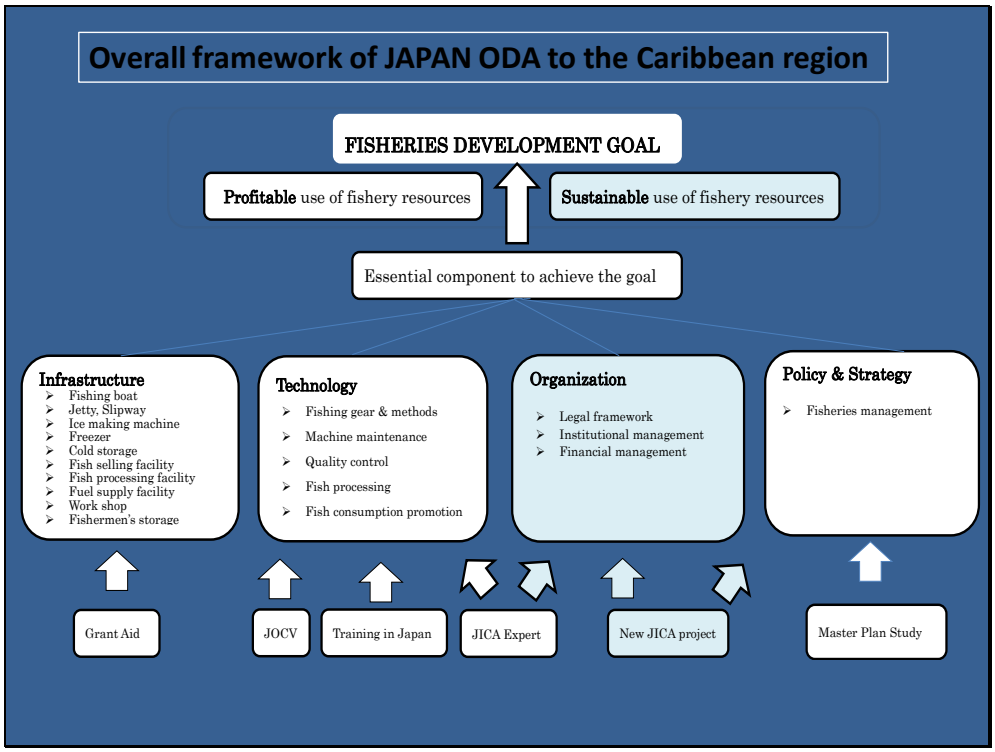
•①Qualification for FAD fisheries ⇒Change from open access
- Registration and license
- Participation in Co-management

•②Rules for FAD fisheries
- Who can deploy
- How to operate around FADs
- How and who maintains FAD

•③Fisheries information to be utilized for FAD management
- Catch and effort data, recorded and reported by the fisher
- Evaluation of status of resources based on the data
- Management rules developed based of the evaluation

•④Fisheries Co-management mechanism for FAD fisheries
- Fishers organization for fisheries management
- Fishers meeting to discuss and agree on management rules
- Self-governing of rules
- Collaboration mechanism between Fisheries Department/Division and the fisher organization, to formulate and enforce rules
- Legislation of rules

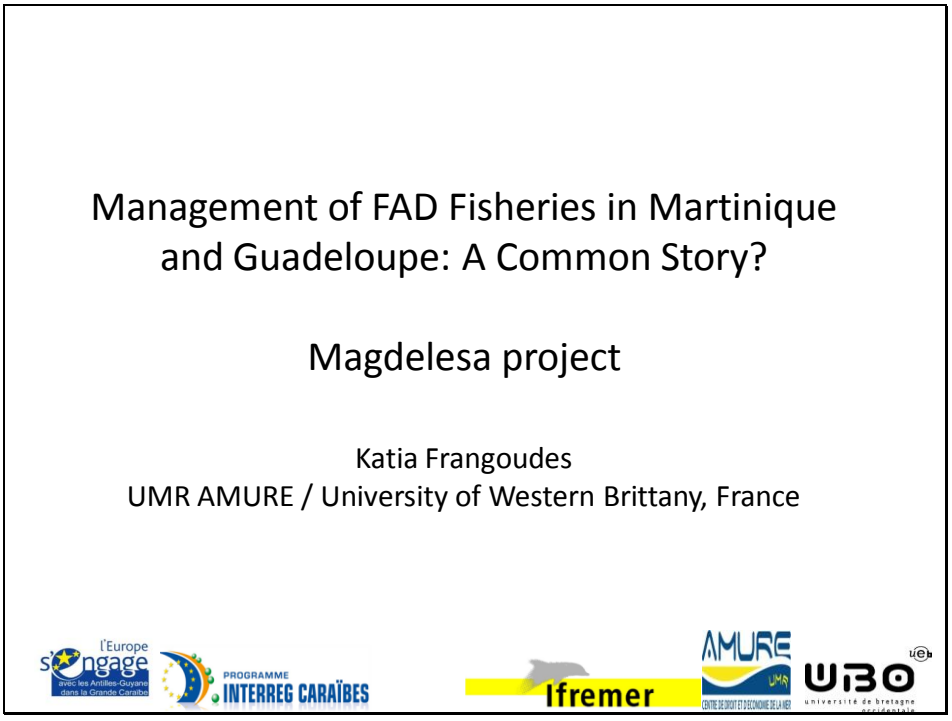
Slide 25



Slide 26

FAD management system in Martinique and Guadeloupe

Slide 1



Slide 2

FAD Development: commons elements

-started 30ies years ago

-initiated by fisheries scientists

With the objective : Decrease fishing effort on insular shelf

- Local authorities supported FAD development for

- Better income of fishers
- Improvement of fisher's livelihoods
- Offering employment to local population

- First experiences benefited of the financial aid of regional authorities
- Success of the experiences and extension of FAD

Slide 3

Martinique

Territorial authorities decided to support financially FAD

1999: 15 FAD's were financed

2012: 10 FAD's and others in between

First period

Fisheries Committees: Regulated Access to FAD

- limited to professional fishers
- In possession of fishing license delivered by CRPM
- License Fees = maintenance of FAD

Slide 4

Nowadays

Public FAD's no license / open to all fishers

- Monitoring and control is under the responsibility of the maritime police
- Recreational fishers still excluded officially

Simultaneously

- Slow development of private FAD
- One fisher / one FAD or one FAD with group of fishers (common contribution)

- But without any regulation (position, number of fishers and FAD's, management; etc….) and without any responsibility for the maintenance of public FAD's (not possible)/ opposite of their own FAD

Slide 5

Fisher's representation of FAD's

- FAD fishing represents a big part of their overturn
- Without FAD the pressure on insular shell will be higher
- Against regional FADs because their empirical knowledge is not taken into account and they don't cover their needs
- Need for more durable FADs
- Prefer to have many small FADs instead of few big
- Problems with Fishers organisation because it doesn't hear their wishes

Others points to be underlined

Elderly fishers practice less FAD's fishing

Only few of active fishers operate regularly around FAD's and all of them are using all type of fishing gears

After 30 years, is the slow development of FAD the result of a lack of ownership of this development or something else?

Slide 6

Guadeloupe

- FAD's experiences were considered by fishers as successful
- They start to invest in FAD's on private level and few examples of collective are available
- High development of private FAD's

Fishers' organisation (beginning)

Regulated Access to FAD's, fishing activity around FAD's, position and authorisation

Today: don't know number, position, etc...

Slide 7

Different types of competition are observed:

- on the number of FAD's (more and more)
- Some areas appear more productive than others but not possibility to move
- Finally: Space become limited and new comers are obliged to go further and further or practice others type of fishing
- FAD cost is higher for those in deeper waters (4000 to 5000 m)

Slide 8

For fishers the high number of FAD is explained

- Resources can be in deeper water than in areas closer to the coast
- With many FADs there is no need to practice high sea fishing (traîne) because resources can be found around FAD's and this decreases fuel consumption

Consequences

- Many hours of work on land are needed for FAD construction
- To avoid high cost and also because they prefer to build their FADs in the way they think that they need

Slide 9

Other remarks

- Complains against FADs not prepare by them
- Think that new collective FAD park could be good for young fishers
- But want to participate actively in the choice of the areas to avoid conflicts
- Want to build this FAD's because they know what they need
- 5 last years, resources are not present and fishers return back to traps, nets on insular shell

Slide 10

Two different type of development of FAD:

Martinique: Public funding and private

Guadeloupe: Private funding

Fishers organisations

-Competencies in resources management so

-Co-management of FAD fisheries is possible

- But fishers organisation didn't take this power

- FAD fisheries management has not changed overtime

Slide 11

Why ?

- Because their action concentrates on other purposes (subsidies?) than resources management?
- Because they suffer of luck of legitimacy among fishers and don't feel able to undertaken such objective?
- Do fishers organisation leaders aim at collective interests or their own interests / fishers perception

The case of French islands shows that:

Co-management cannot be decreed by law. Its roots are part of the history of the area.

Slide 12

Some Proposals

Strengthen fishers organisation and administration capacity is a condition to obtain effective co-management**.**

By building capacity of leaders / have them to think not as 'I' but as "WE"

Teach them to listen to the voice of fishers and to bring it to negociation meetings

Train fisheries administration in co-management

Building capacity will contribute to fishers empowerment and better resources management

Slide 13

THANKS! MERCI!

Who is the FAD fisher in Martinique? Thinking about social consequences brought by anchored FADs

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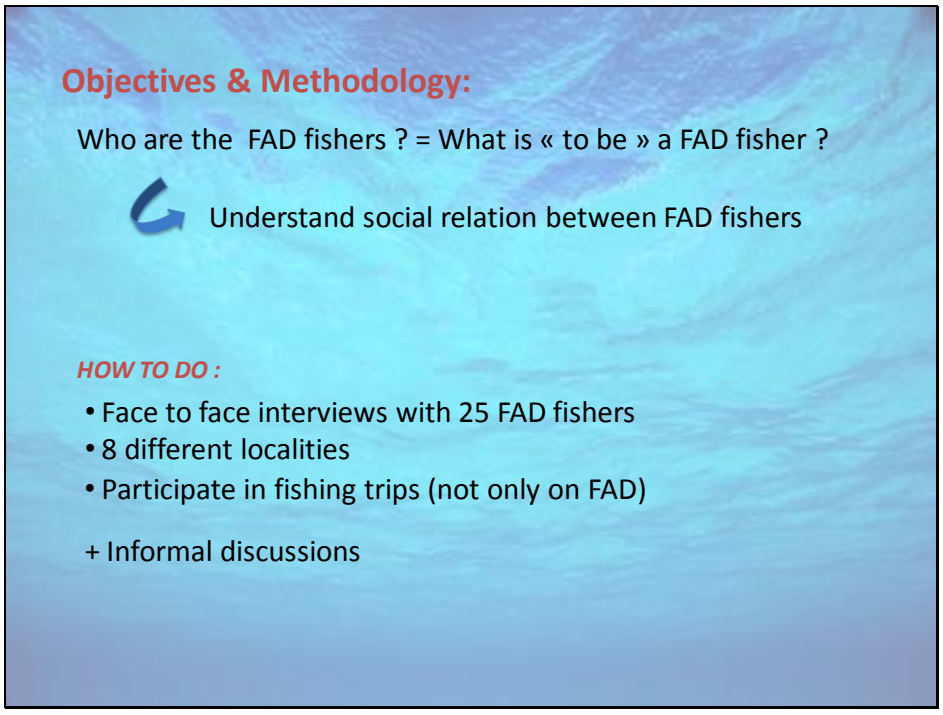
Slide 2



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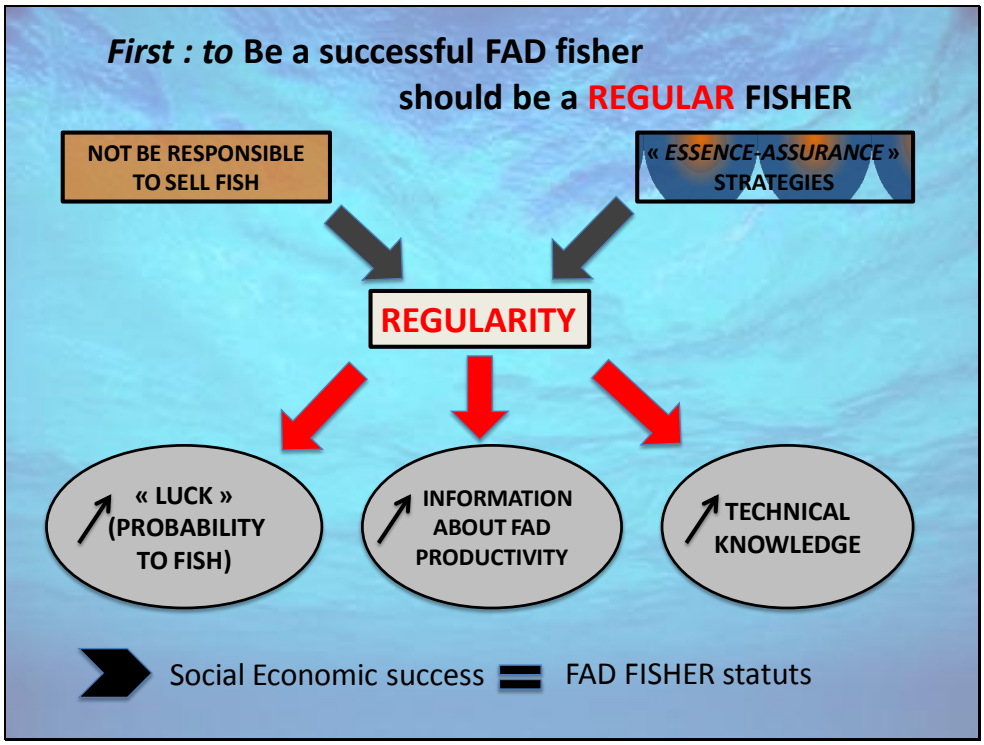

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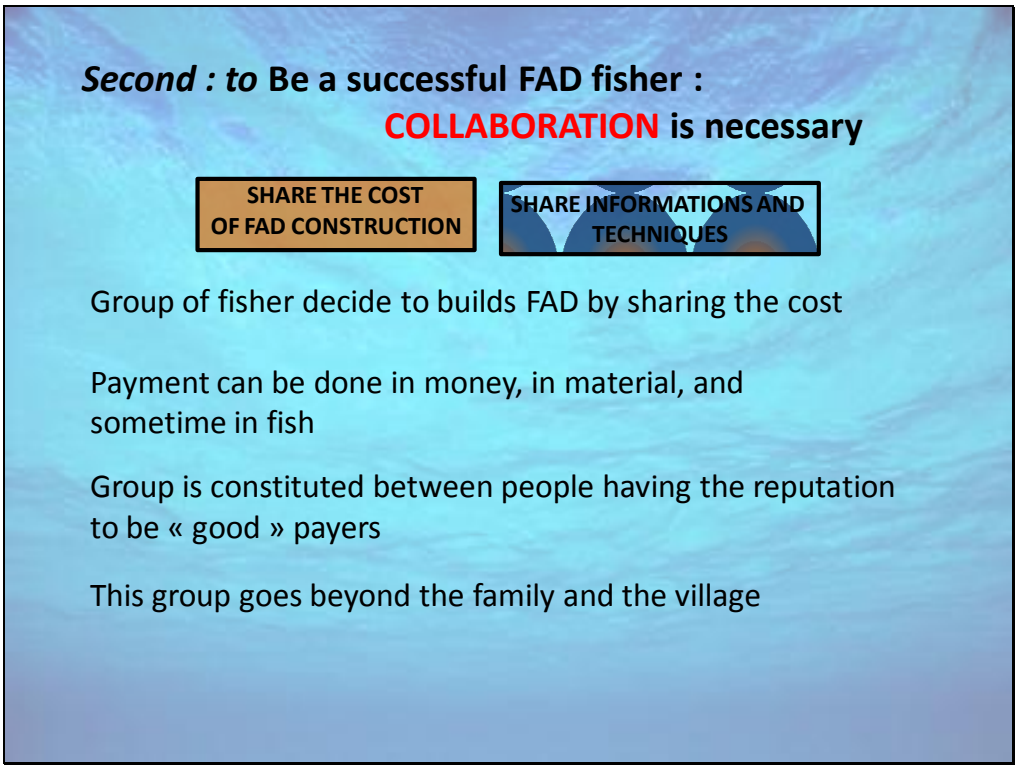

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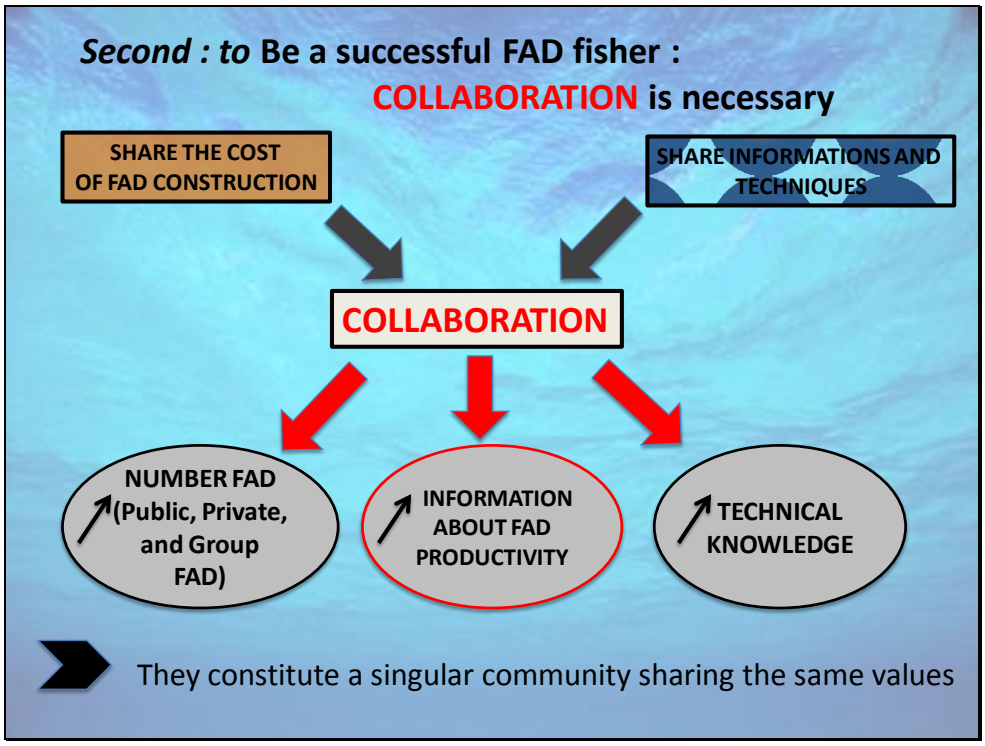

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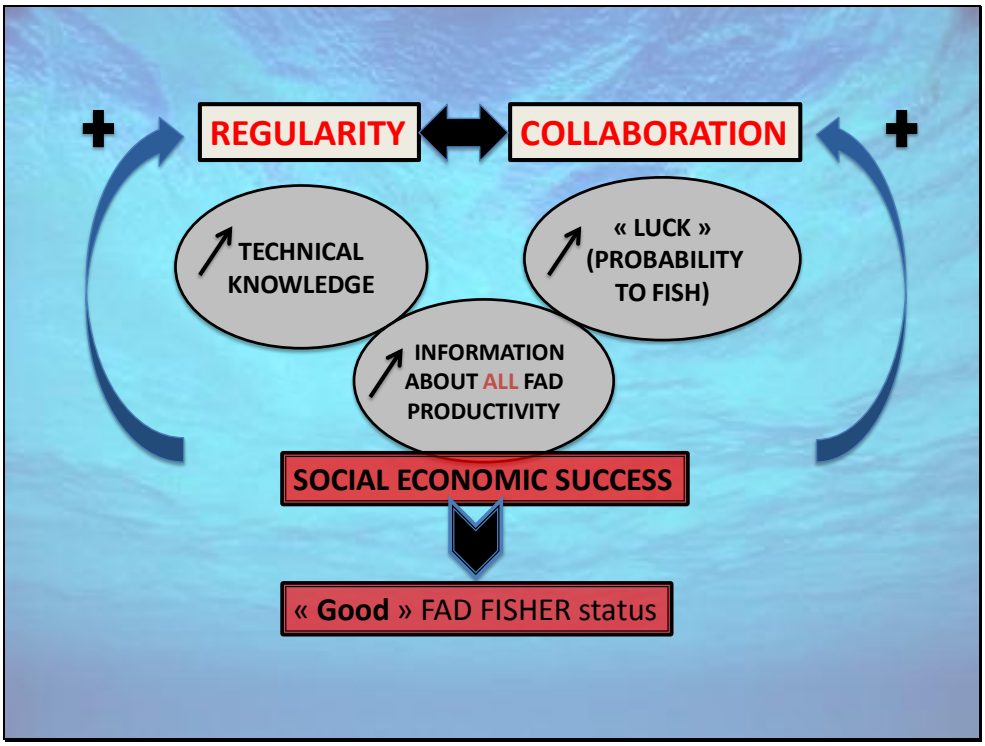


Slide 9

CONCLUSION:

NEW ??

- In Martinique, fishers who cooperate constitute a social group
- The other fisher could be named « cheater » because they benefice from the first group
- To Be a FAD fisher, two conditions : regularity and solidarity
- In reality, this type of fishers are few and…
- It appears that the only conflict is the presence of two groups

SO…

Private collective FAD encourage the establishment of a community
Public policies should suppport this groups wich can contribute to improve fisheries management around FAD.

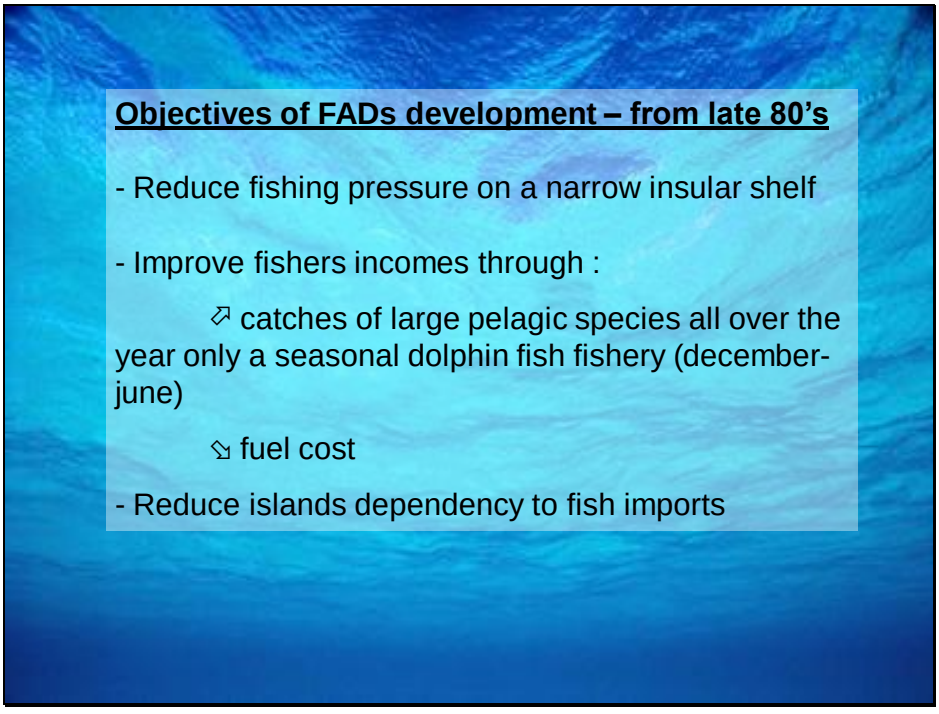
Slide 10

THANK YOU

Small scale FAD fisheries, fishing behaviour and incentives to allocate effort towards offshore resources

Slide 1

Slide 2



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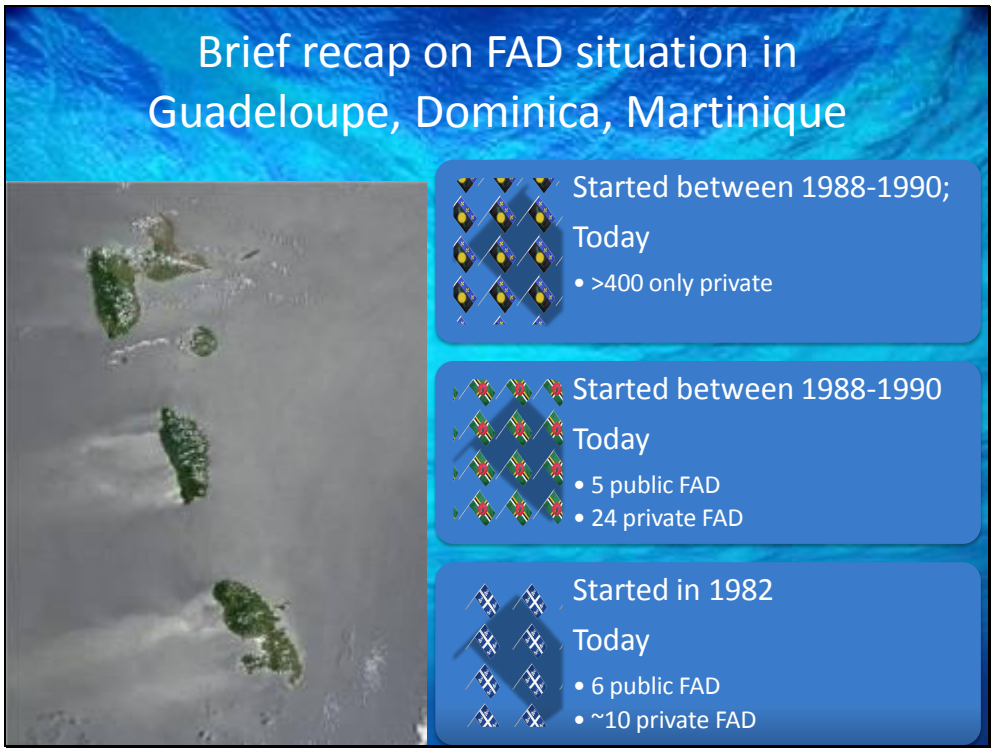

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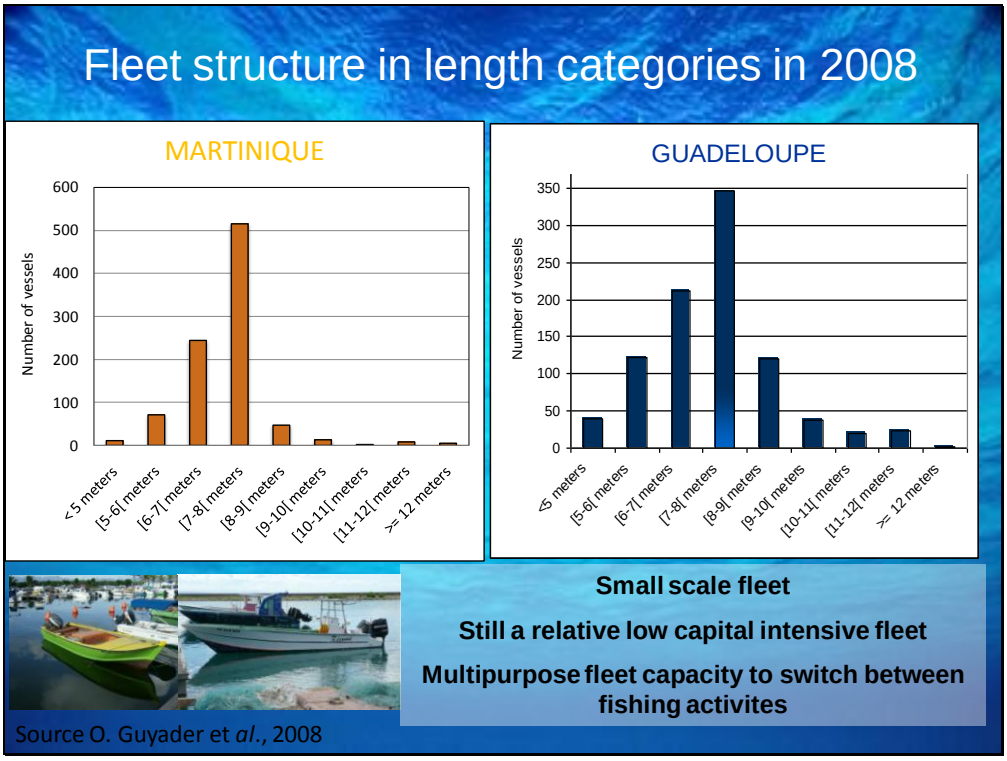

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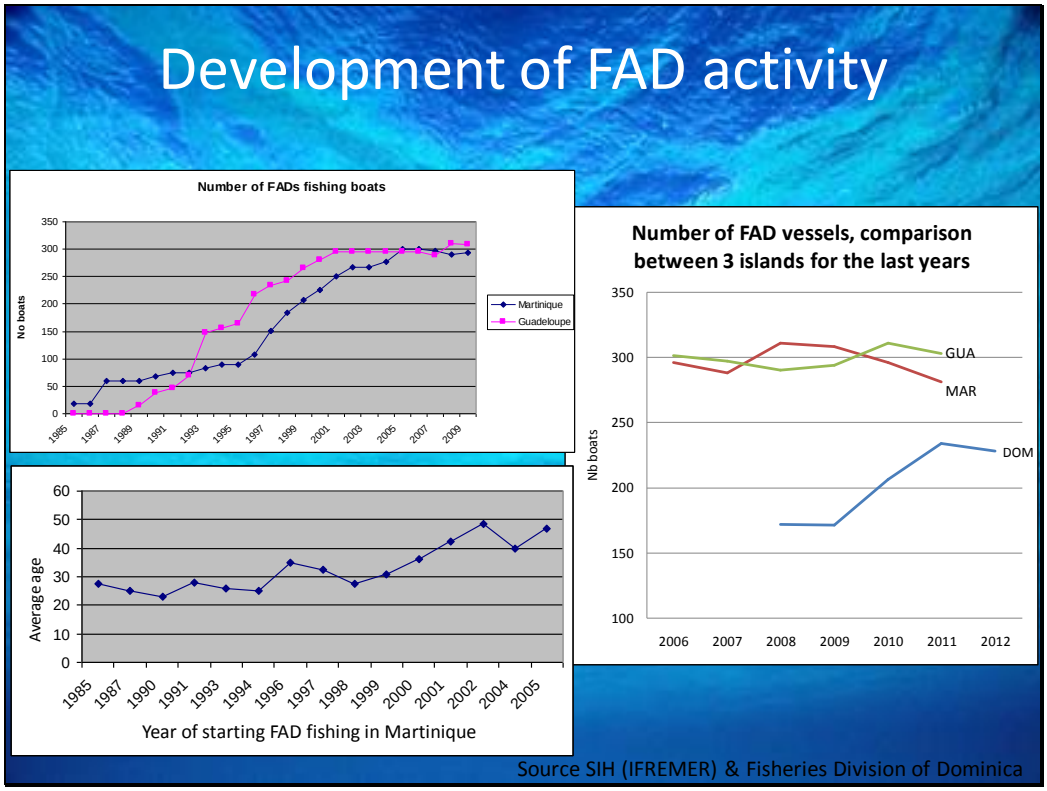

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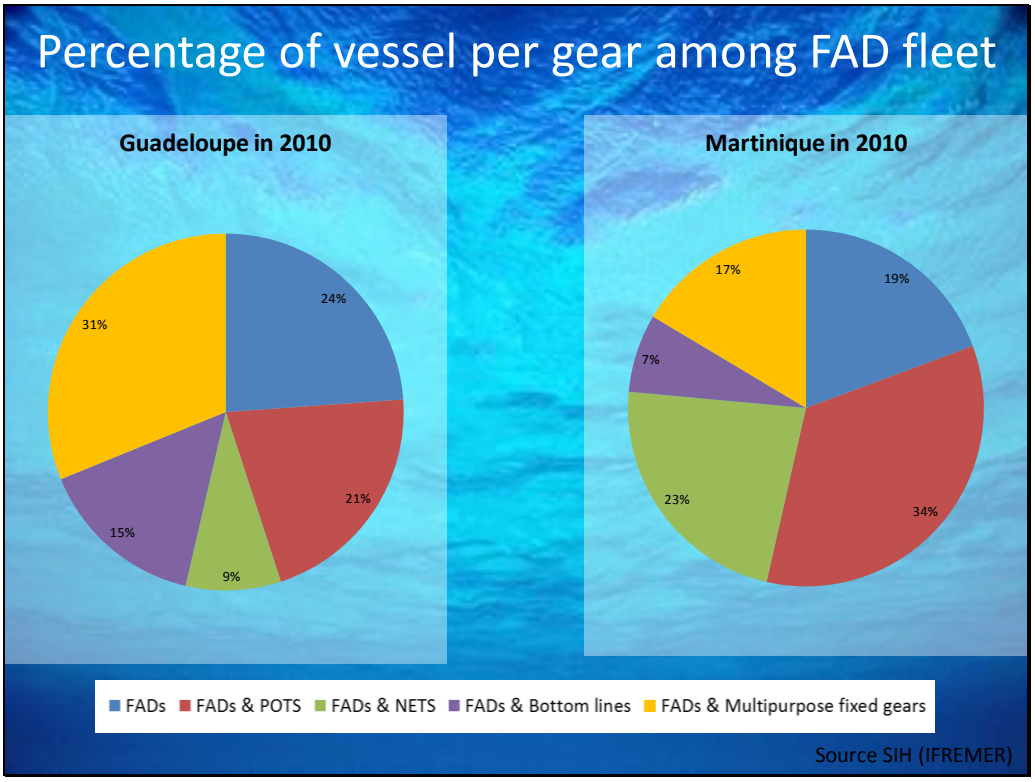

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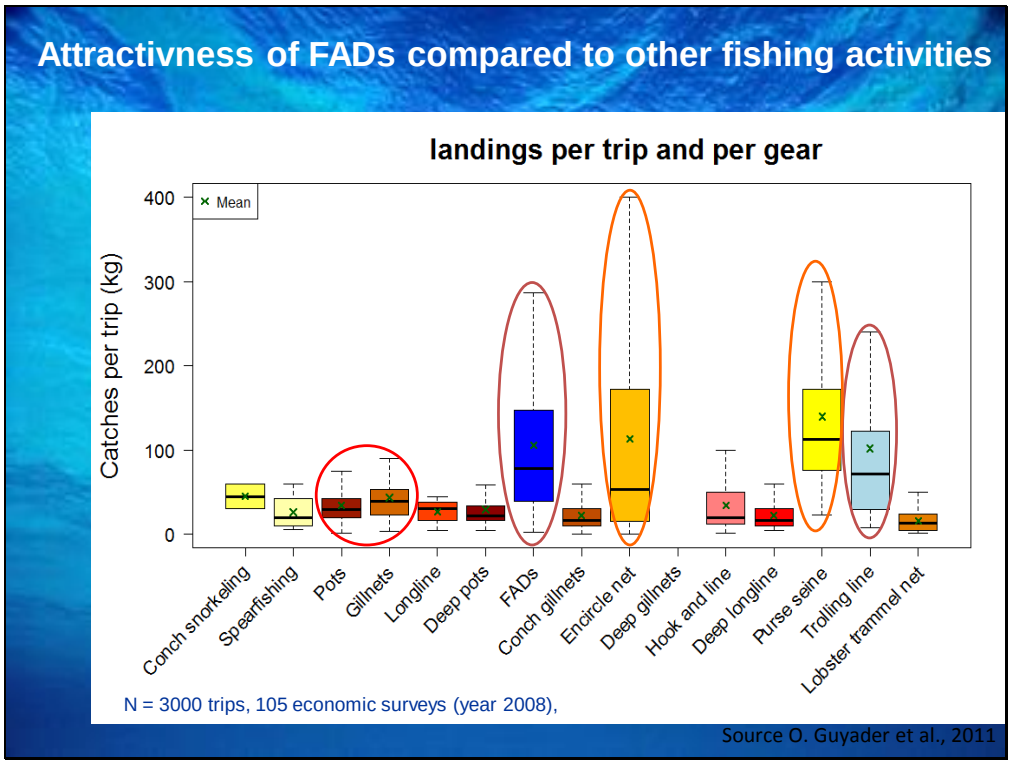

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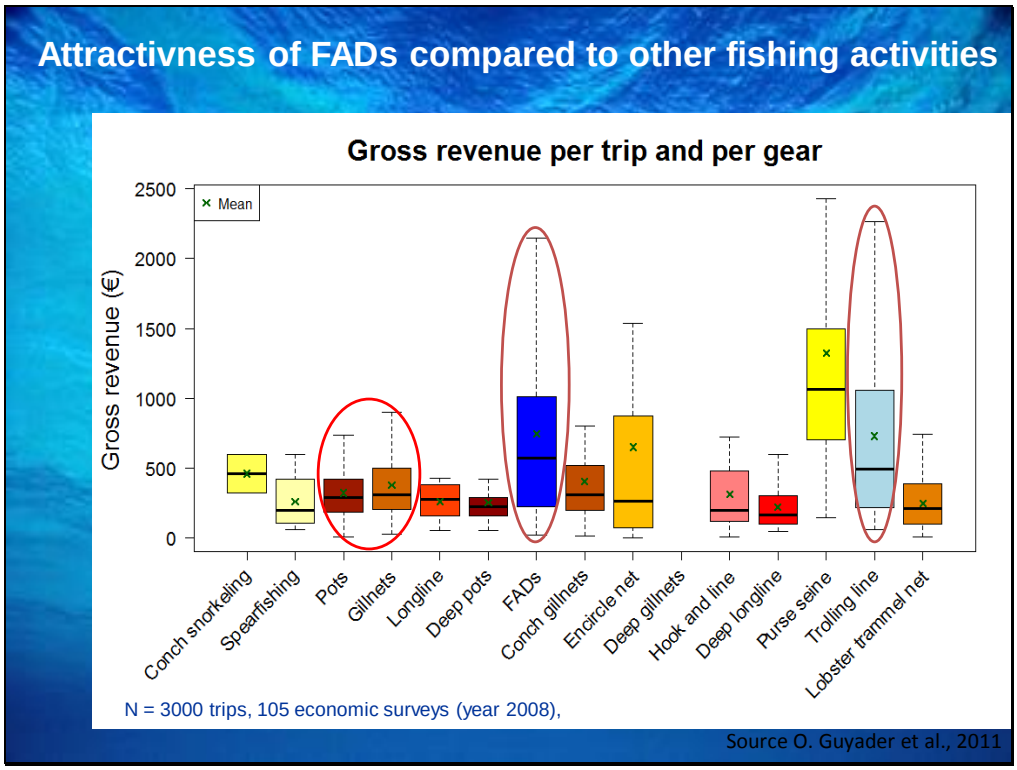

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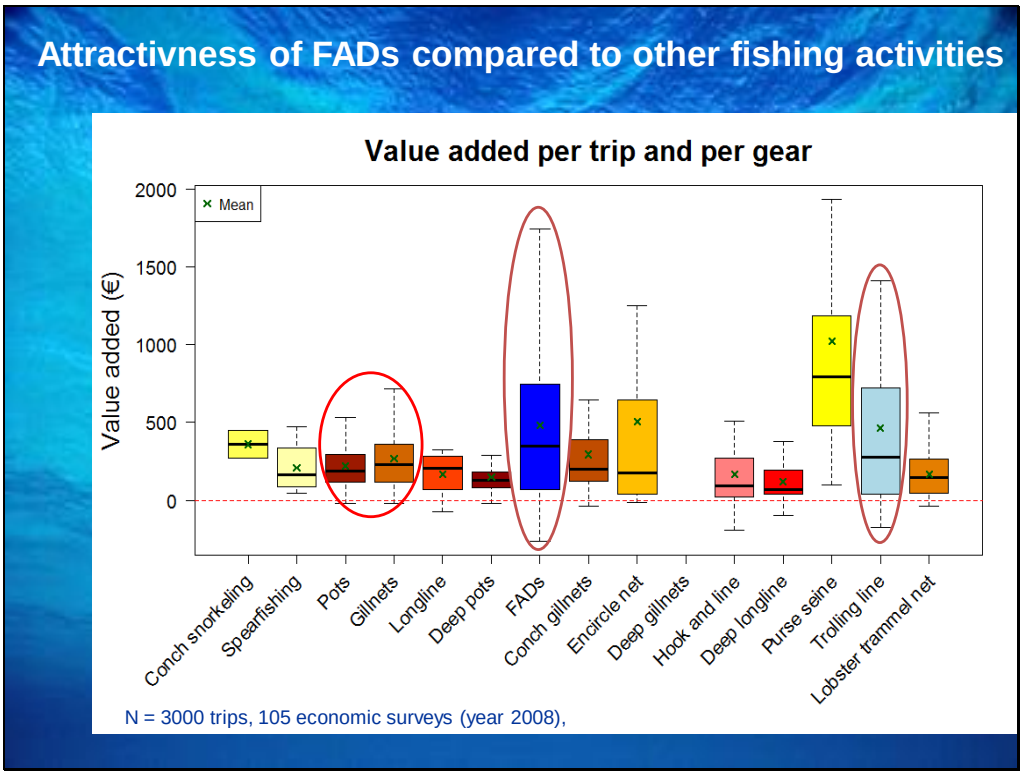

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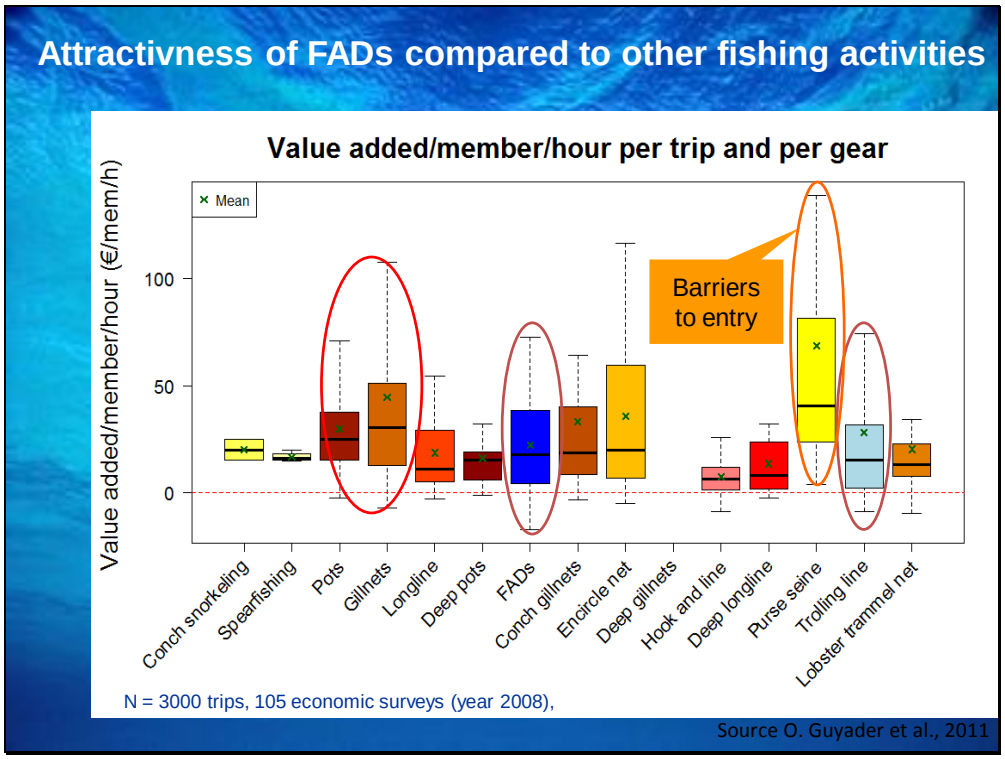
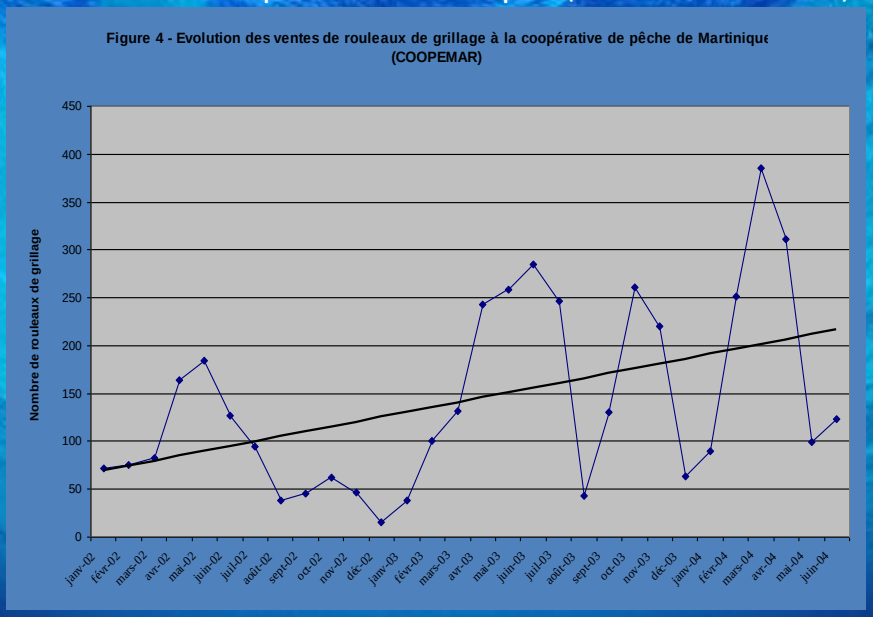


Slide 11

Sale of wire for pots in Martinique (Jan 2002 – Jun 2004)

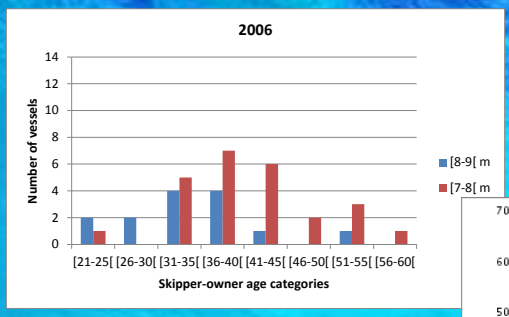


The overexploited insular shelf resources are probably an additional income
No economical regulation of the activity on these resources

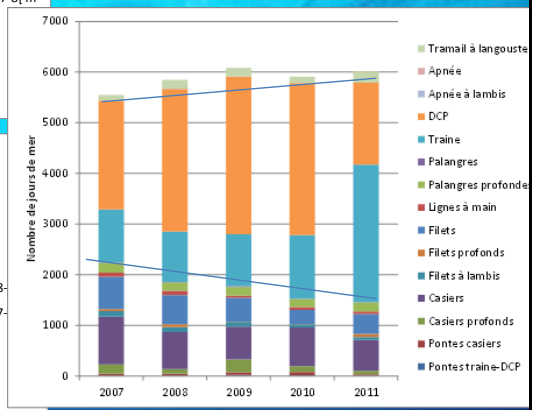
11

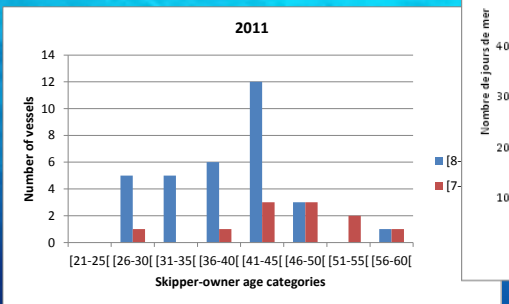
Slide 12

Effort deployed towards offshore resources



An example in Guadeloupe, Désirade Island





Source O. Guyader et *al.*, 2013

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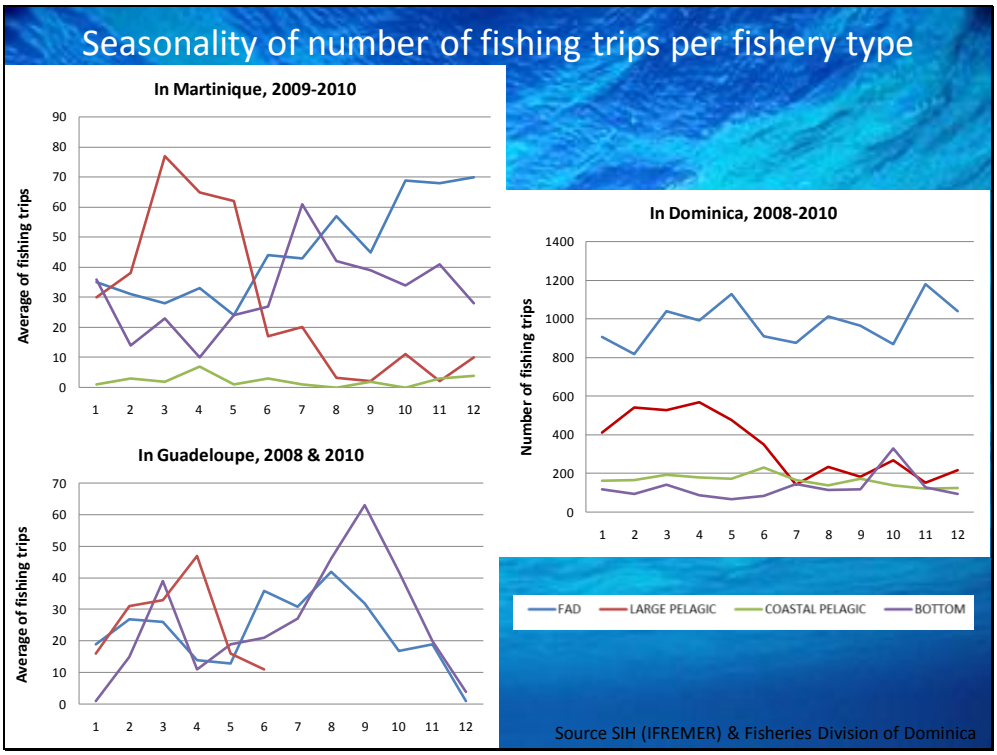

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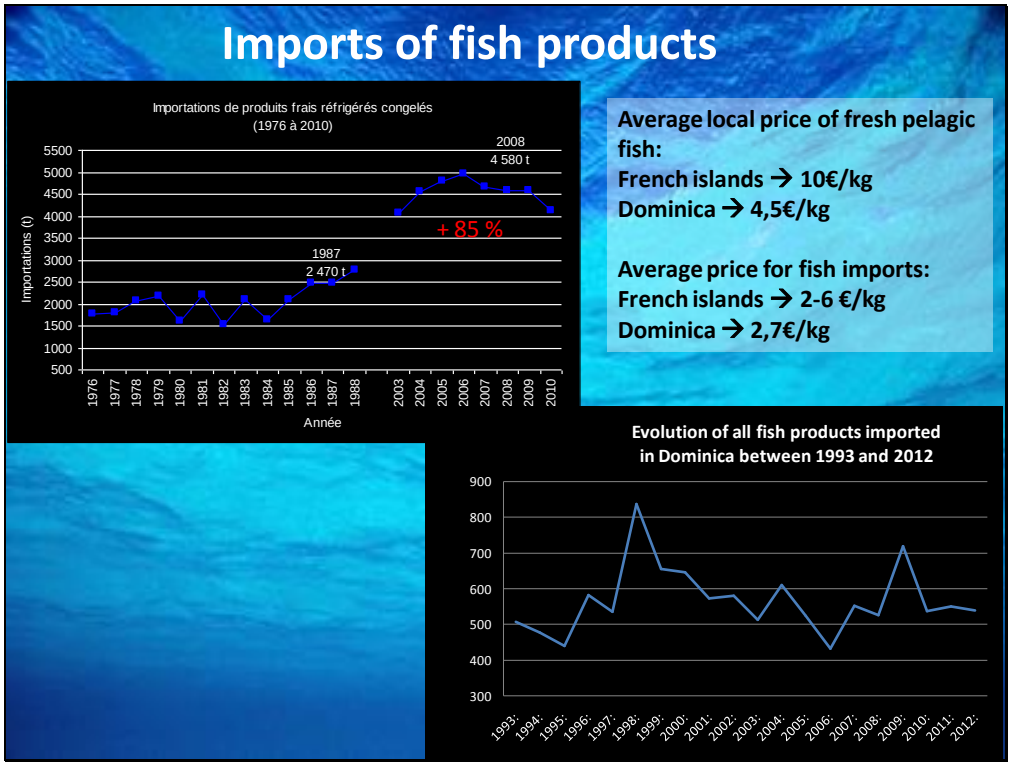

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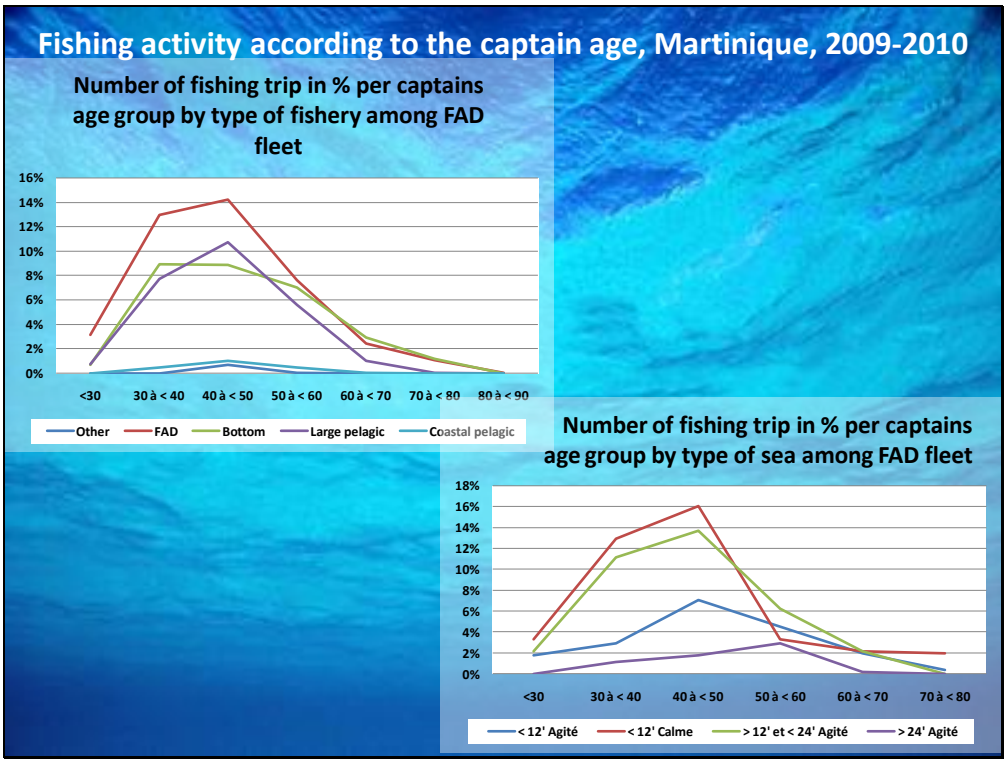

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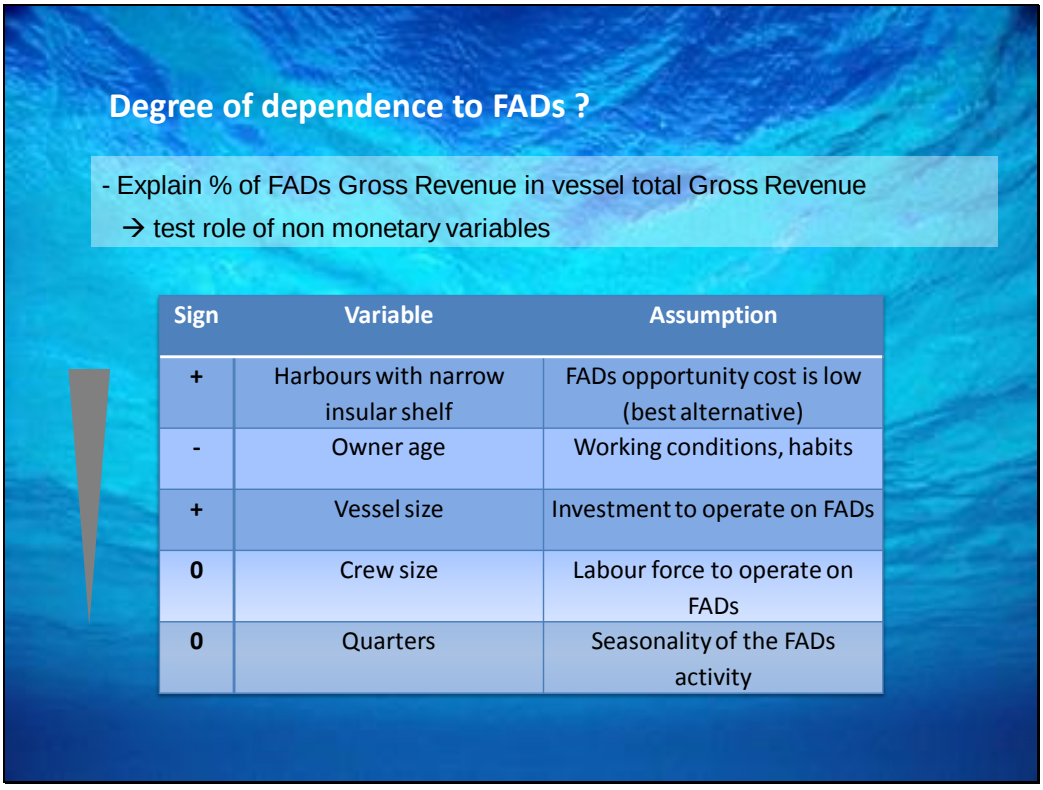


Slide 17

Conclusions and perspectives

FADs economic returns seems sensitive at local level to :

➢ **How to regulate moored FADs fisheries (incentives, compliance, role of co-management…) to improve the net benefits for the fishing communities?**

Slide 18

Resolutions

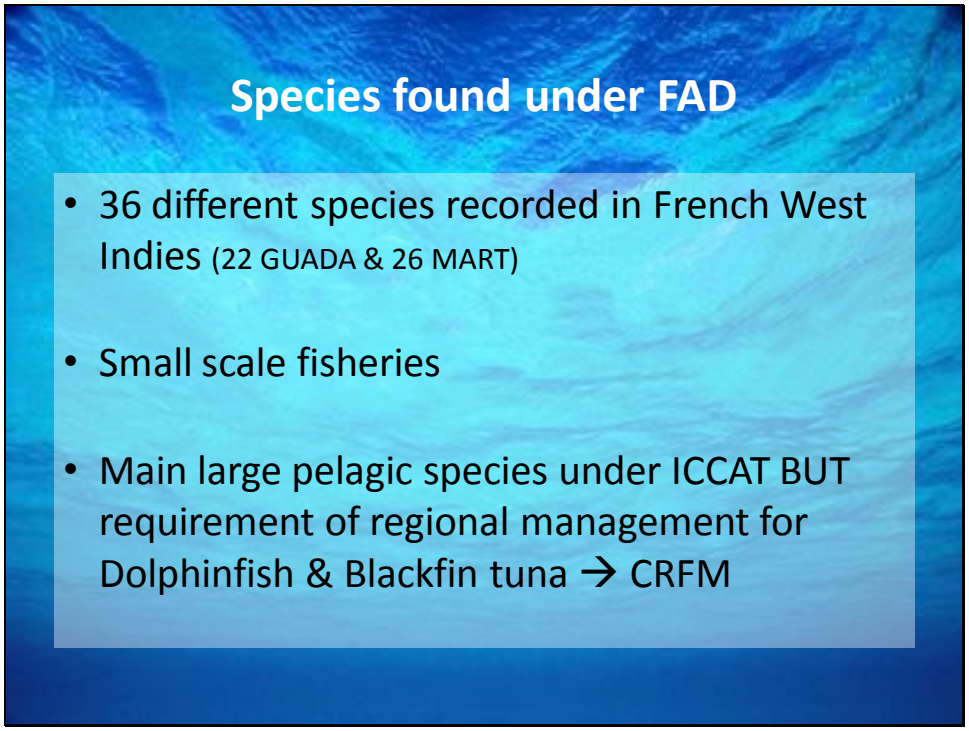
- To improve FAD monitoring in all countries
- To improve monitoring of fishing activity of all fleet considering the multipurpose nature of small scale fishing vessels
- Development of FAD fishery without simultaneous implementation of regulations to reduce/control the effort on inshore fishing is an important consideration to effect a reduction on inshore fishing pressure (licence establishment?)

Slide 19

Different means contributing to FAD's Fishing selectivity

Slide 1

Slide 2

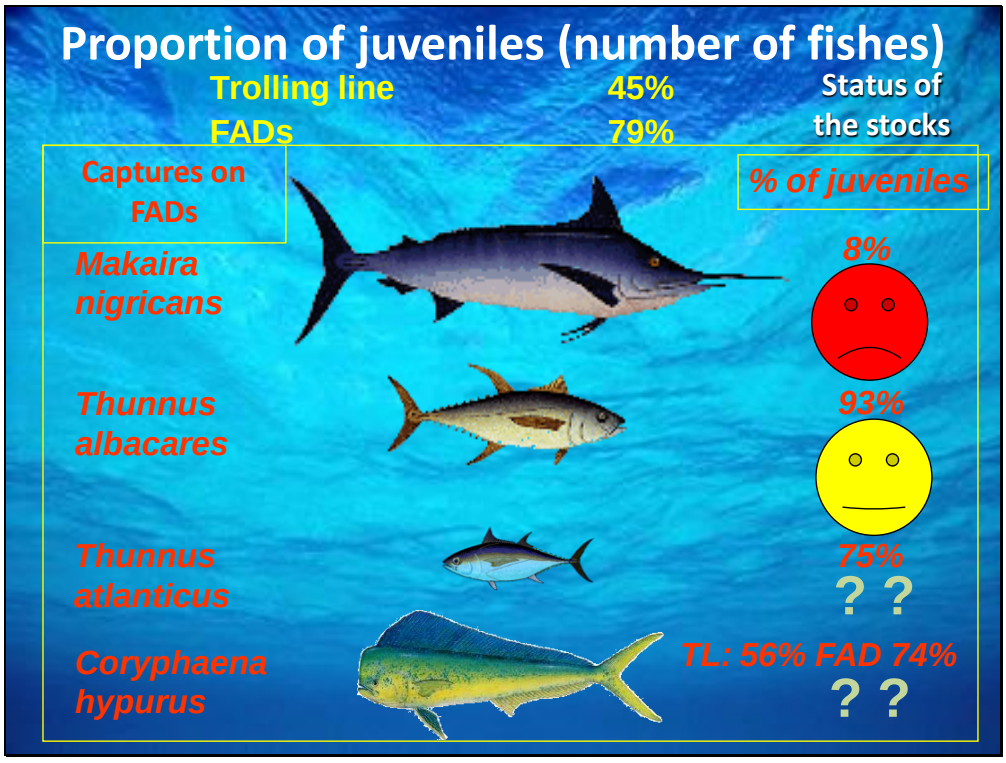


Slide 3

Emblematic species around FAD?

- Birds → exceptional captured by accident
- Turtles → never seen around FAD
- Marine Mammals → reasonable presence, can affect FAD fishing in particular the Dolphin but not captured
- Shark have being detected during experimental fishing trips by night & day, the species were: *Carcharhinus longimanus, Carcharhinus signatus, Prionace glauca & Isurus ocyrinchus* . In Martinique only 1,3% (2009) - 1,5% (2010) of landings were diverse sharks

Slide 4



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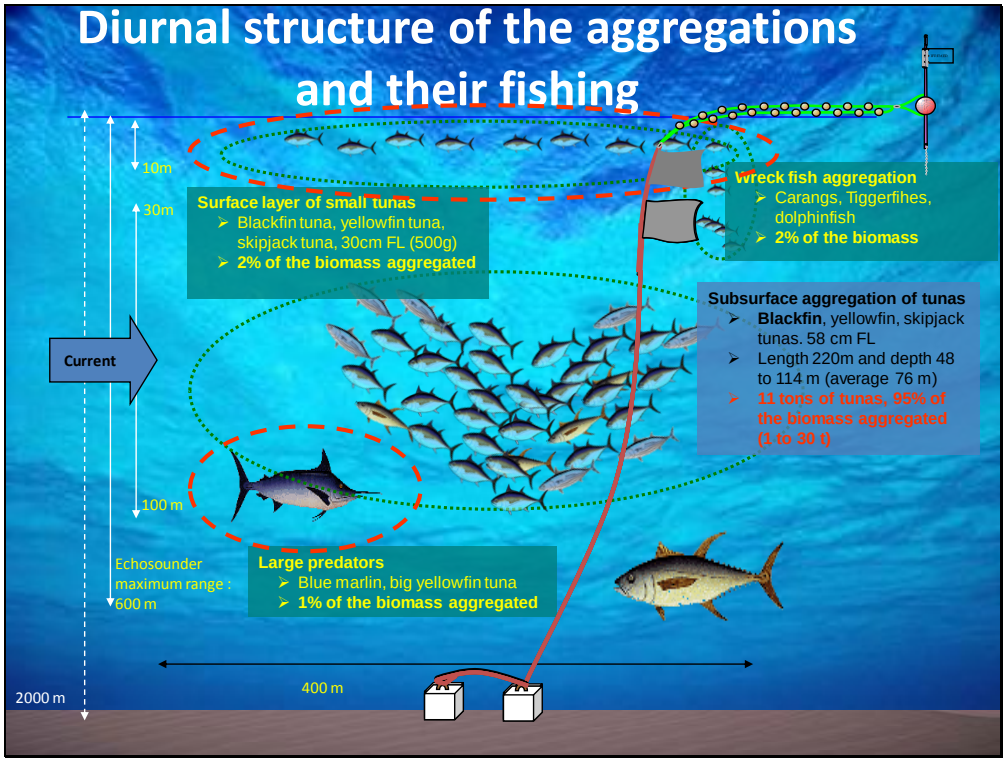

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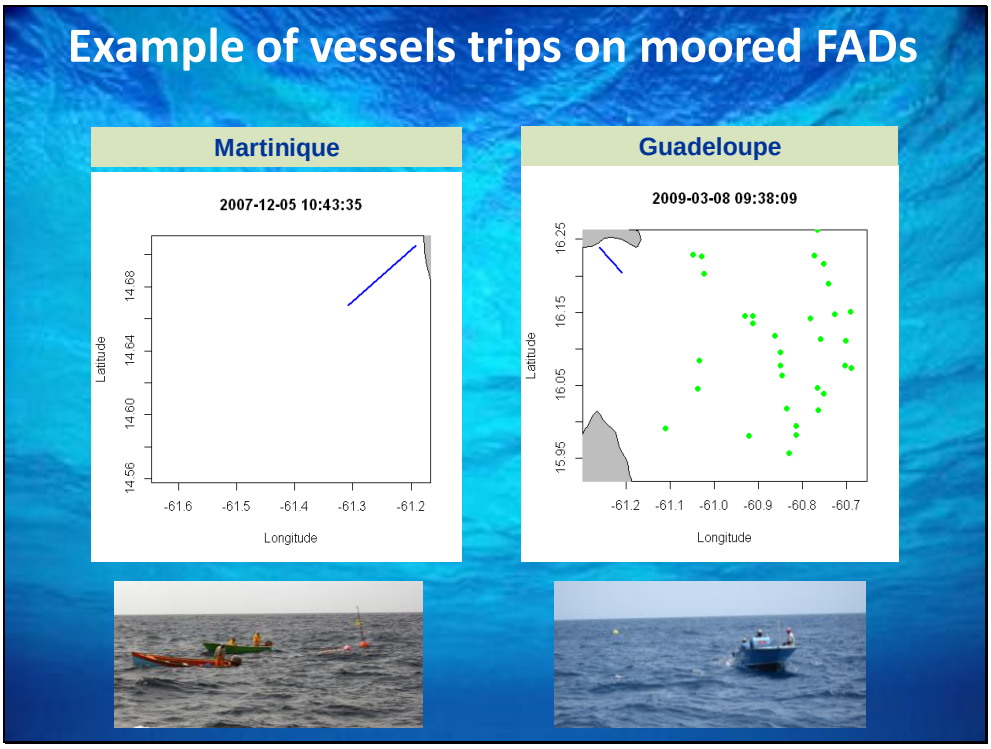

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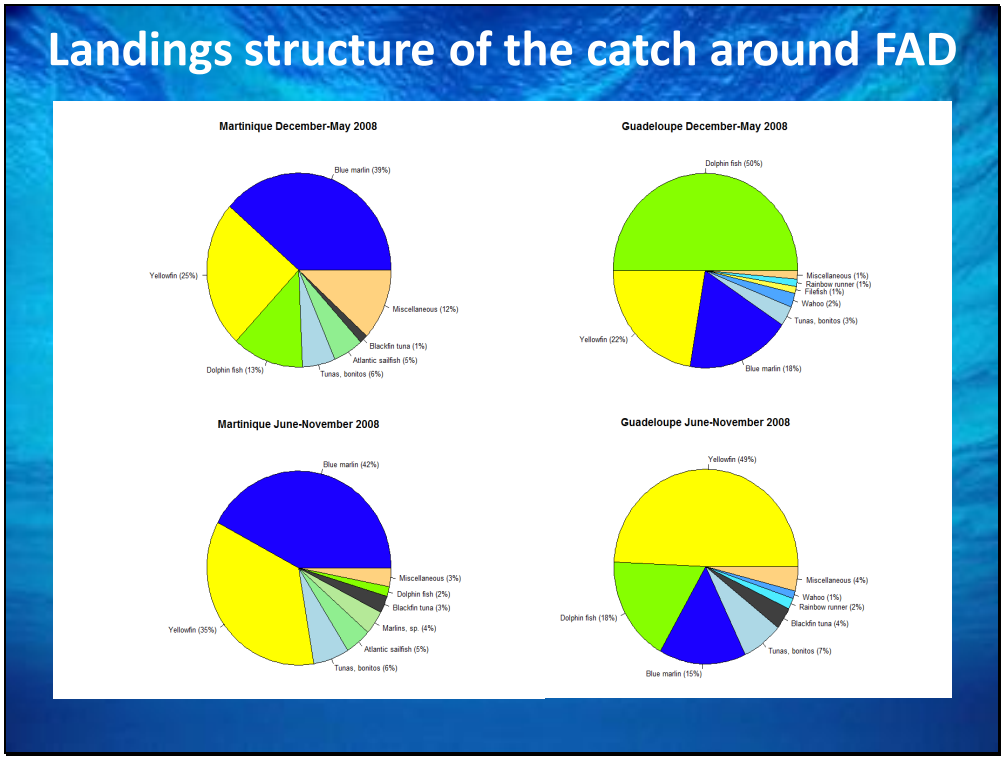


Slide 9

Size frequencies of Blackfin tuna on FAD according to time slot

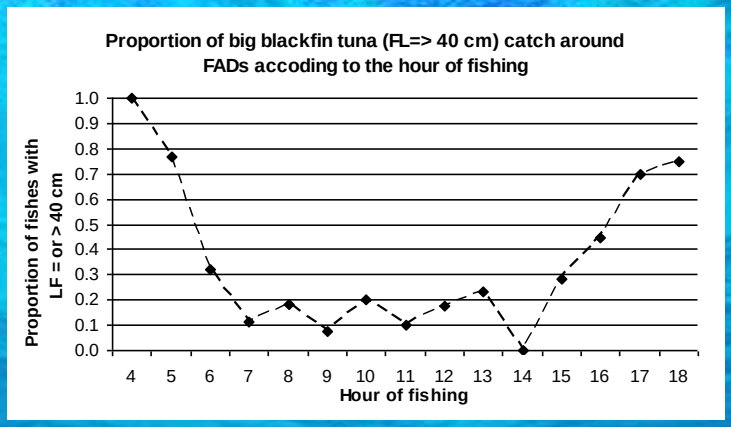


Figure 9. Proportion of big Blackfin tuna (FL => 40 cm) caught around FADs according to the hour of fishing (2004 & 2005)

Slide 10

2 –Gears and Fishing techniques

Slide 11

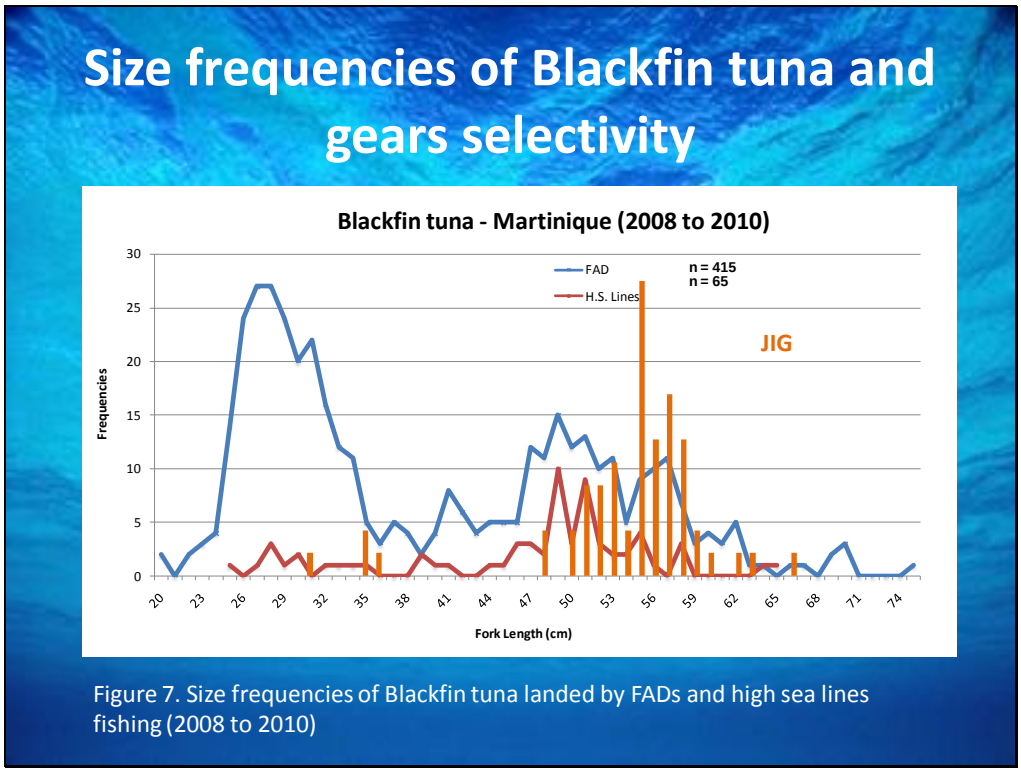
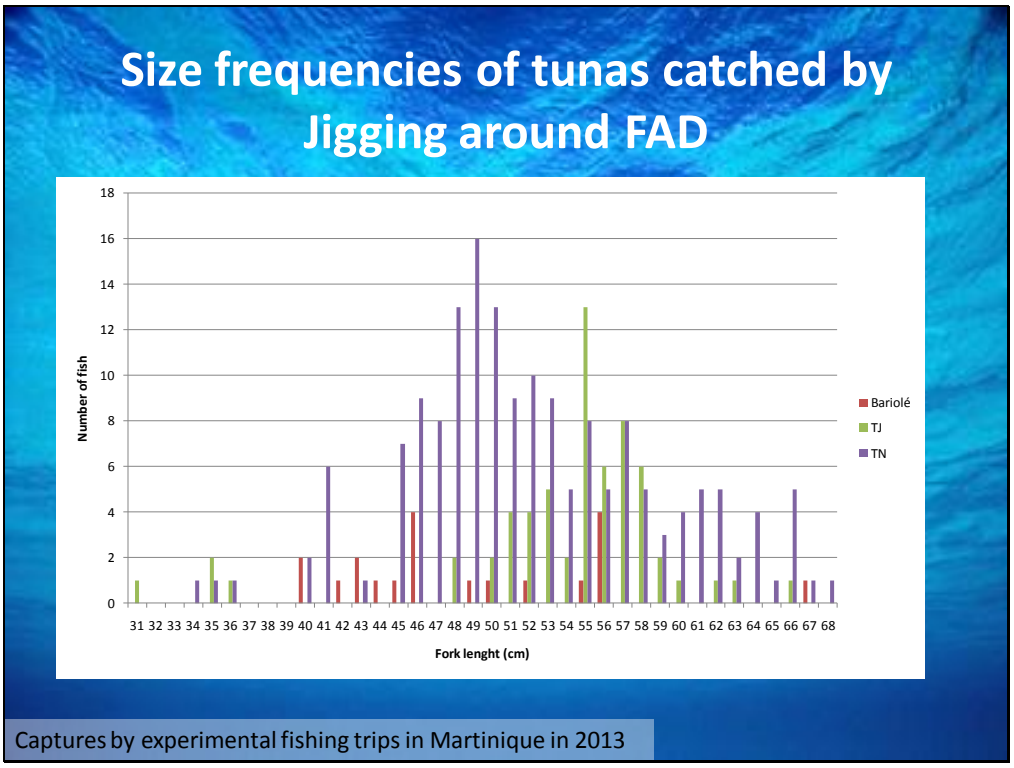


Figure 7. Size frequencies of Blackfin tuna landed by FADs and high sea lines fishing (2008 to 2010)

Slide 12

Slide 13



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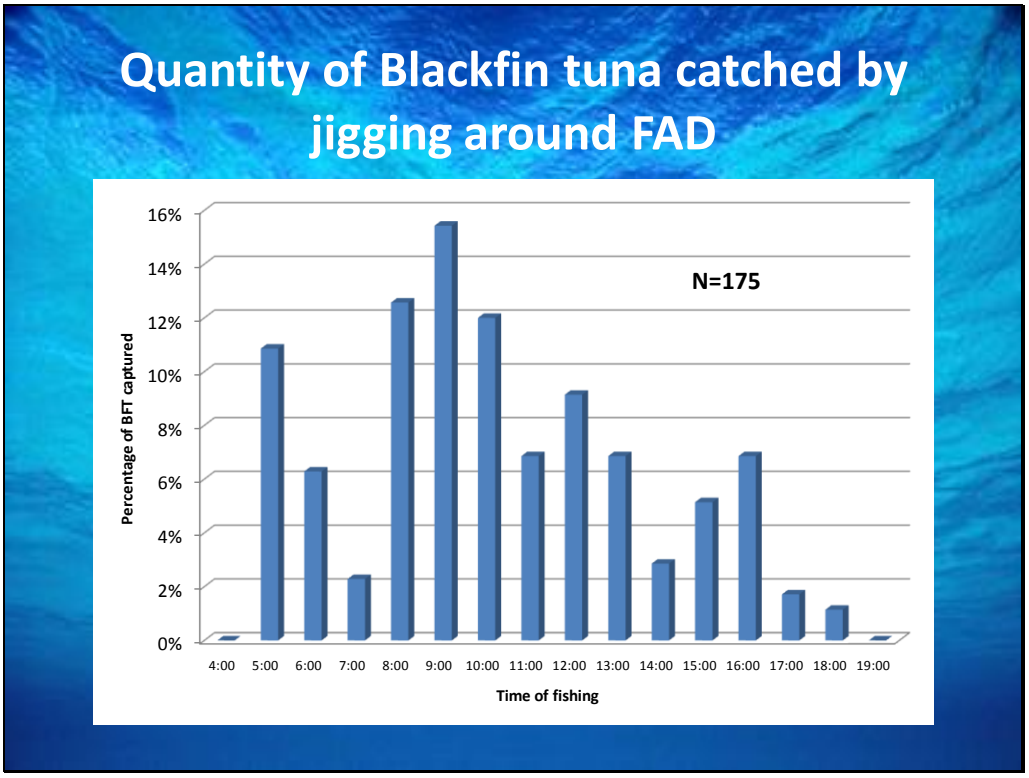

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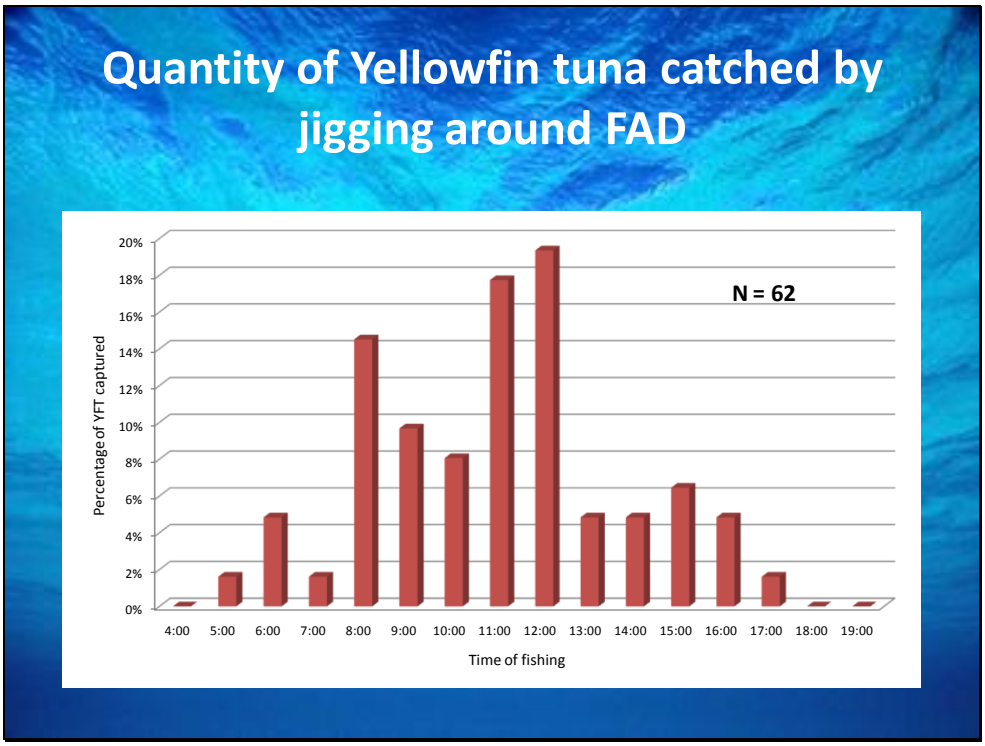

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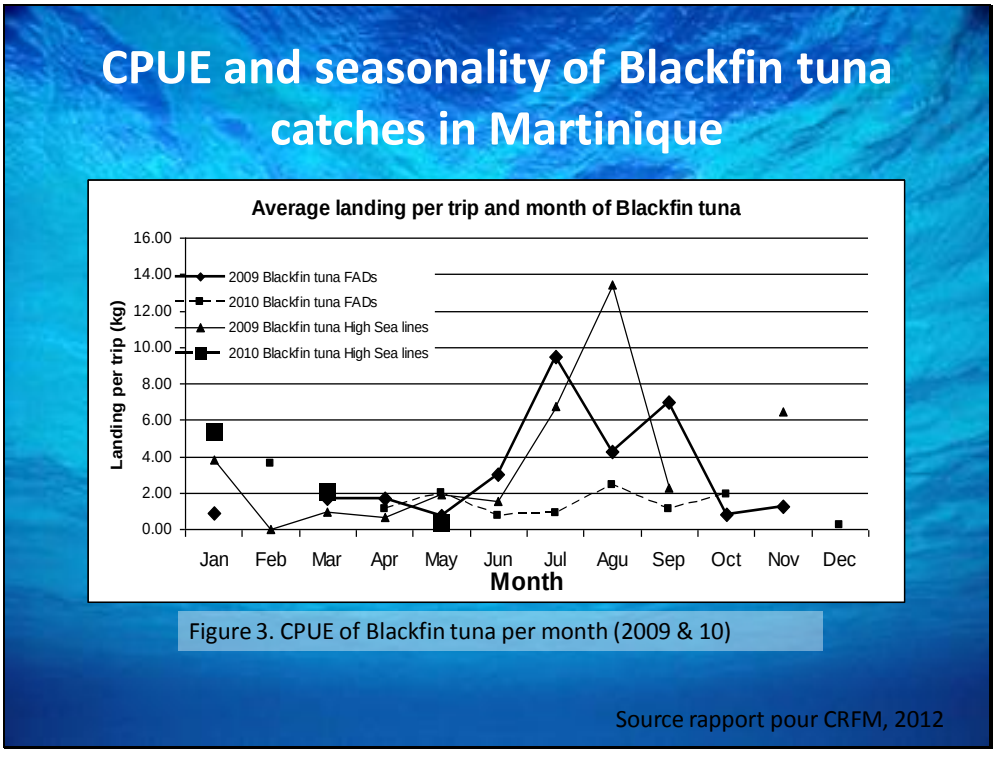


Figure 3. CPUE of Blackfin tuna per month (2009 & 10)

Source rapport pour CRFM, 2012

Slide 17

3 – Bait choice on vertical longlines (drifting buoy)

Slide 18

- Life bait (% of capture)
  - Flying fish: 20% (n=62)
  - Blackfin tuna: 15% (n=196)
  - Skipjack: 10% (n=153)
  - Yellowfin tuna: 8% (n=36)

- Dead bait :
  - Flying fish: 50% (n=6)
  - Frozen fish and dead sliced fish: 18% (n=98)
  - Dead sliced fish: 18% (n=154)
  - Frozen squid + dead fish: 13% (n=26)
  - Frozen squid: 8% (n=110)

Slide 19

4 – Distance of FAD deployment from shore

Slide 20

Distance to the coast *vs* fishing

0 to 12 nautical miles
10,5 fishes /trip
44,9 kg / trip

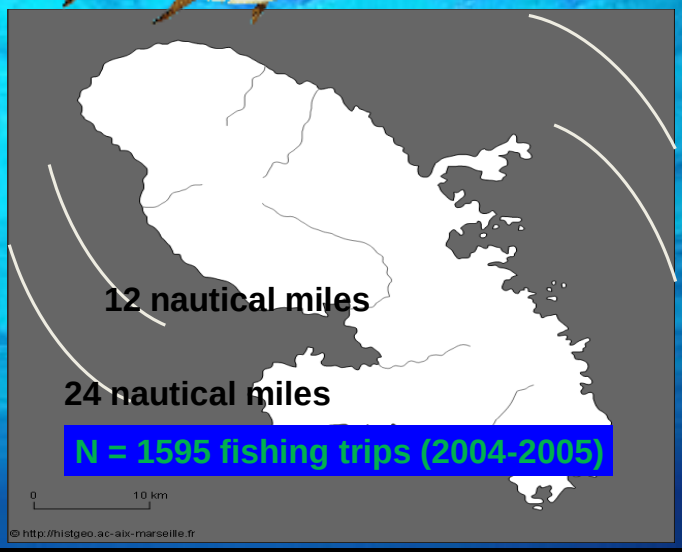
240 kg/FAD/Day
YFT
17 kg / trip
90 kg/FAD/Day

12 to 24 miles
14,7 fishes /trip
89,7 kg / trip

340 kg/FAD/Day
YFT
42 kg / trip
160 kg/FAD/Day

24 miles & more
19,9 fishes /trip
135 kg / trip
540 kg/FAD/Day
YFT
86 kg / trip
344 kg/FAD/Day

Yellow fin tuna (YFT)



Slide 21

Quantity catched according to the distance of the FAD and Species

Species (kg)	< 12 MN	12 – 24 MN	> 24 MN
		20 MN	
Skipjack	1,5	4,3	
Yellowfin tuna	17	42	86
Blue marlin	17	36	34

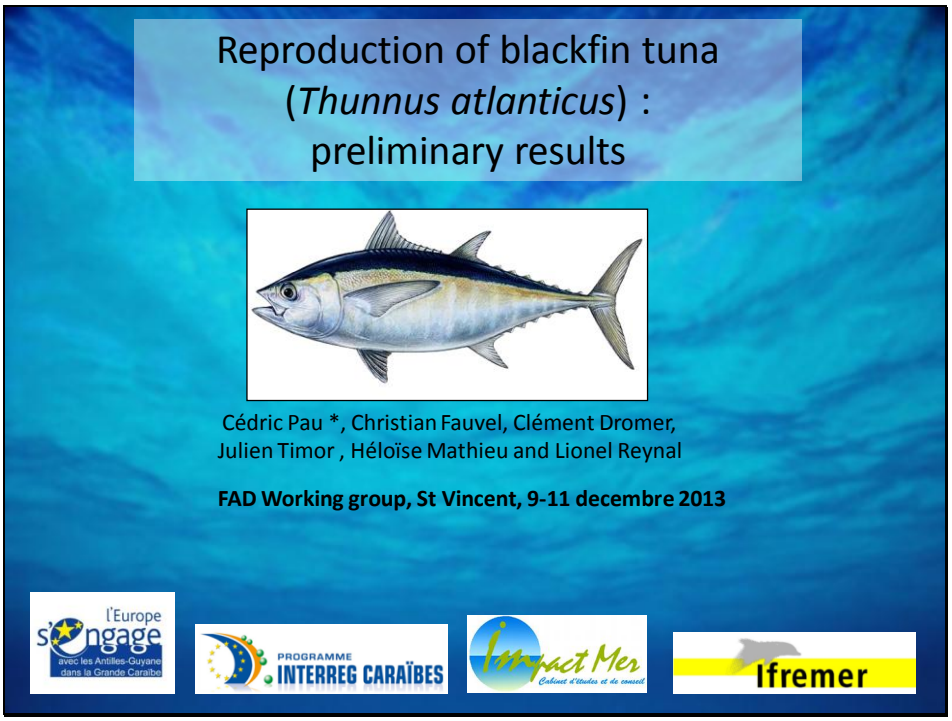
Average catched per fishing trip in Martinique, 2004 & 2005

Slide 22

Thank you

Reproduction of Black fin tuna: Preliminary results

Slide 1



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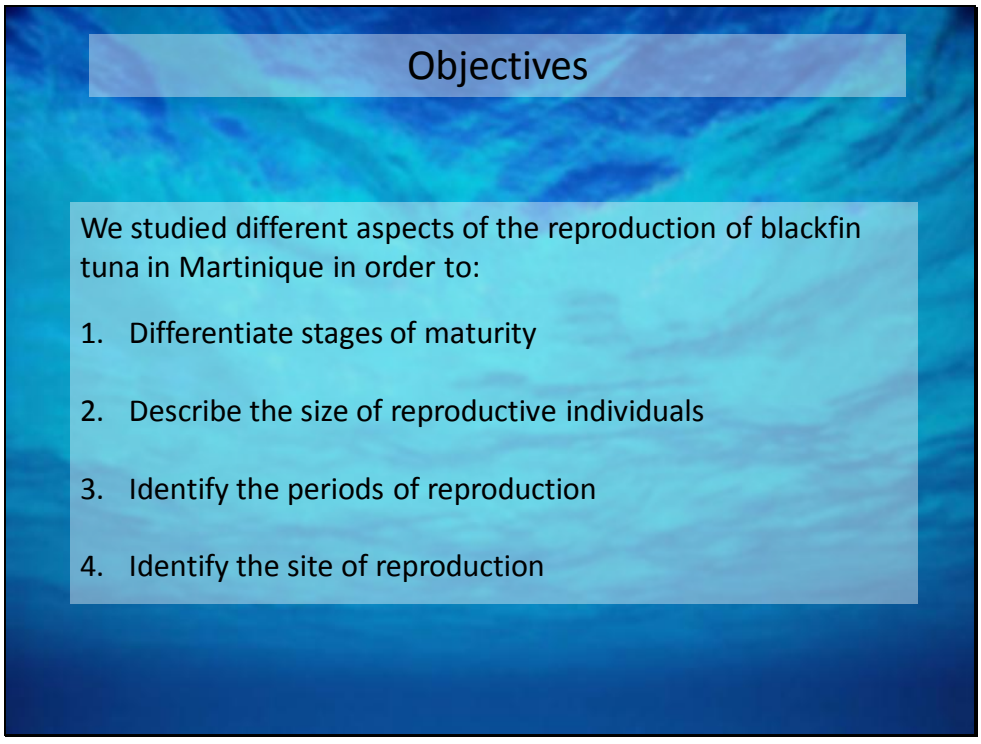
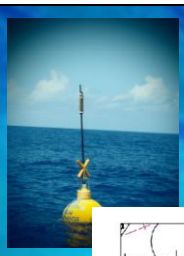


Slide 3

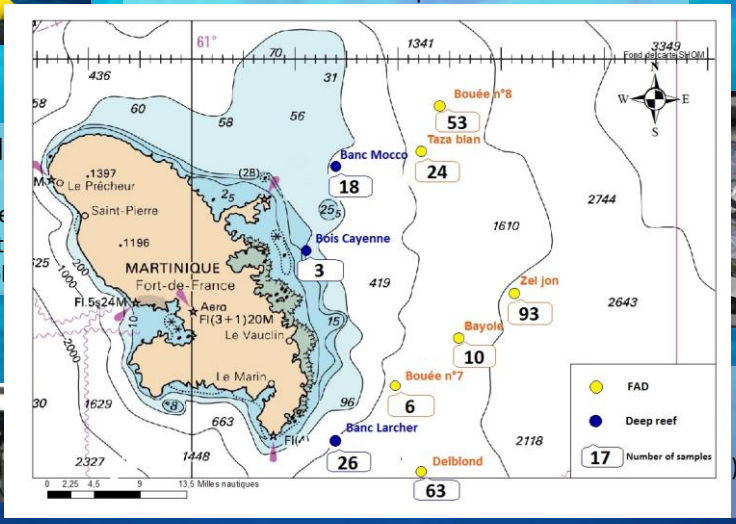
Sampling protocol

Slide 4



1- Samplings at sea

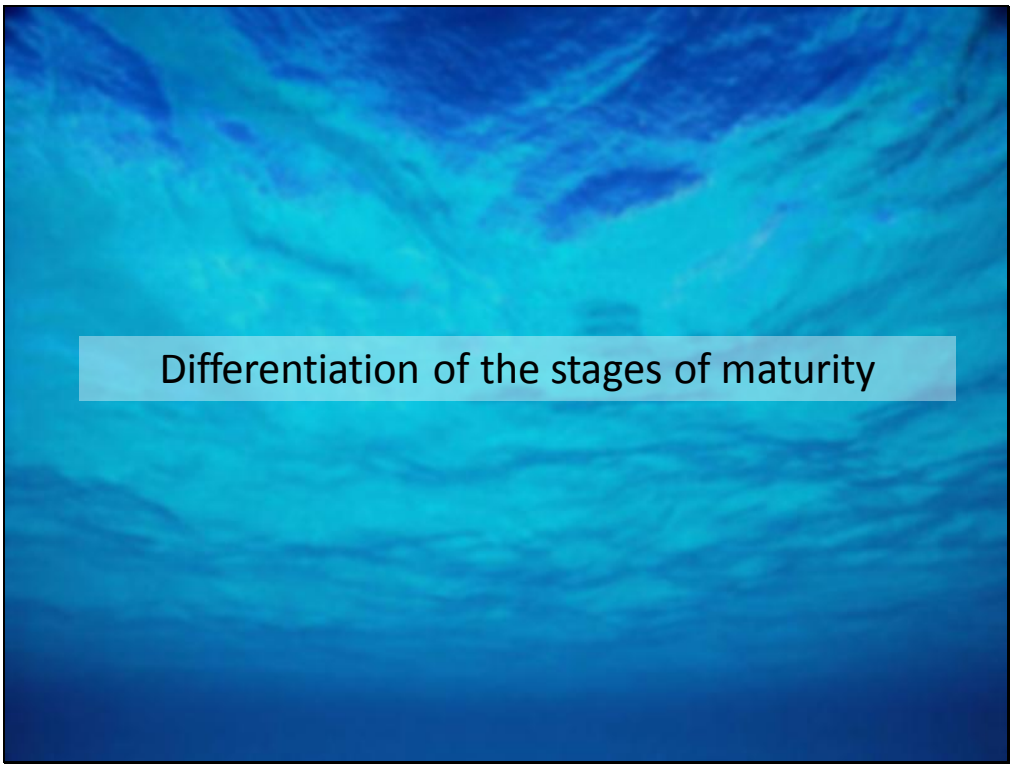
- 22 fish trips from the 28th Feb to the 4th Sept 13
- 299 individuals captured
- Atlantic coast of Martinique



2- On l

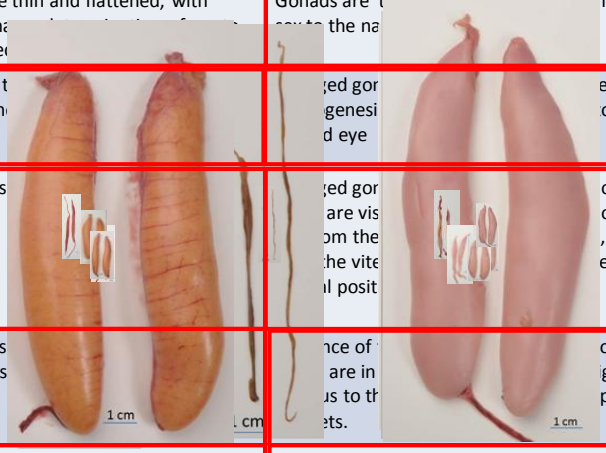
- Biome
  of gut
- Sampl

Slide 5



Slide 6

		Male	Female	
IMMATURES	**Stage I**	Gonads with small-ribbon shape, determination of sex to the nacked eye is not possible		
	Stage 1	Testes are thin and flattened, with ribbon sha… the nacke…	Gonads are t…ination of …sex to the na…	
	Stage 2	Enlarged t… section, n…	…ed gor… …genesi… …d eye	…er been in …o the
IN MATURATION	**Stage** 3	Milt flows … length	…ed gor… …are vis… …om the… …he vite… …l posit…	…of ovary), …odging or …, they …eus in
MATURES	**Stage** 4	Milt flows … on the tes…	…nce of … …are in … …us to th… …ets.	…ovary. …gration of …pid
POST SPAWN	**Stage** 5	Testes are lightly flabby, few or no milt in the central canal.	Ovary contains ovum in degradation, with possible regression of the ovary mass .	



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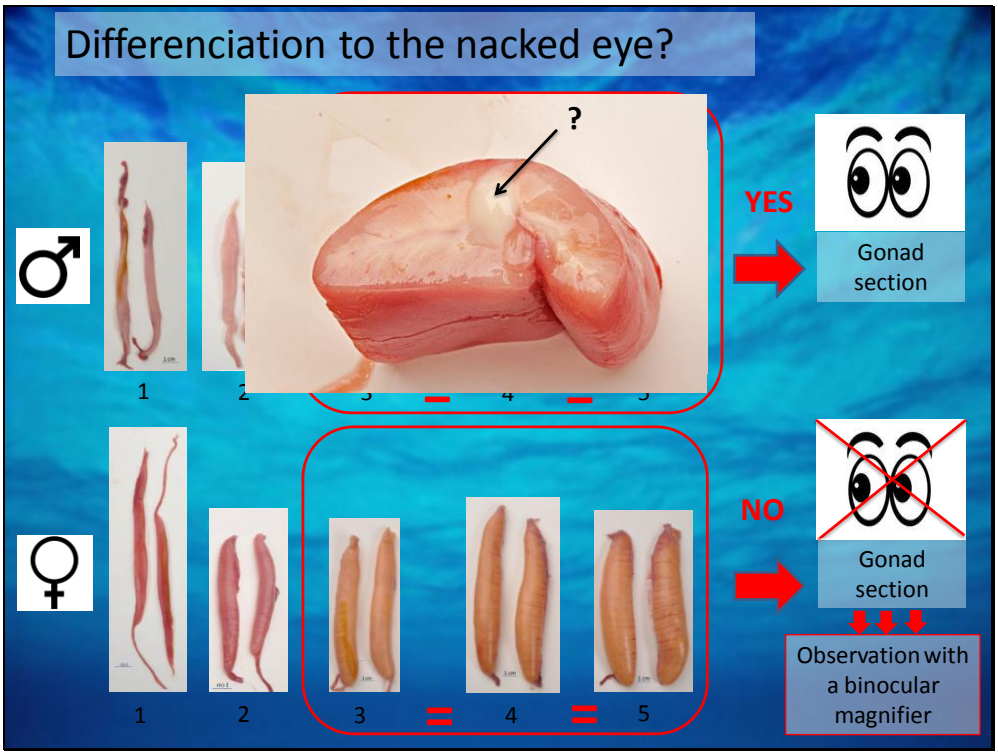

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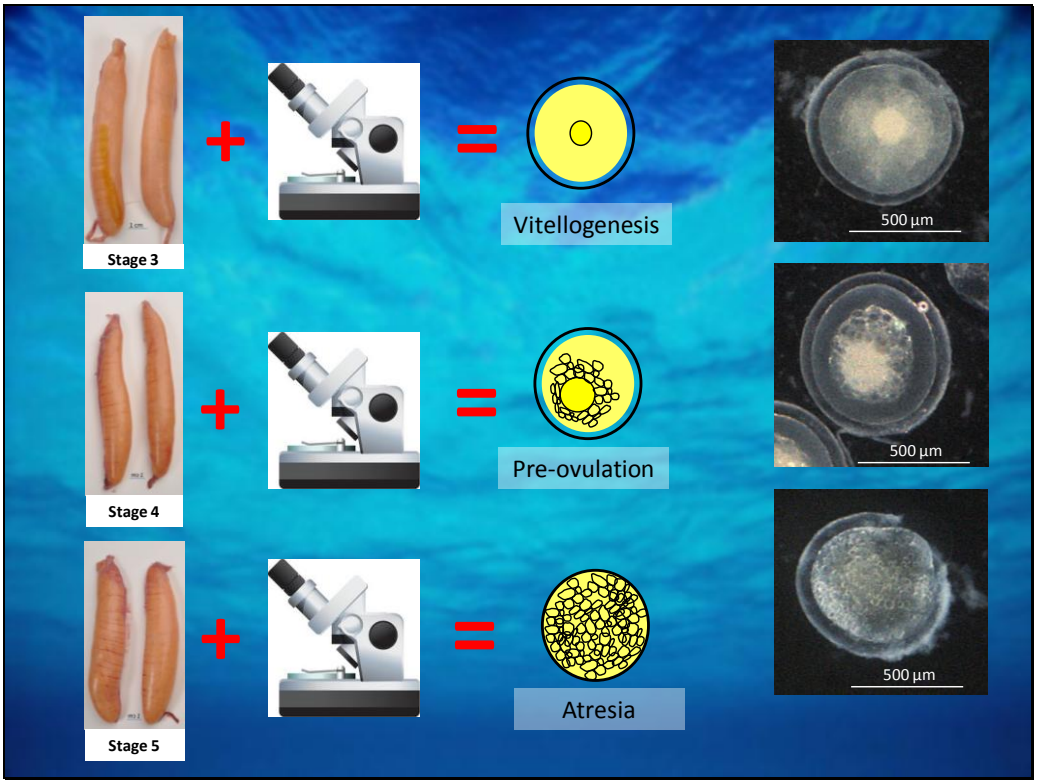

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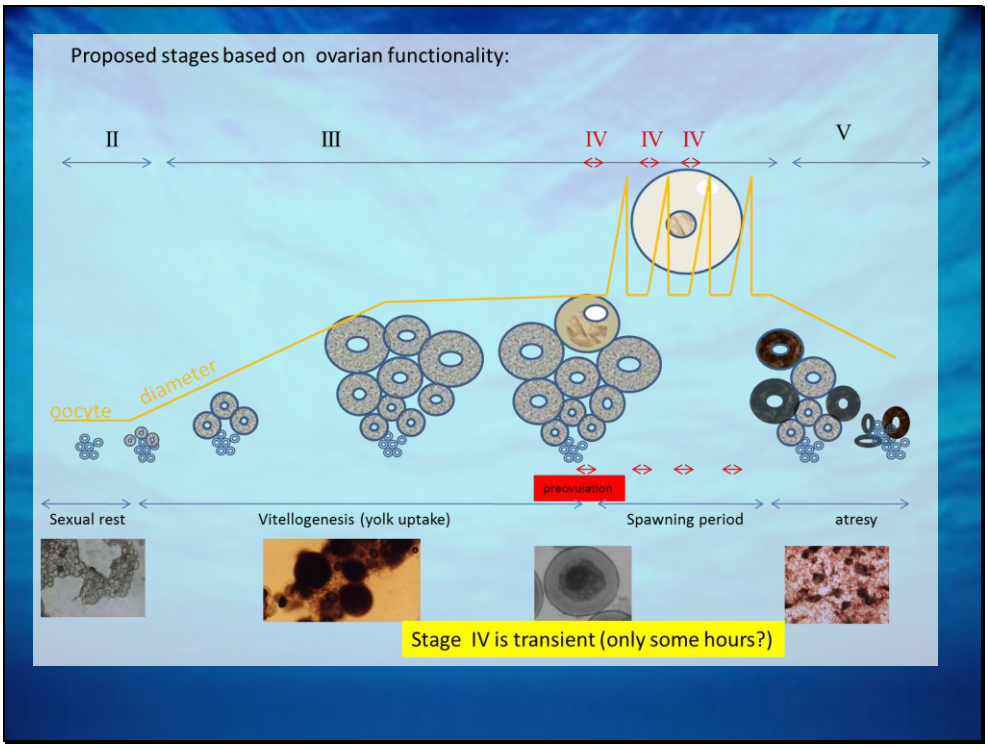

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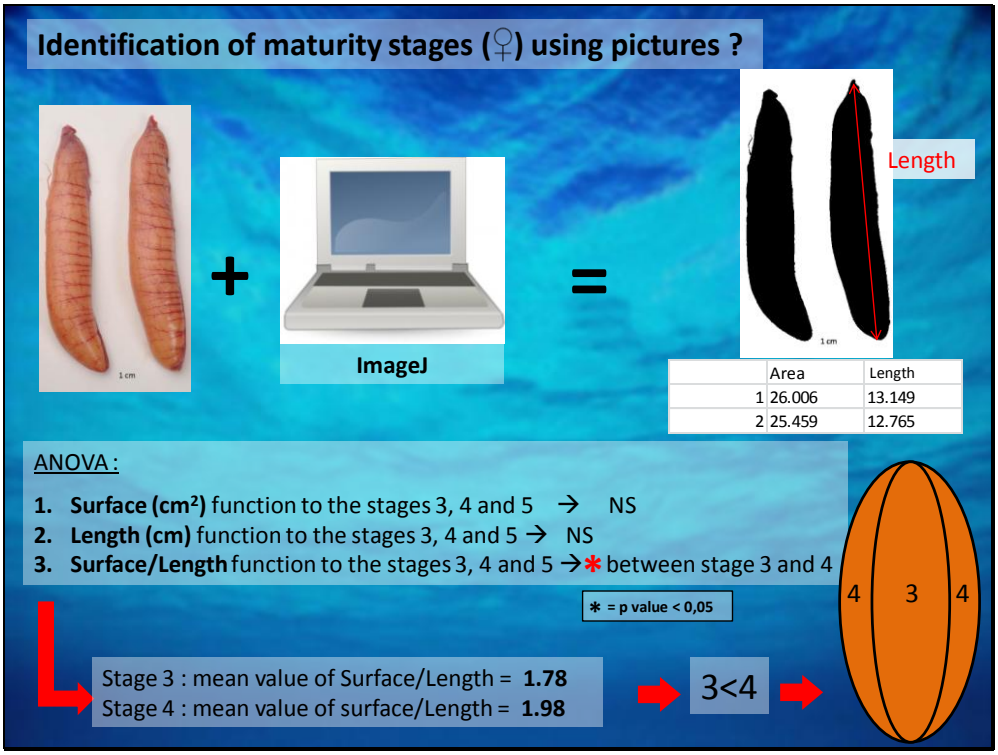

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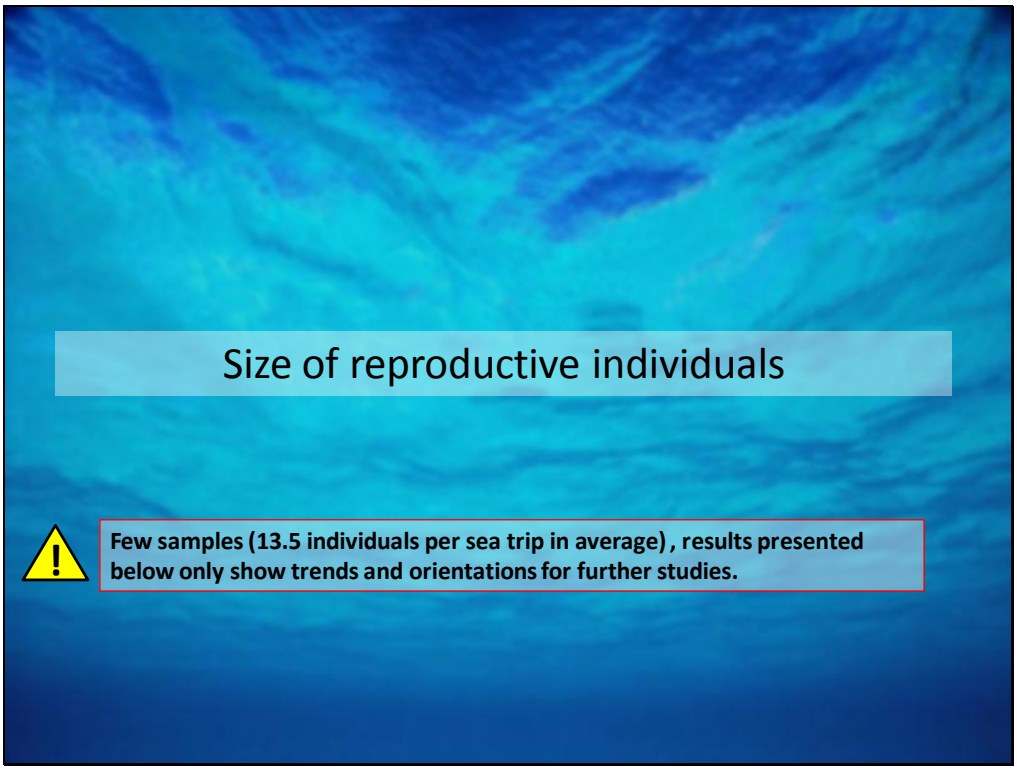

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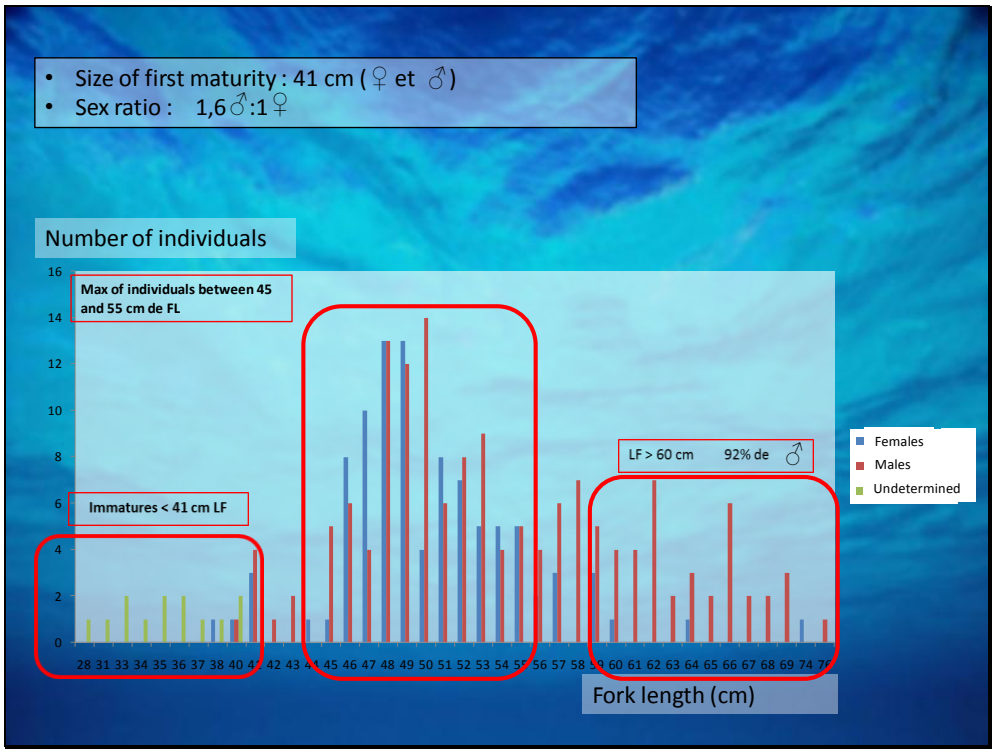
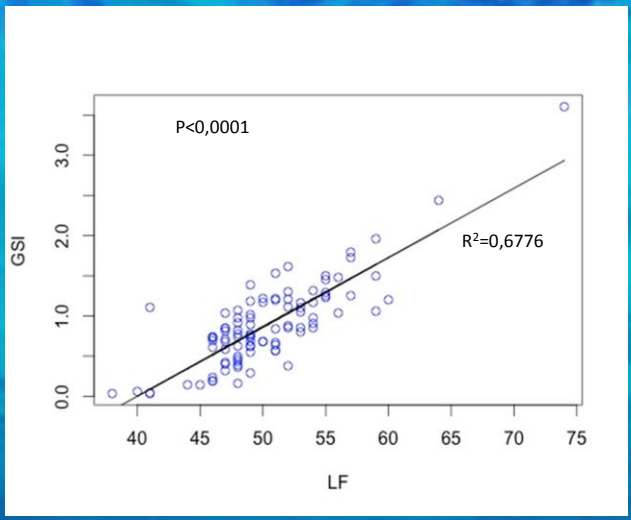


Slide 13

Gonado Somatic Index (GSI) = Gonad weight/size of the individual



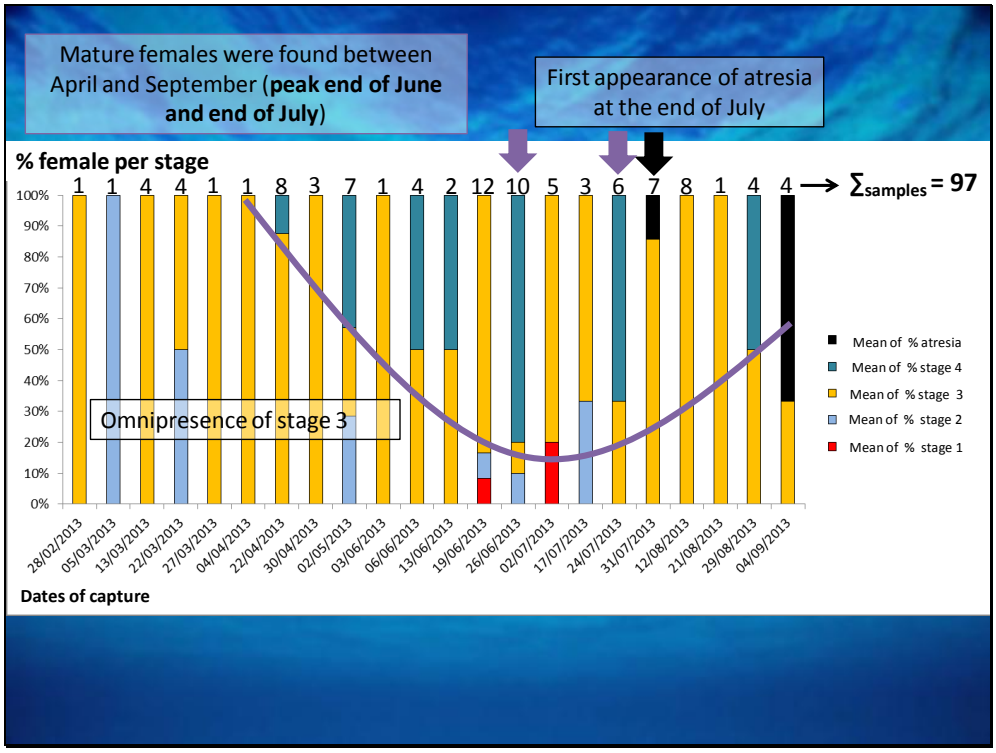
GSI increases with the individuals size: **more individuals are big, more its gonads (so its fecondity) are proportionally important in size.**

Slide 14

Periods of reproduction

Few samples (13.5 individuals per sea trip in average), results presented below only show trends and orientations for further studies.

Slide 15



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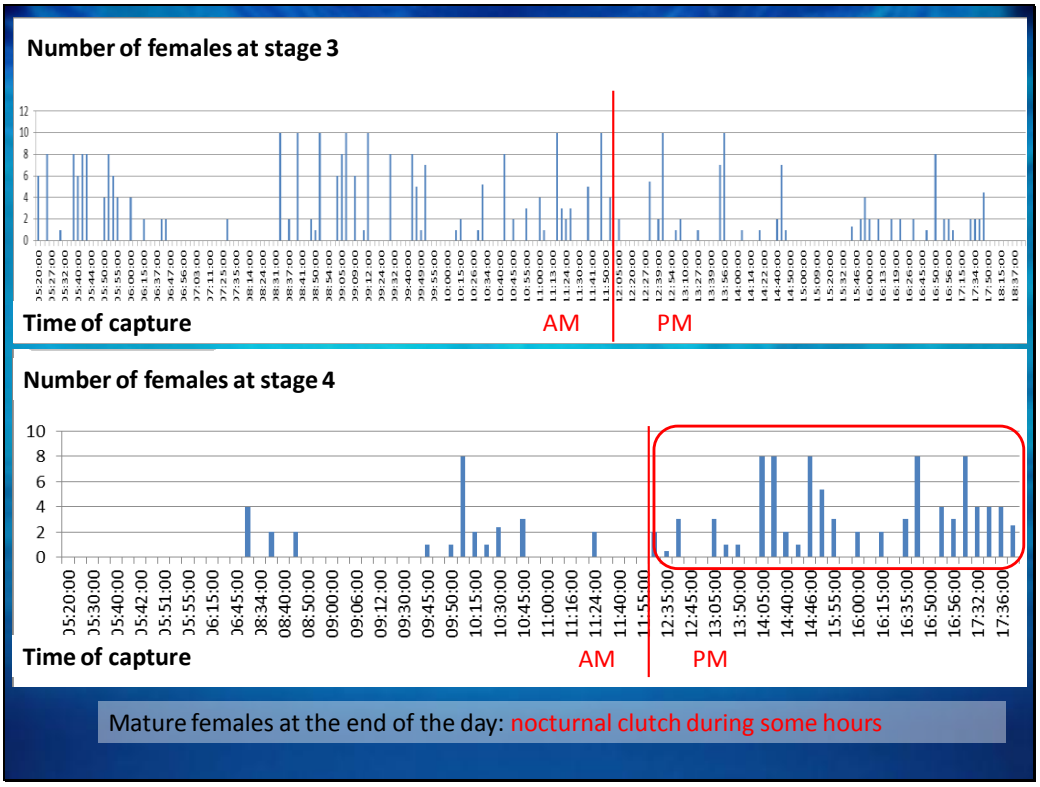

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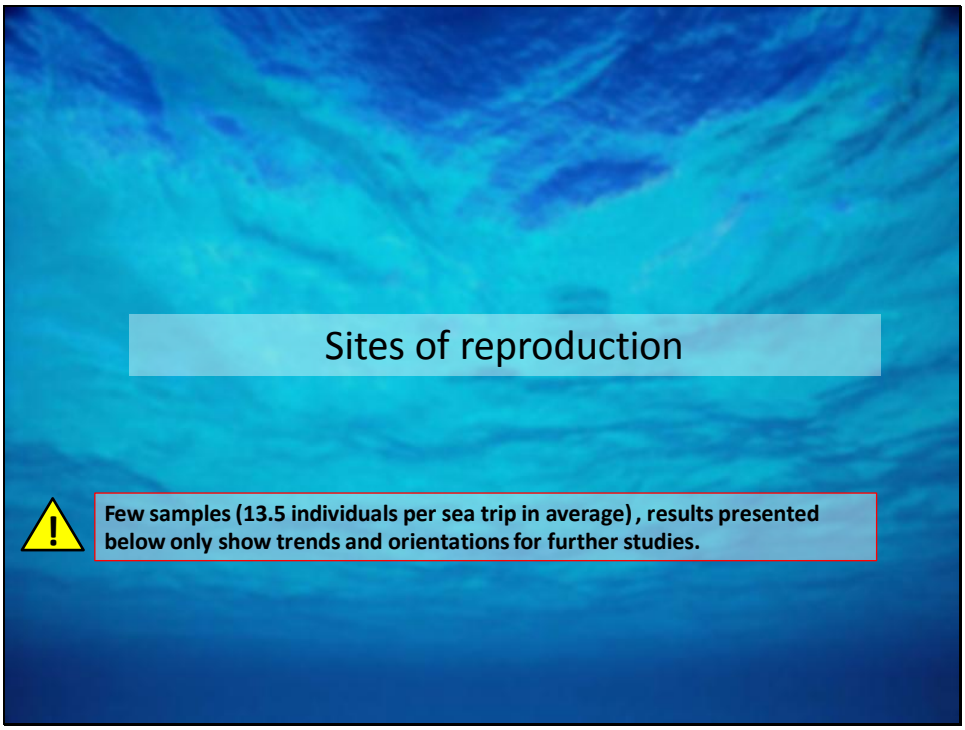

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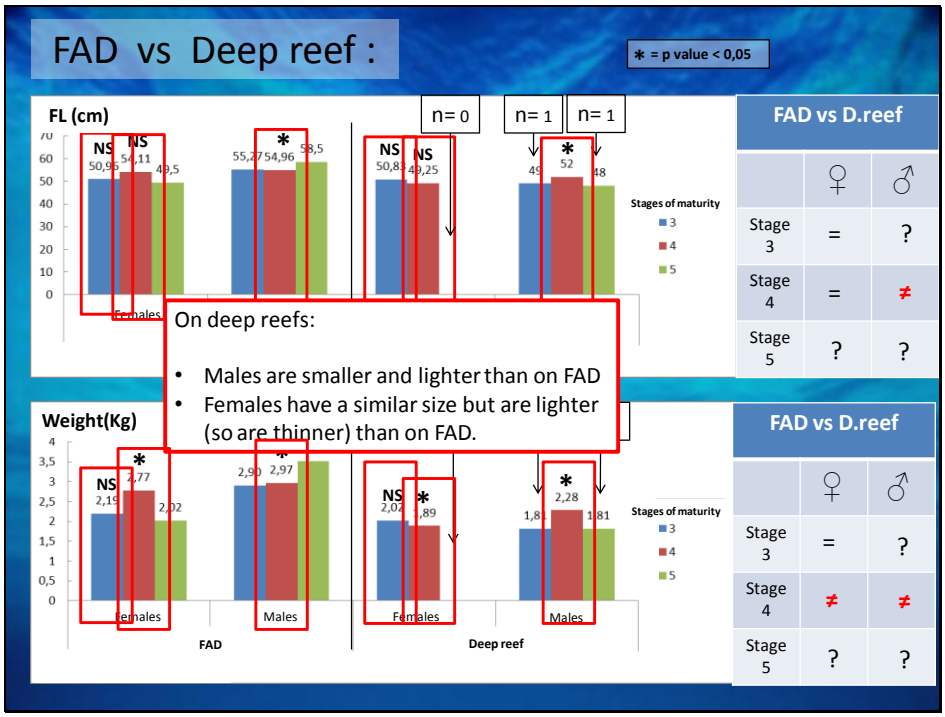


Slide 19

Recommendations :

- **Collect more samples to increase the database and the statistical power of results;**
- **Describe an indice to determine the stages of maturity of the gonads based on pictures observations only;**
- **Realize a long-term sampling (2-3 years) to clearly identify the period of reproduction (peak of clutch) and describe eventual interannual variations in clutch.**

Slide 20

Thank you for your attention

APPENDIX 8: TECHNICAL DISCUSSIONS – MARKETING

Experience with Tuna exports to the United States

Slide 1

Slide 2

Slide 3

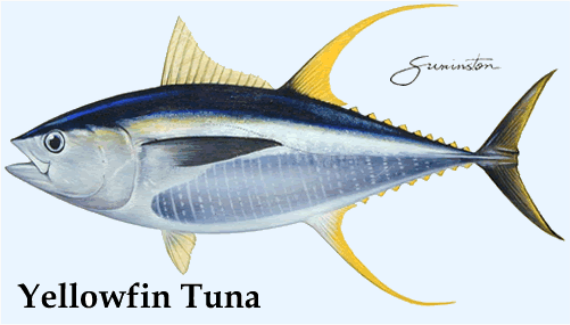
Slide 4

Slide 5

MEETING WITH GRENVILLE FISHERMEN ON GOOD QUALITY FISH HANDLING FOR EXPORT

Slide 6

YELLOW FIN TUNA



Slide 7

Pelagics Landed at Grenville

Slide 8

FISHERIES DIVISION

Ministry of Agriculture, Lands, Forestry, Fisheries & the Environment
Melville Street Fish Market Complex, Melville Street, St. George
Tele # (473) 440-3814 Fax # (473) 440-6613

CERTIFICATE OF HACCP COMPLIANCE

TO WHOM IT MAY CONCERN

This serves to inform that SPICE ISLE FISH HOUSE LIMITED with F.D.A. #17209710700 of Grand Mal,St.George's, Grenada, W.I. has been operating under Grenada's *Fish and Fishery Products Regulations* SRO. 17/1999, and the incorporated recommendations and concepts from the National Advisory Committee on Microbiological Criteria for Foods, the U.S. Food and Drug Administration's *Fish and Fishery Products Hazards and Control Guide*, the U.S. Food and Drug Administration's mandatory seafood HACCP regulations (21 CFR Part 123) and current Good Manufacturing Practices (cGMP's; 21 CFR part 110), and various sanitation standard operating procedures (SSOP's) prepared by the Governmental Agencies, and individuals having expert knowledge of the concept and applications of sanitation in food processing.

.....

Johnson Peter St. Louis
Fisheries Officer 1Ag.
Designated Fish Inspector
9016 – 102500 – 99258
Certificate Number
22nd January, 2013

Slide 9

EMPLOYMENT

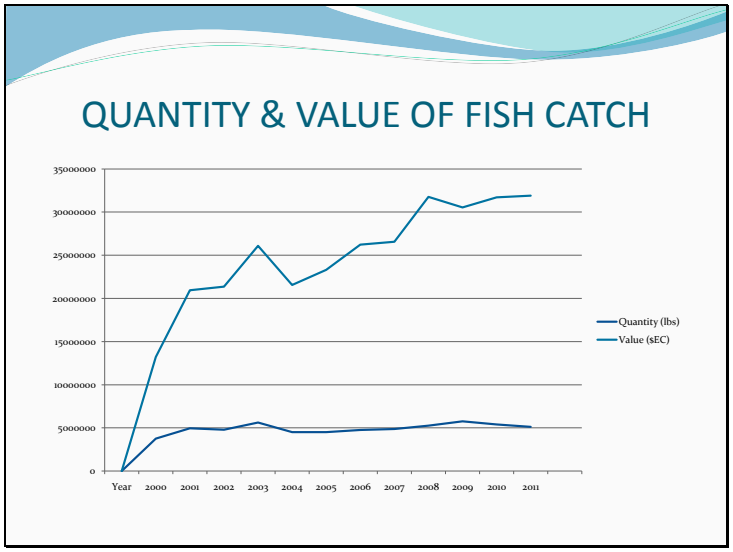
- 1987
  - Fishermen – 1,200
  - Boats - 490
  - Vendors - 28
  - Employment – 1,500
  - Fish Processing Establishments - 1
- 2011
  - Fishermen – 3,000
  - Boats - 750
  - Vendors - 60
  - Employment – 3,800
  - Fish Processing Establishments - 3

Slide 10

IMPORTANCE OF THE SECTOR

- Sustainable livelihoods & social well-being especially for lower income group
- Food security
- Poverty alleviation
- Foreign exchange earning: value-added
- Nutrition – important source of protein / minerals

Slide 11



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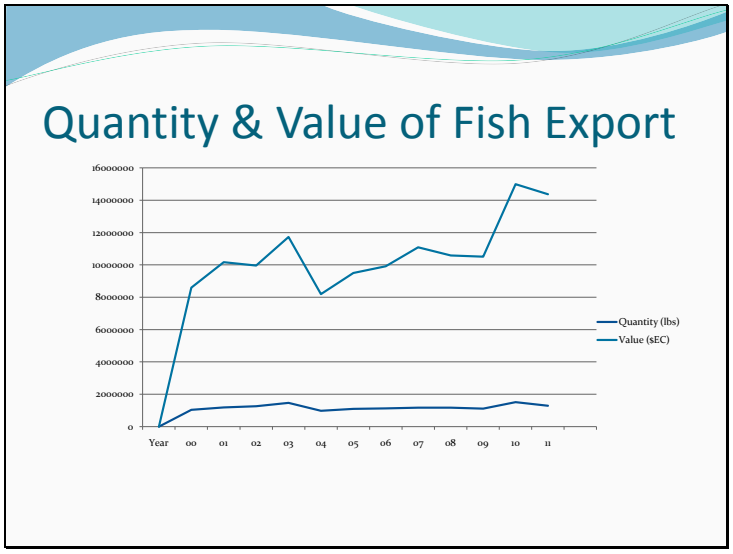


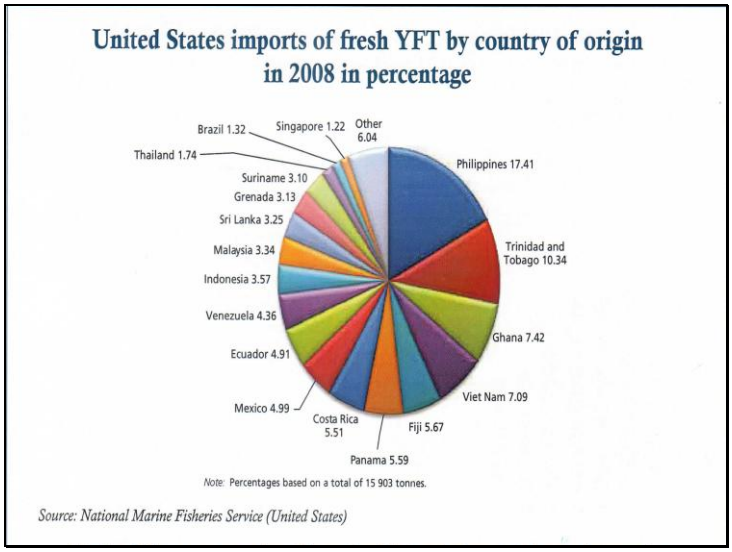
Slide 13

GRENADA HAS ‘’NICHE’’ TUNA MARKET IN U.S.A.

Slide 14

GRENADA TUNAS ARRIVING IN USA,EATEN RAW AS SUSHI AND SASHIMI

Slide 15



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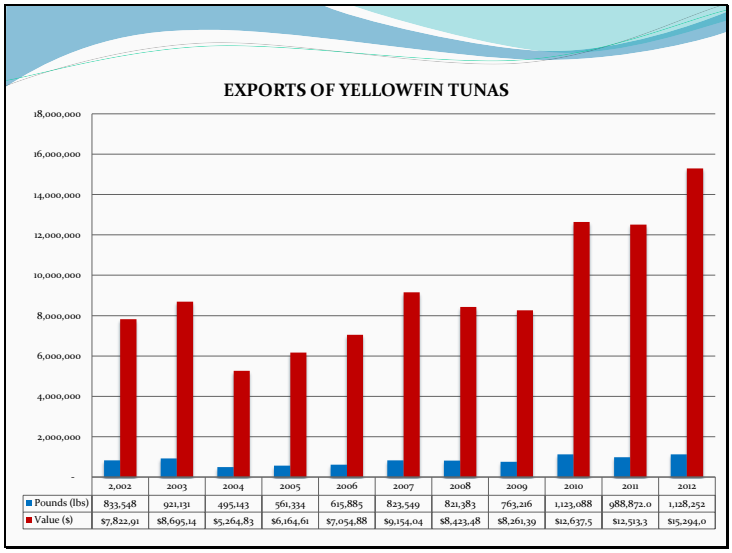

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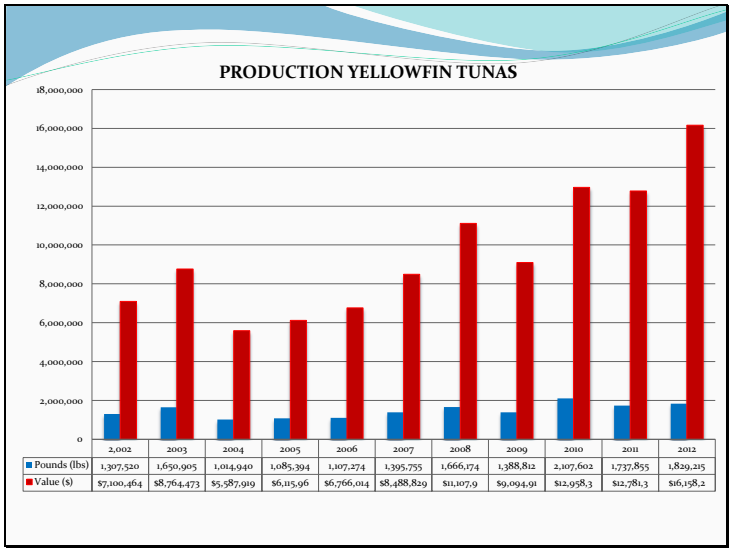
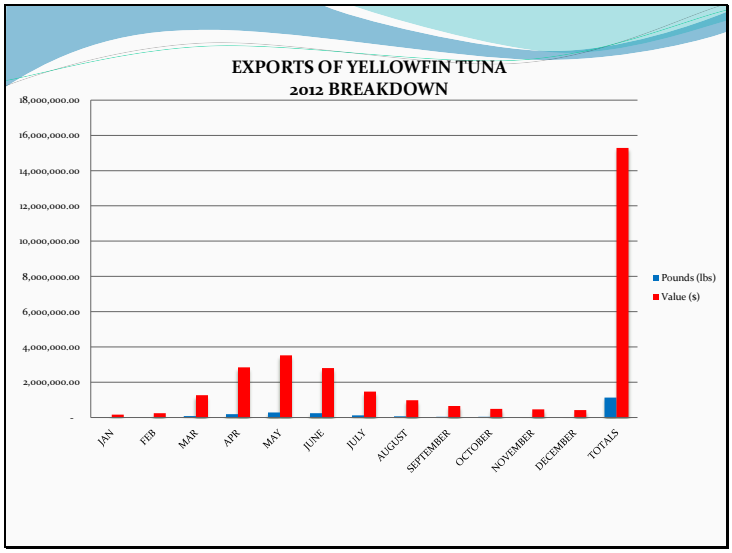


	2,002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Pounds (lbs)	1,307,520	1,650,905	1,014,940	1,085,394	1,107,274	1,395,755	1,666,174	1,388,812	2,107,602	1,737,855	1,829,215
Value ($)	$7,100,464	$8,764,473	$5,587,919	$6,115,96	$6,766,014	$8,488,829	$11,107,9	$9,094,91	$12,958,3	$12,781,3	$16,158,2

Slide 18



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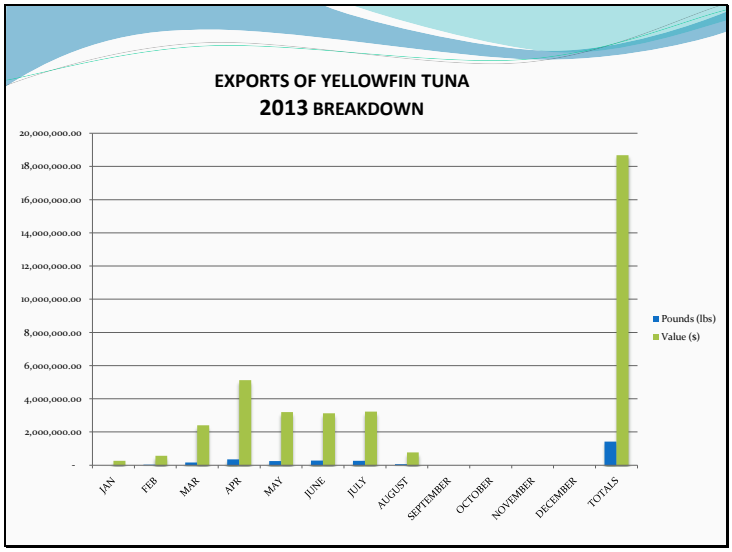


Slide 20

STRUCTURE OF THE INDUSTRY

- Structure of fishery
  - Multi-species
  - Marine capture fishery
  - Open access
  - From subsistence to commercial
  - Artisanal & small scale
  - Landing sites – 32
    - Primary – 23
    - Secondary – 8
    - Tertiary – 1
  - Aquaculture: practiced from 1970s - 2001

Slide 21

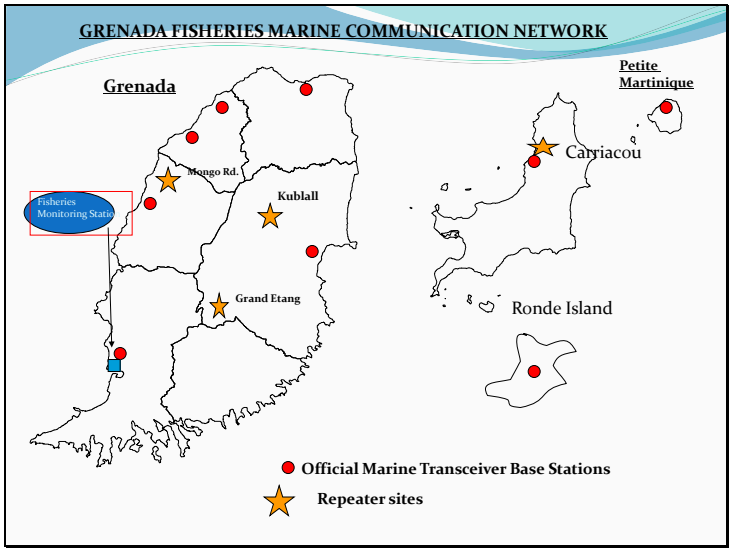
STRUCTURE OF THE INDUSTRY

- Composition of Fishery
  - Oceanic pelagic – tuna, sailfish, dolphin fish, wahoo, king mackerel
  - Demersal –snapper, grouper, coney
  - Coastal pelagic – bigeye scad, round scad
  - Crustacean / shellfish – lobster, conch, marine turtle, sea urchin

Slide 22

TUNA LONGLINE FLEET

Slide 23



Slide 24

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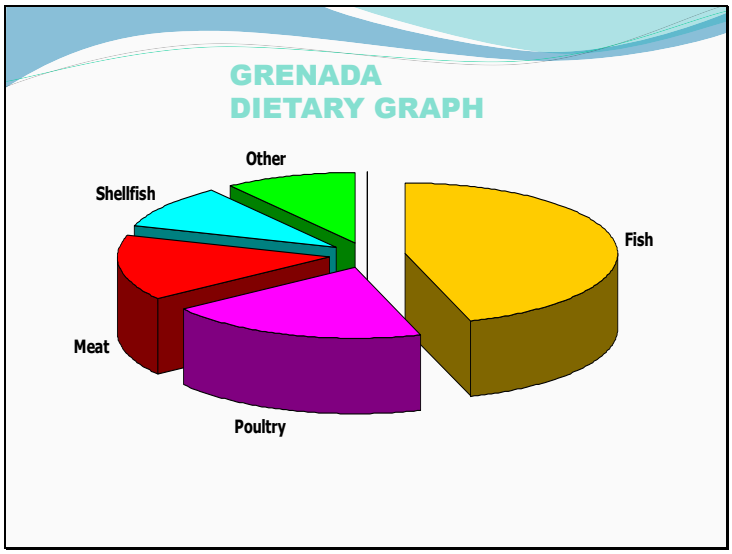
Slide 26



Slide 27

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Slide 30

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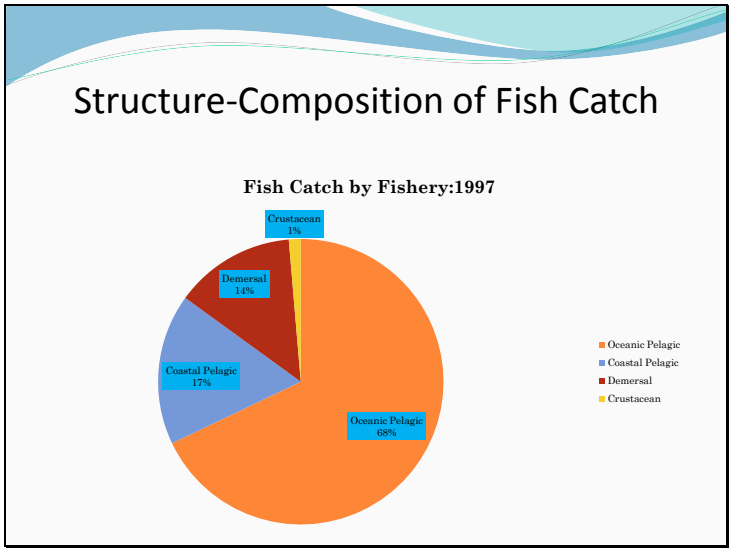
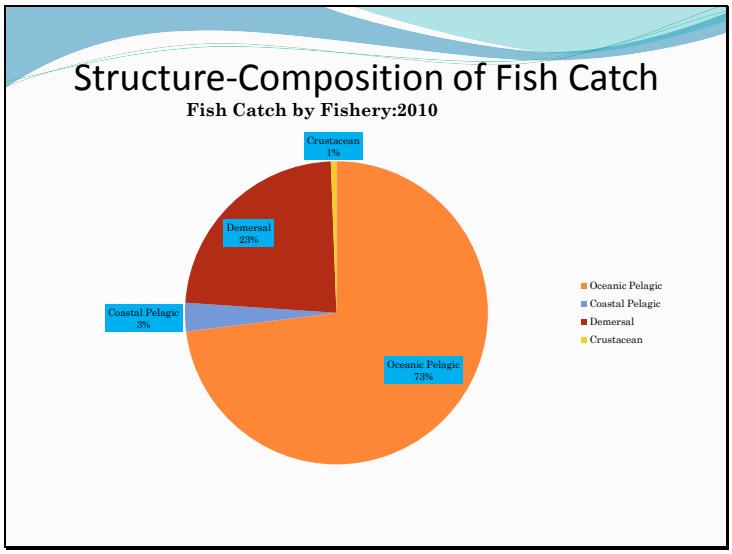
Slide 32

JOHNSON ST.LOUIS &MORAN MITCHELL APPROVED HACCP&SSOP FISH QUALITY CONTROL TUTORS

Slide 33



Slide 34



Slide 35

THE TUNA FISHERY IN GRENADA

- IT IS ALIVE - Not dead
- IT IS VIBRANT – Bursting with energy or activity.
- IT IS ROBUST – Full of health and strength.
- IT IS SUSTAINABLE – Capable of being sustained.
- IT IS MANAGABLE – We direct and control this fishery.
- IT GENERATES FOREIGN EXCHANGE – It brings money into the economy.

Slide 36

NEW TUNA LONGLINERS WITH ICE BOXES

Slide 37

LATEST LONGLINER WITH ICE MACHINE

Slide 38

FISHERIES OFFICERS TRAINED LONGLINERS

Slide 39

TUNA LONGLINERS IN PORT

Slide 40

GRENADA FISH PRODUCTION AND EXPORT		
	QUANTITY (LBS)	VALUE (XCD)
TOTAL PRODUCTION 1978 – 2013(35YEARS)	150,230,740.09	$574,603,901.42
TOTAL EXPORT 1984 – 2013(29YEARS)	33,598,575.34	$268,231,486.96
TOTAL PRODUCTION TUNAS 1978 – 2013(35YEARS)	YELLOW FIN TUNA	BIG EYE TUNA
	34,709,692.00	300,914.95
	$184,406,113.00	$1,157,894.00

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Slide 43

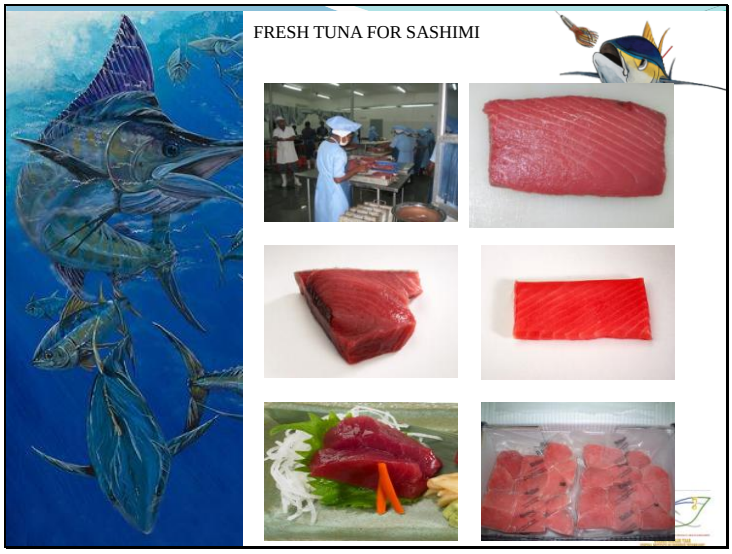
LUCRATIVE TUNAS FOR EXPORT

Slide 44

FRESH SASHIMI TUNA EATEN RAW

Slide 45

Slide 46



Slide 47

PROPER HANDLING OF TUNAS

- Handle aggressively to maintain freshness.

Slide 48

FROZEN GEL PACKS FOR COOLING TUNAS

Slide 49

ICE FOR SLUSHING TUNAS

Slide 50

CONSISTENT LIGHTING FOR GRADING

Slide 51

SALT FOR ICE SLUSH FOR COOLING TUNAS

Slide 52

ICING TUNAS

Slide 53

NEW TUNA LONGLINER

Slide 54

LONGLINERS WITH ICE BOX

Slide 55

TO PRESERVE FRESHNESS HANDLE PROPERLY AT THE POINT OF CAPTURE

Slide 56

KILL TUNA QUICKLY

Slide 57

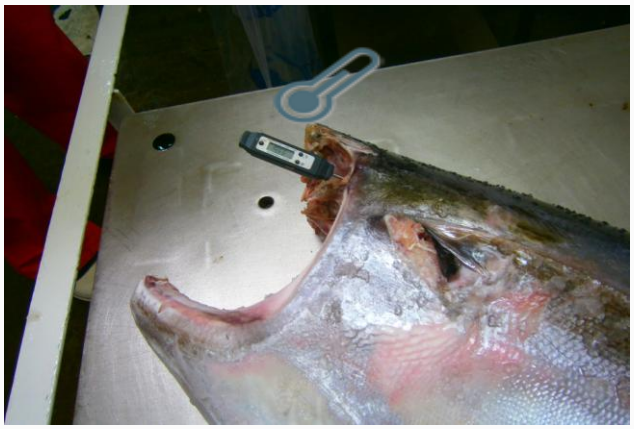
Slide 58

Slide 59

40 °F /4.4 °C)
TUNA NOT YET READY FOR SHIPPING

Slide 60

33.6 °F/ 0.8 °C TUNA READY FOR SHIPPING



Slide 61

FISH PROCESSOR MAKING TAIL CUT

Slide 62

TAIL CUT SAMPLE

Slide 63

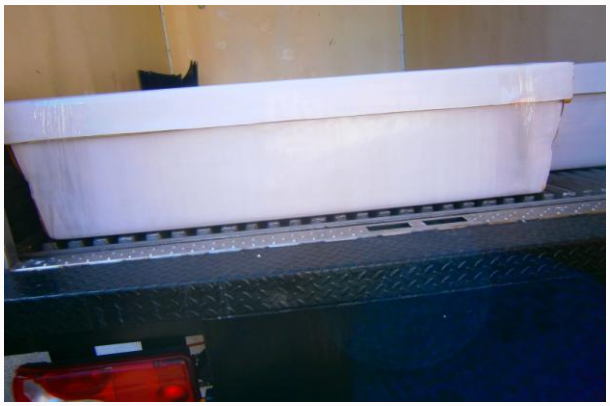
BOX WRAPPING MACHINE

Slide 64

TUNA BOXES

Slide 65

TUNA LEAVING IN BOXES FOR USA



Slide 66

GRENADA TUNAS OFF TO USA

Slide 67

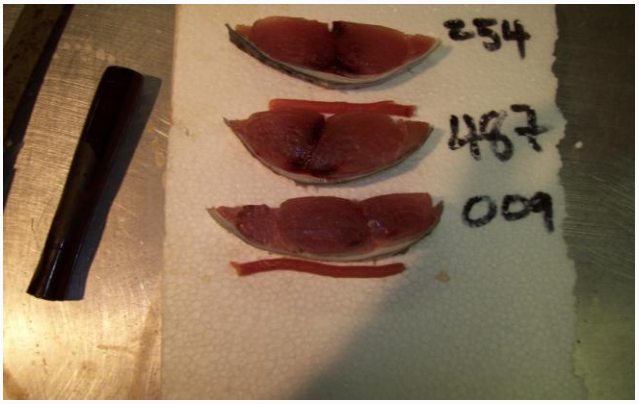
REMOVAL FROM BOXES IN USA

Slide 68

TAKING TAIL CUTS FOR GRADING

Slide 69

USING FLASHLIGHT TO GRADE TAIL CUTS



Slide 70

GRADING CORE SAMPLES

Slide 71

WASHING THE FISH

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CLEAN AND PREPARE BOX

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DOCUMENTING THE GRADES

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MOVING FISH INTO NEW BOX

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REPACKING FISH

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REPACKING TUNAS

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RE-ICING TUNAS

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SIFHL HACCP&SSOP INSPECTION

Slide 79

ALL TUBS, TANKS, BARRELS AND OTHER CONTAINERS FOR HANDLING FISH SHOULD BE OF NON- CORROSIVE MATERIAL AND EASY TO CLEAN.

Slide 80

MANAGER OF S.I.F.H.L. EXPLAINING TO SSOP HEALTH INSPECTOR

Slide 81

MANAGER JAMES NICHOLAS OF S.F.A. INC. WITH SANITATION&HYGIENE INSPECTORS

Slide 82

MANAGER NORDOM SEAFOODS LTD.WITH HACCP INSPECTORS

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CHEMICAL INSTRUMENTS TO MONITOR INDUSTRY

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LABORATORY EQUIPMENT AT P.C.L.

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HEAVY METAL DETECTOR

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GRENADA APPROVED TO EXPORT FISH TO EU

Slide 87

ST.JOHN'S FISHERFOLKS TRAINED IN POST-HARVEST TECHNOLOGY

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ST.MARK'S FISHERFOLKS IN TRAINING

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S.F.A.MANAGER EXPLAINS PLANT SANITATION PROCEDURES TO INSPECTORS

Slide 92

FISH WAS BLED THOROUGHLY AND QUICKLY.

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TAKING OF CORE SAMPLE FOR GRADING

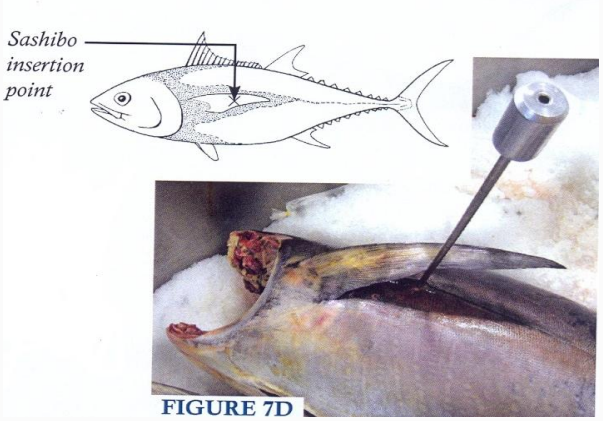

FIGURE 7D

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TAIL CUT

Cuts are made low enough to avoid compromising the yield.

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FISHERMEN EXAMINING CORE SAMPLE OF TUNAS

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CORE SAMPLE

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Sashibo inserted into the fish next to the dorsal fin, however, this could cause scoring or scratching of the loins.

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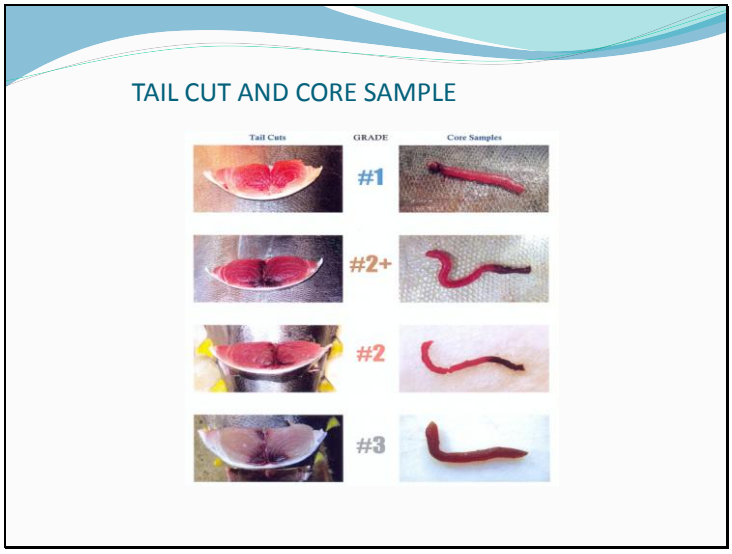

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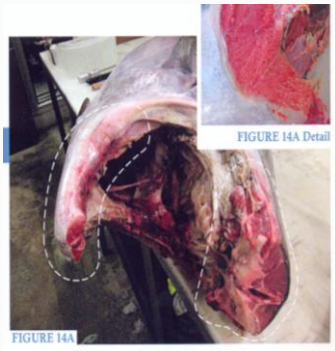
GRADING CORE SAMPLE IN THE LIGHT

Slide 102

FRESHNESS

In # 1 grade tuna, the collar, or nape, where the head has been removed, should appear as clean with no discoloration.

Figure 14A



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MEAT COLOR

The color of #1 tuna will be bright red, shiny and translucent like a red stop light.


FIGURE 17C

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FAT

The presence of the fat in the tail, just below the skin, is essential in determining #1 grade tuna.

FIGURE 16C

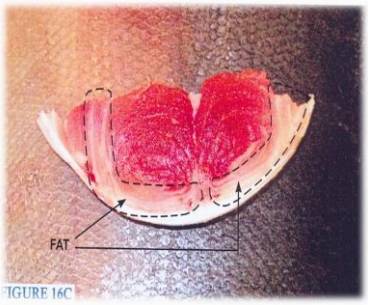

FIGURE 16C

Slide 105

FISHING VESSELS

Grenada has a fishing fleet of over 700 vessels.

- Over 180 commercial Tuna Long-liners.
- 87 large long-liners (30 – 60 feet)with Inboard engines: Ice hold and bait Well.
- 93 medium-size long-liners (24 – 29 feet) with cabin, outboard motor and bait well.
- 520 small vessels(under 24feet) with cabin,open deck pirogues outboard motor with and without bait well.

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FISHING GEARS

MAIN GEAR

- Surface long-line gear.

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SEASONALITY

- Fishing is conducted all through the year.
- November to June is the peak season for all fishing.
- July to October is the slow period.

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SPECIES

- Main Species targeted: Yellow Fin Tuna/ Thunnus Albacares.
- Other Species targeted: Marlin, Sail Fish, Mahi Mahi, Kingfish, Shark.

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REPRODUCTION AND LONGIVITY

- Yellow fin Tuna lives up to 5-8 years
- Female release 10 million eggs in one spawning season

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INFRASTRUCTURAL DEVELOPMENT

JAPANESE TECHNICAL ASSISTANCE:

- In 1991 a new fish market was built by Japanese in Gouyave
- In 1994 a new fish market was built in Grand Mal
- In 2001 a new fish market was built in Melville Street St. George's
- In 2004 a new fish market was built at Grenville in St. Andrews.
- In 2011 a new fisheries complex was built at Gouyave

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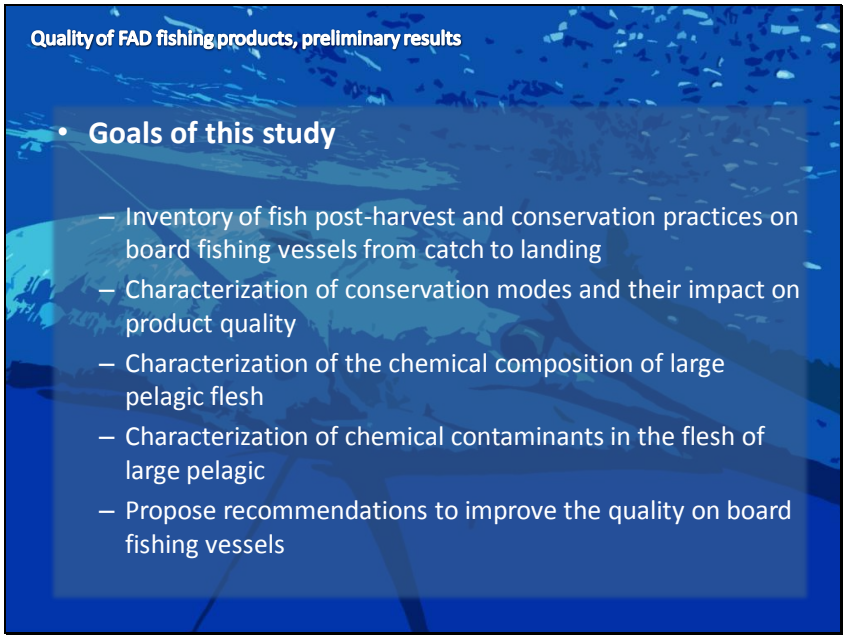
Quality of FAD Fishing Products: Preliminary results

Slide 1

Slide 2



Slide 3

Quality of FAD fishing products, preliminary results
Materials & methods

- **Implementation**

On board fishing vessels

– Fish surface temperature follow-up from catch to handling (Subcutaneous)

Blackfin tuna, Yellowfin tuna and Blue Marlin

Slide 4

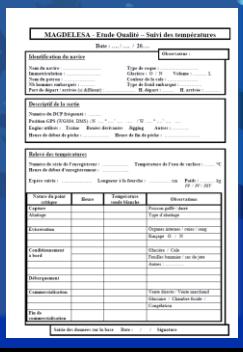
Quality of FAD fishing products, preliminary results
Materials & methods

- **Implementation**

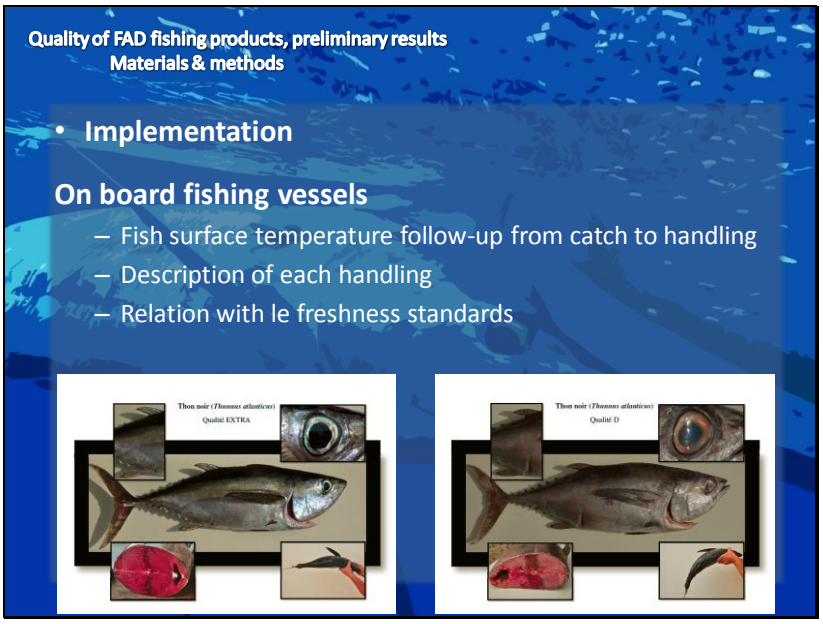
On board fishing vessels

– Fish surface temperature follow-up from catch to handling

– Description of each handling made by fisherman


MAGDELESA - Etude Qualité – Suivi des températures

Slide 5



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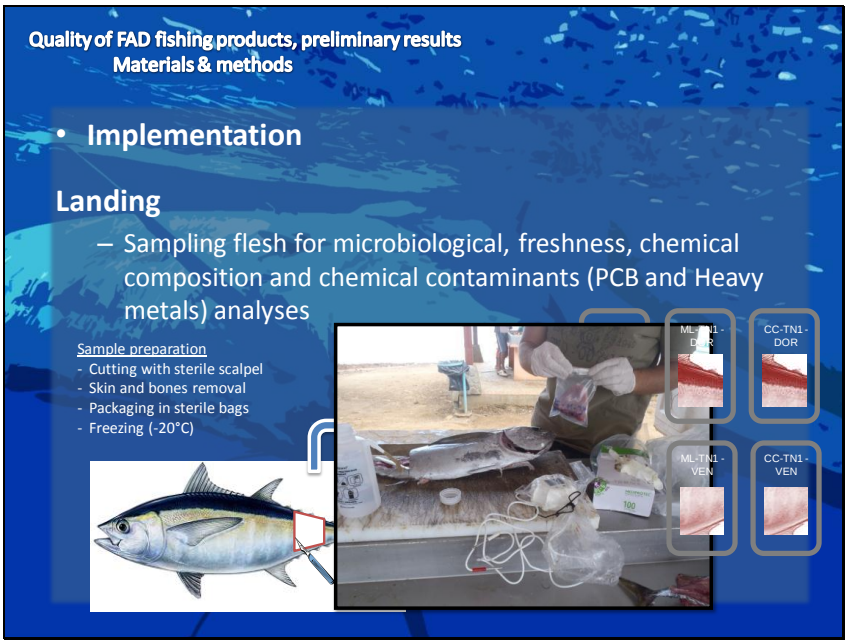

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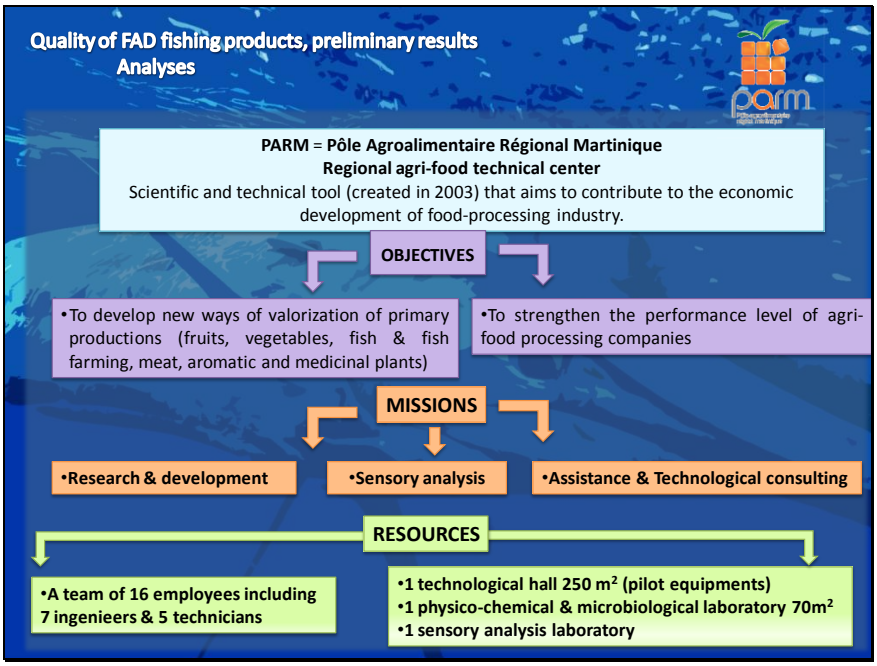

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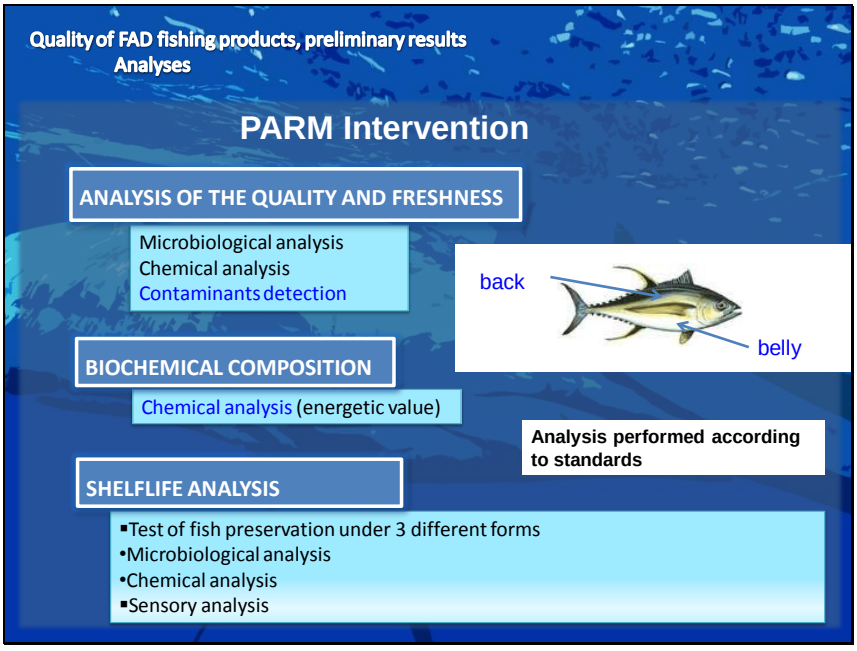

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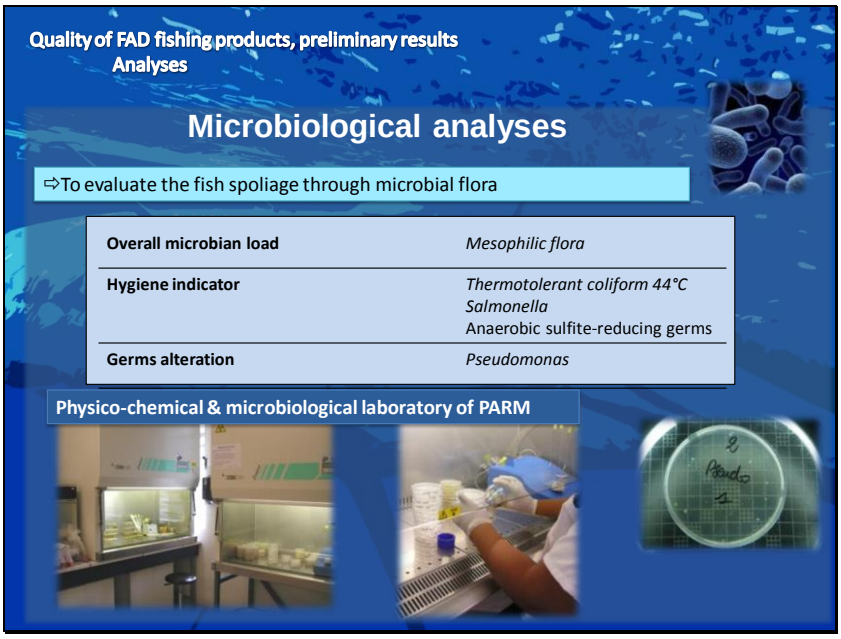

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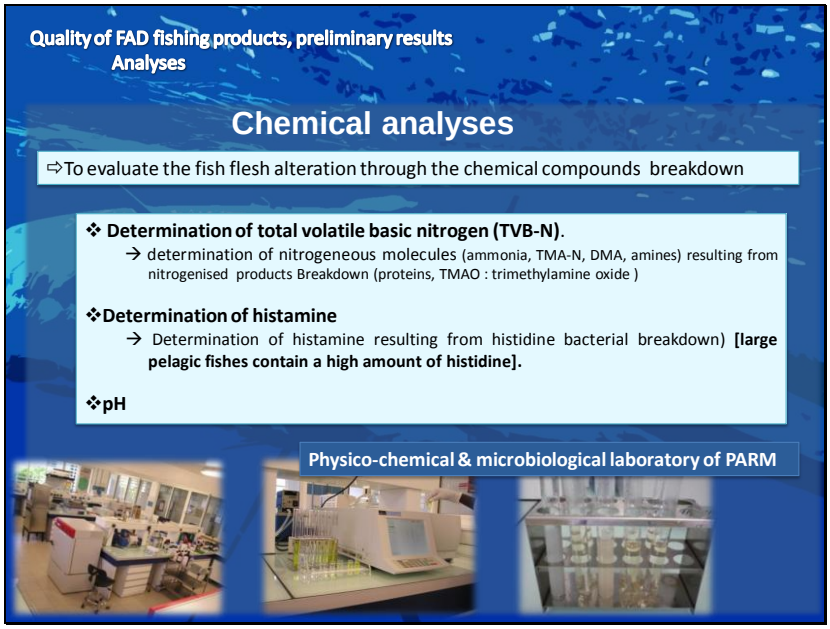

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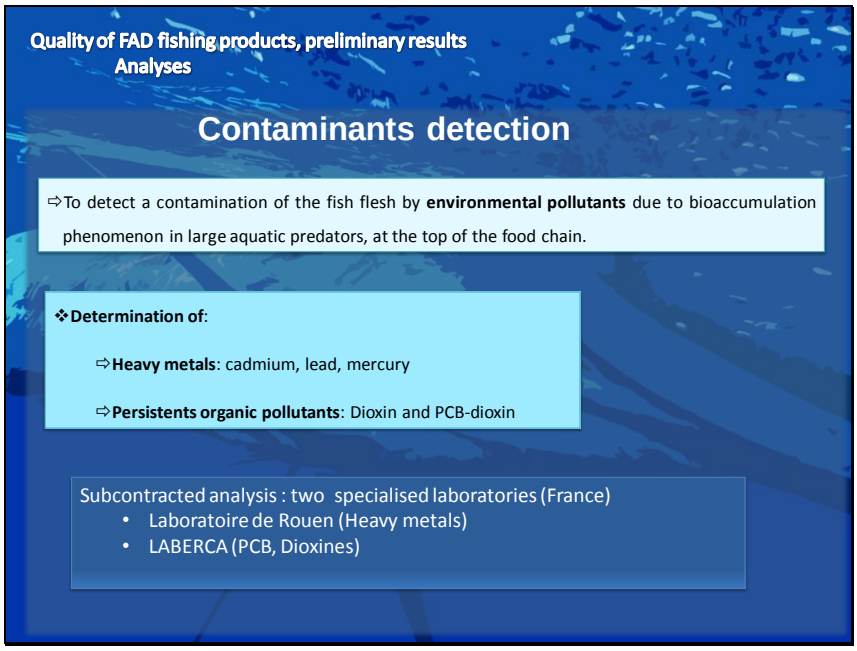

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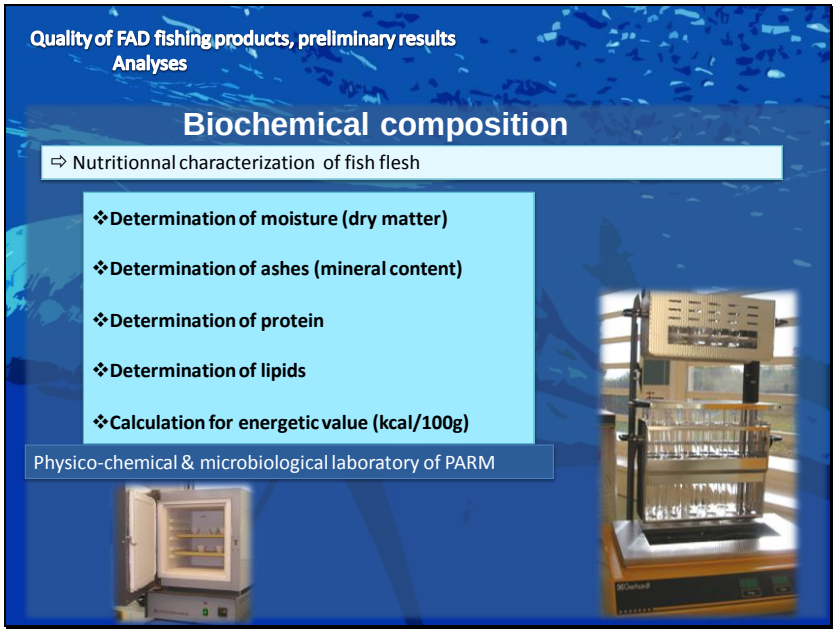

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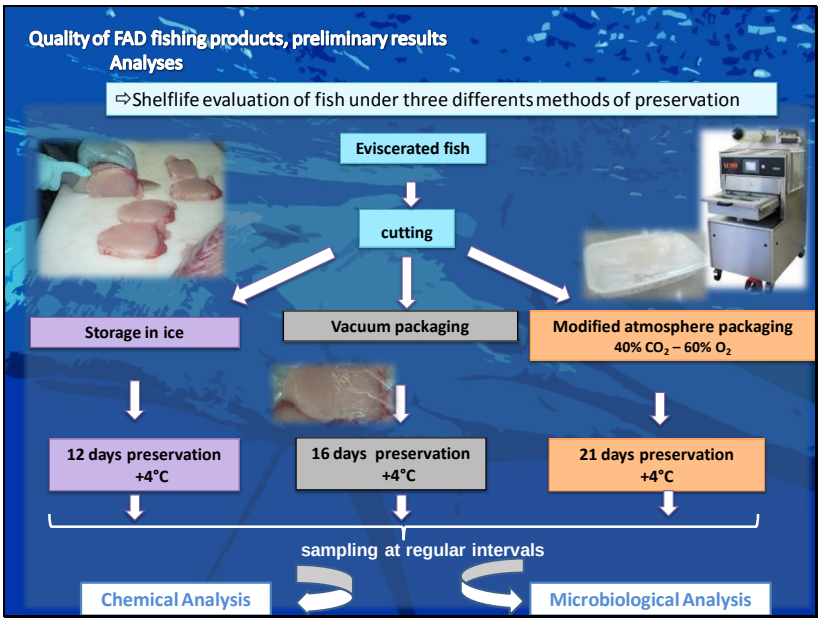

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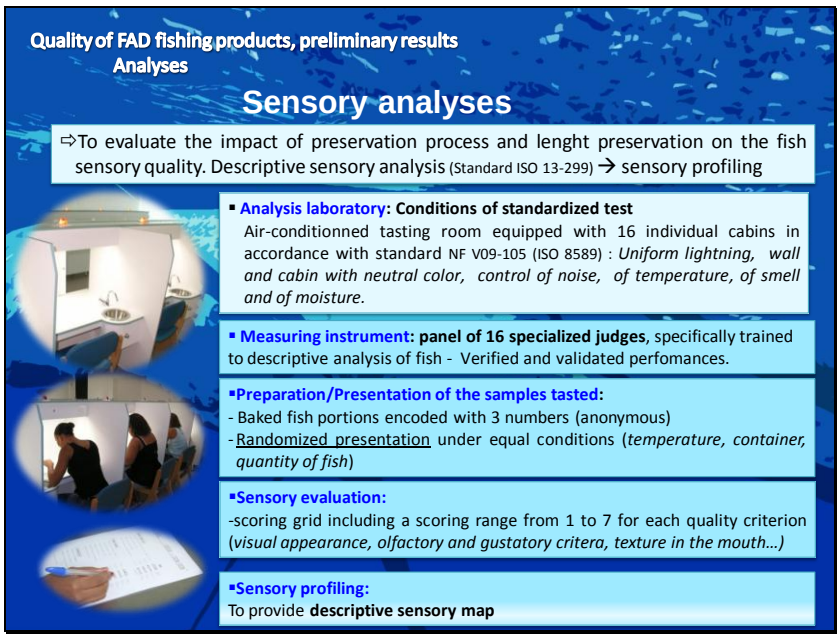

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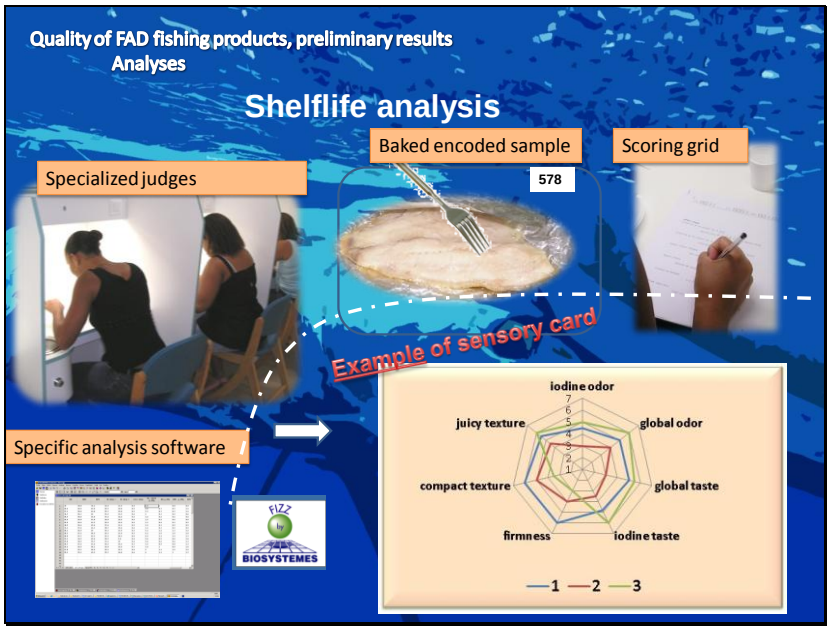

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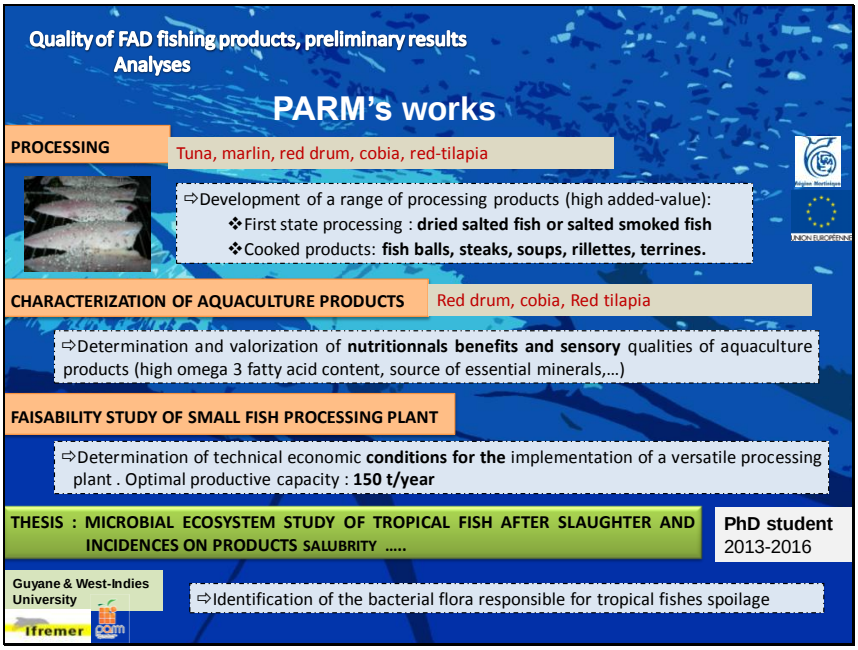

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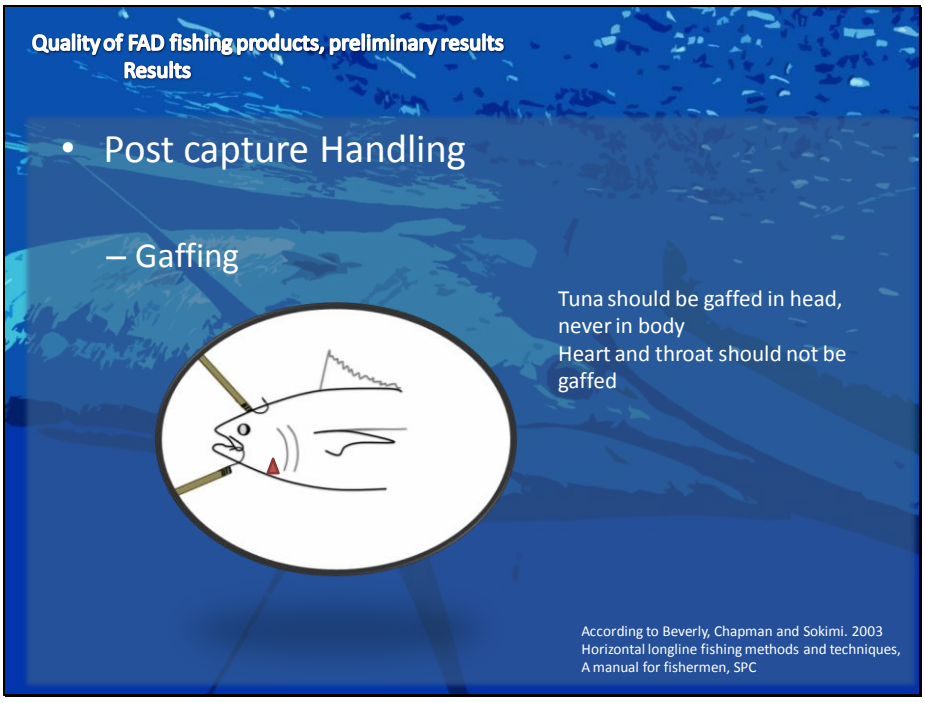

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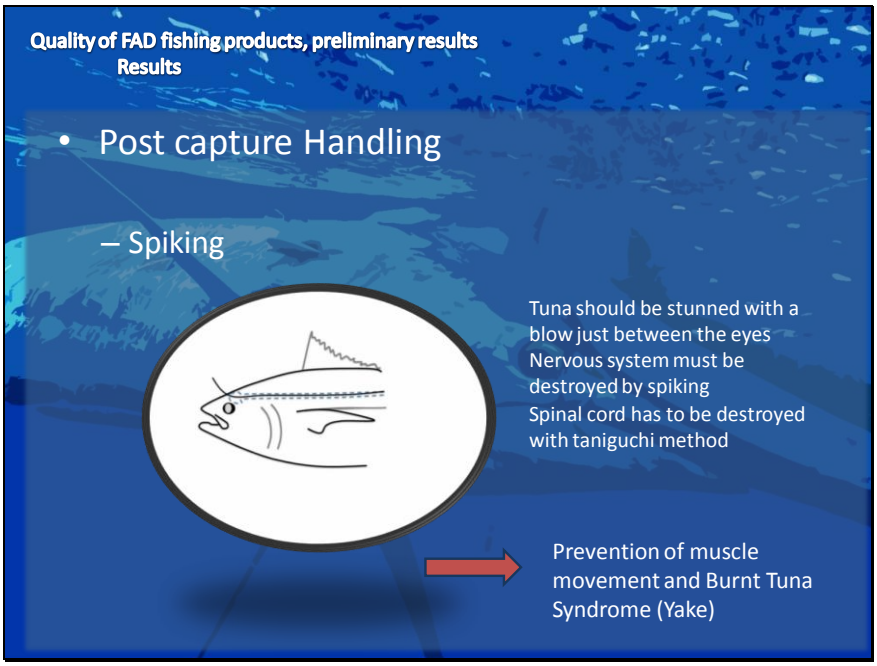

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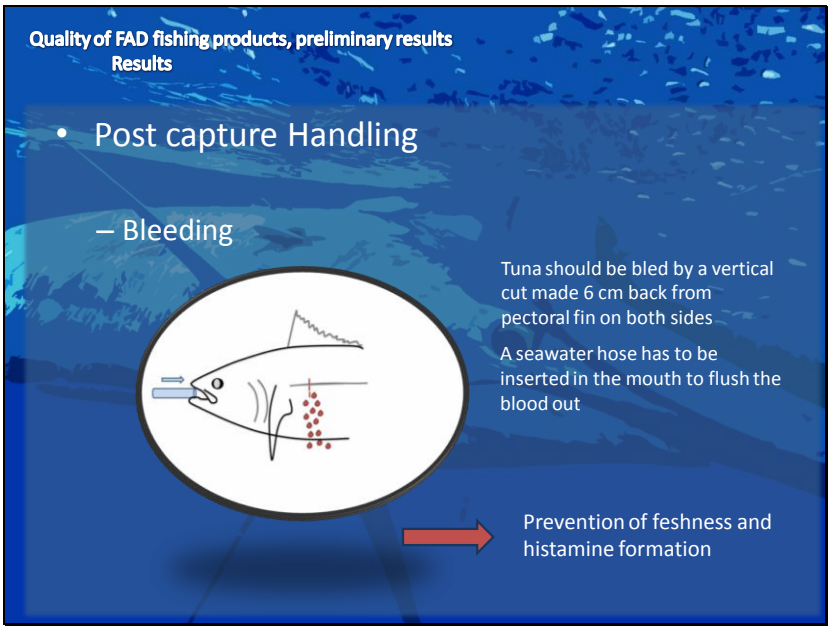

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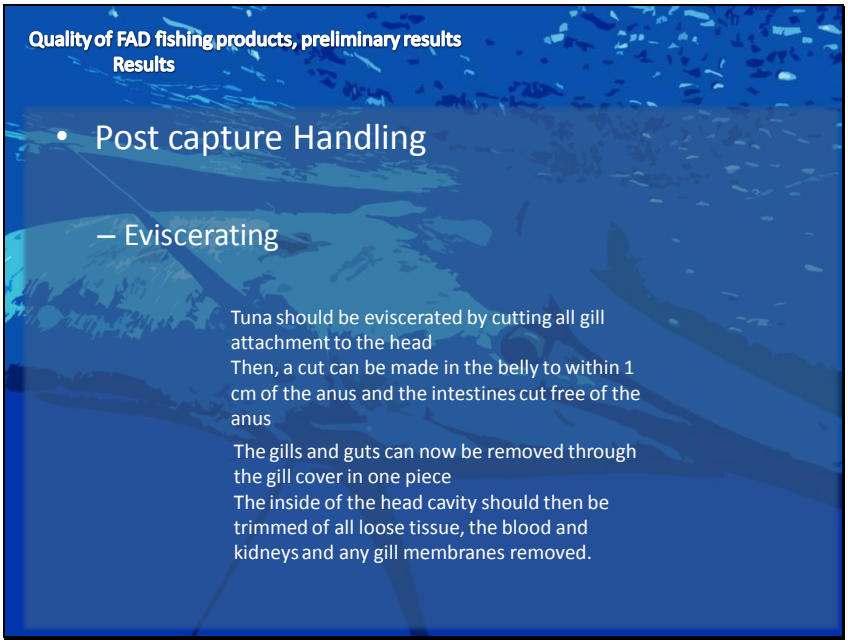

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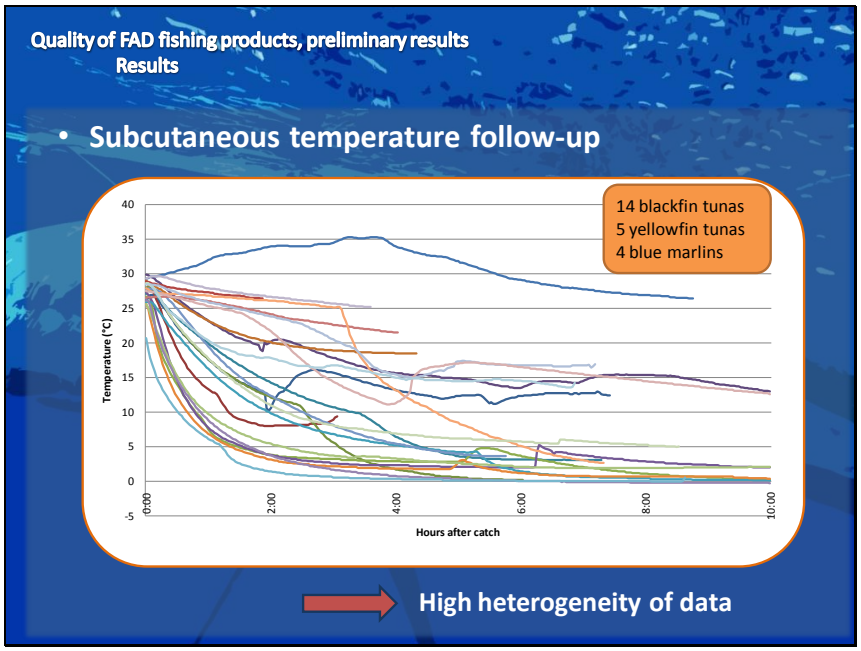

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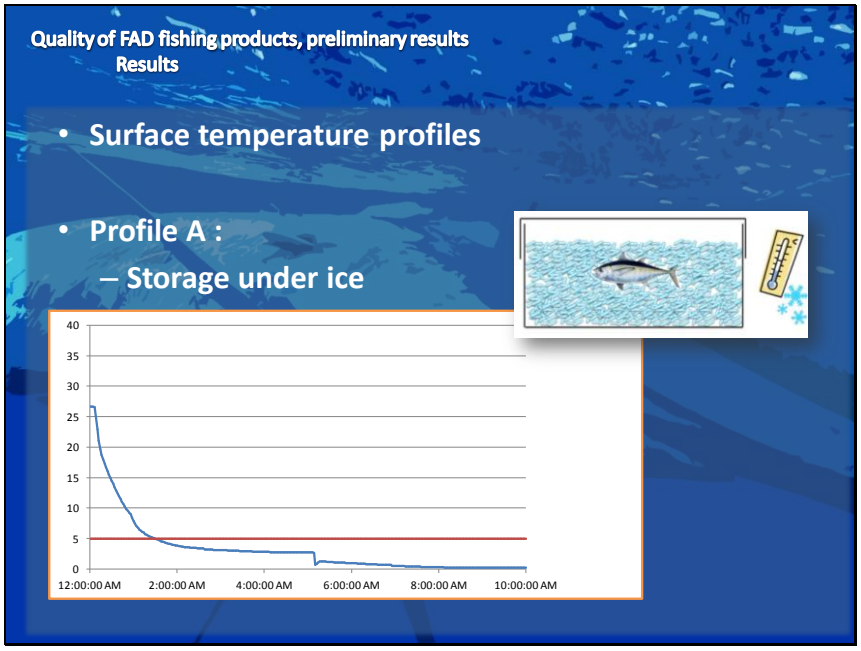

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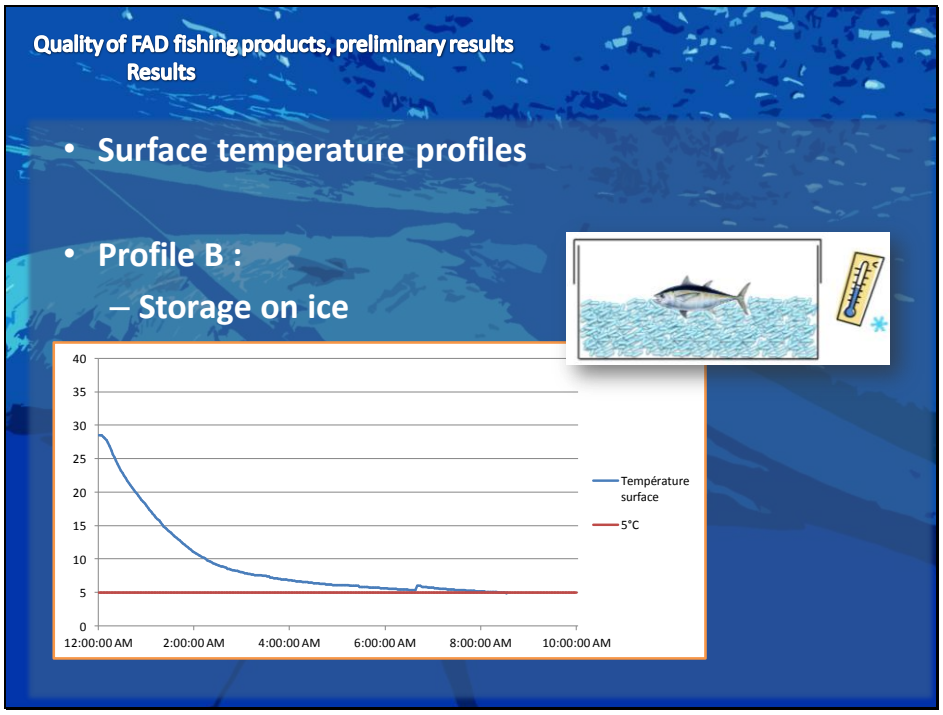

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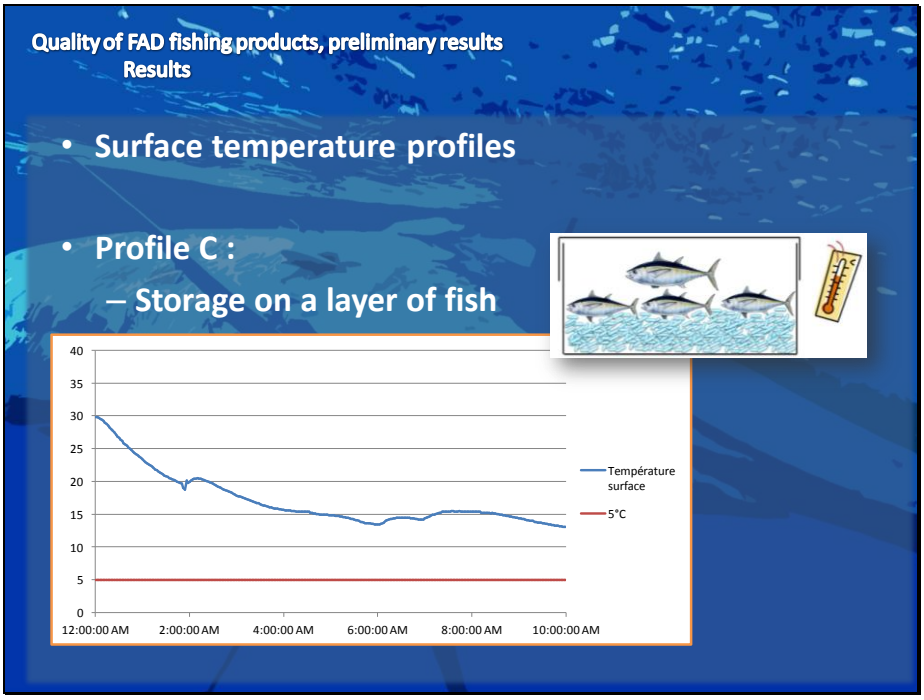

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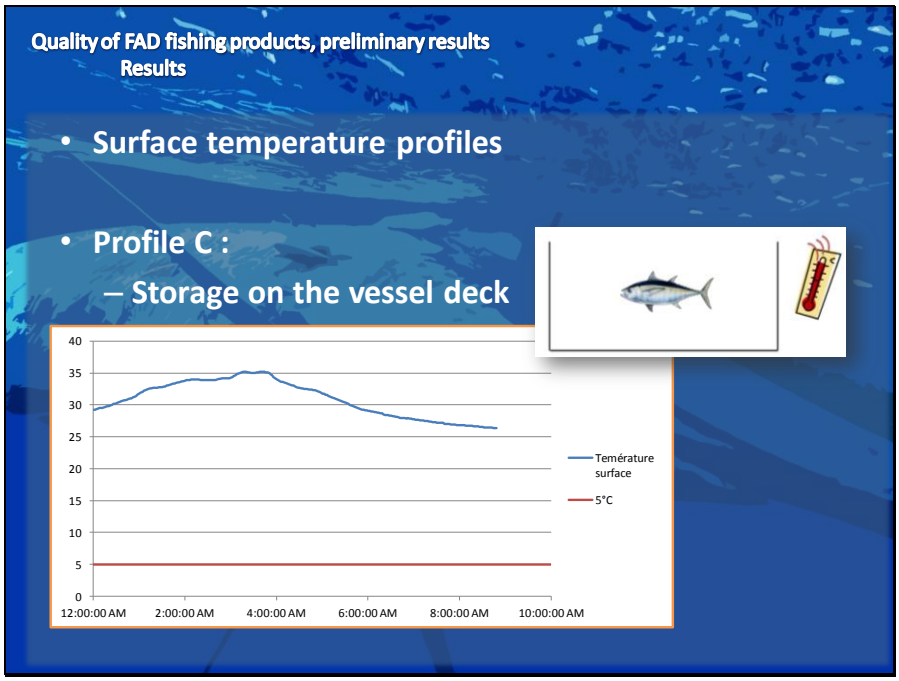

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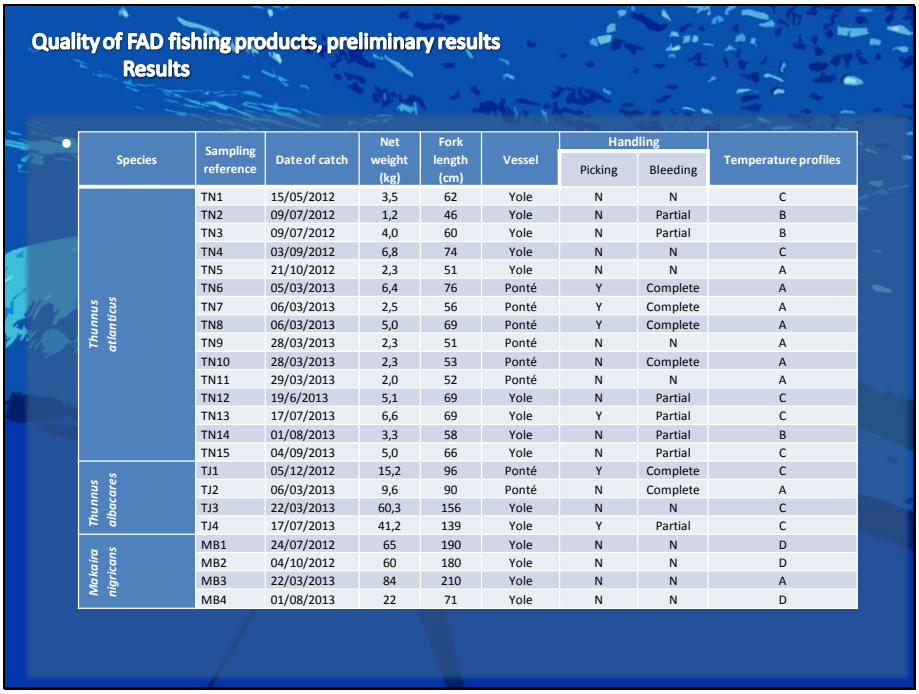

Species	Sampling reference	Date of catch	Net weight (kg)	Fork length (cm)	Vessel	Handling		Temperature profiles
						Picking	Bleeding	
Thunnus atlanticus	TN1	15/05/2012	3,5	62	Yole	N	N	C
	TN2	09/07/2012	1,2	46	Yole	N	Partial	B
	TN3	09/07/2012	4,0	60	Yole	N	Partial	B
	TN4	03/09/2012	6,8	74	Yole	N	N	C
	TN5	21/10/2012	2,3	51	Yole	N	N	A
	TN6	05/03/2013	6,4	76	Ponté	Y	Complete	A
	TN7	06/03/2013	2,5	56	Ponté	Y	Complete	A
	TN8	06/03/2013	5,0	69	Ponté	Y	Complete	A
	TN9	28/03/2013	2,3	51	Ponté	N	N	A
	TN10	28/03/2013	2,3	53	Ponté	N	Complete	A
	TN11	29/03/2013	2,0	52	Ponté	N	N	A
	TN12	19/6/2013	5,1	69	Yole	N	Partial	C
	TN13	17/07/2013	6,6	69	Yole	Y	Partial	C
	TN14	01/08/2013	3,3	58	Yole	N	Partial	B
	TN15	04/09/2013	5,0	66	Yole	N	Partial	C
Thunnus albacares	TJ1	05/12/2012	15,2	96	Ponté	Y	Complete	C
	TJ2	06/03/2013	9,6	90	Ponté	N	Complete	A
	TJ3	22/03/2013	60,3	156	Yole	N	N	C
	TJ4	17/07/2013	41,2	139	Yole	Y	Partial	C
Makaira nigricans	MB1	24/07/2012	65	190	Yole	N	N	D
	MB2	04/10/2012	60	180	Yole	N	N	D
	MB3	22/03/2013	84	210	Yole	N	N	A
	MB4	01/08/2013	22	71	Yole	N	N	D

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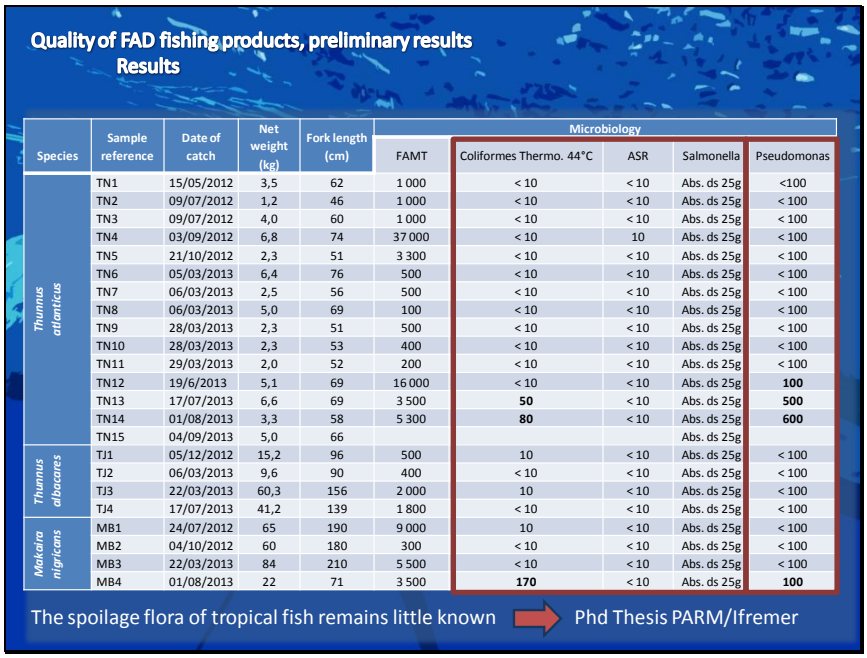

Species	Sample reference	Date of catch	Net weight (kg)	Fork length (cm)	Microbiology				
					FAMT	Coliformes Thermo. 44°C	ASR	Salmonella	Pseudomonas
Thunnus atlanticus	TN1	15/05/2012	3,5	62	1 000	< 10	< 10	Abs. ds 25g	<100
	TN2	09/07/2012	1,2	46	1 000	< 10	< 10	Abs. ds 25g	< 100
	TN3	09/07/2012	4,0	60	1 000	< 10	< 10	Abs. ds 25g	< 100
	TN4	03/09/2012	6,8	74	37 000	< 10	10	Abs. ds 25g	< 100
	TN5	21/10/2012	2,3	51	3 300	< 10	< 10	Abs. ds 25g	< 100
	TN6	05/03/2013	6,4	76	500	< 10	< 10	Abs. ds 25g	< 100
	TN7	06/03/2013	2,5	56	500	< 10	< 10	Abs. ds 25g	< 100
	TN8	06/03/2013	5,0	69	100	< 10	< 10	Abs. ds 25g	< 100
	TN9	28/03/2013	2,3	51	500	< 10	< 10	Abs. ds 25g	< 100
	TN10	28/03/2013	2,3	53	400	< 10	< 10	Abs. ds 25g	< 100
	TN11	29/03/2013	2,0	52	200	< 10	< 10	Abs. ds 25g	< 100
	TN12	19/6/2013	5,1	69	16 000	< 10	< 10	Abs. ds 25g	**100**
	TN13	17/07/2013	6,6	69	3 500	**50**	< 10	Abs. ds 25g	**500**
	TN14	01/08/2013	3,3	58	5 300	**80**	< 10	Abs. ds 25g	**600**
	TN15	04/09/2013	5,0	66				Abs. ds 25g	
Thunnus albacares	TJ1	05/12/2012	15,2	96	500	10	< 10	Abs. ds 25g	< 100
	TJ2	06/03/2013	9,6	90	400	< 10	< 10	Abs. ds 25g	< 100
	TJ3	22/03/2013	60,3	156	2 000	10	< 10	Abs. ds 25g	< 100
	TJ4	17/07/2013	41,2	139	1 800	< 10	< 10	Abs. ds 25g	< 100
Makaira nigricans	MB1	24/07/2012	65	190	9 000	10	< 10	Abs. ds 25g	< 100
	MB2	04/10/2012	60	180	300	< 10	< 10	Abs. ds 25g	< 100
	MB3	22/03/2013	84	210	5 500	< 10	< 10	Abs. ds 25g	< 100
	MB4	01/08/2013	22	71	3 500	**170**	< 10	Abs. ds 25g	**100**

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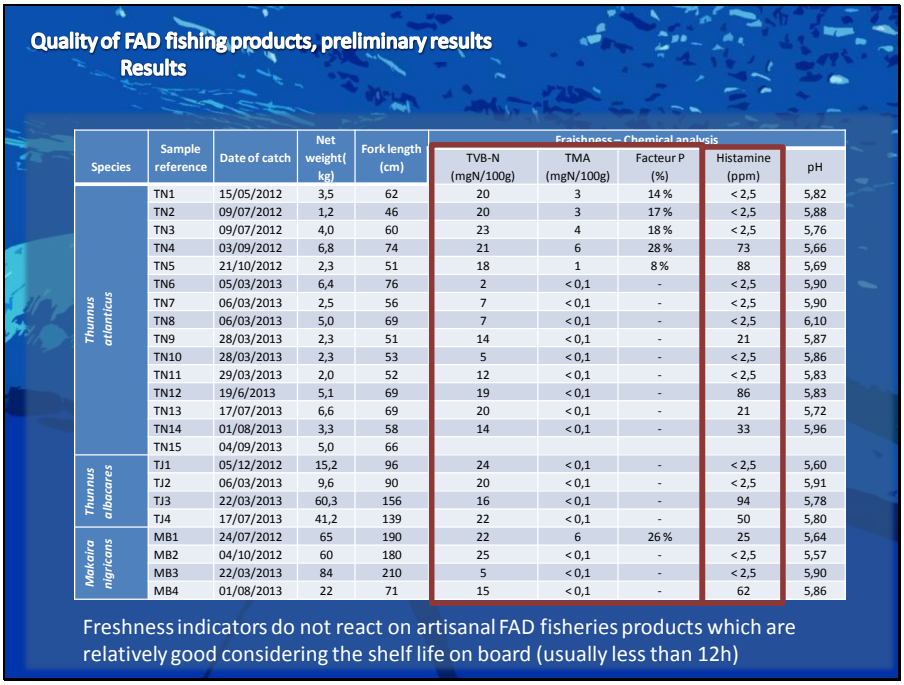

Species	Sample reference	Date of catch	Net weight(kg)	Fork length (cm)	Fraishness – Chemical analysis				
					TVB-N (mgN/100g)	TMA (mgN/100g)	Facteur P (%)	Histamine (ppm)	pH
Thunnus atlanticus	TN1	15/05/2012	3,5	62	20	3	14 %	< 2,5	5,82
	TN2	09/07/2012	1,2	46	20	3	17 %	< 2,5	5,88
	TN3	09/07/2012	4,0	60	23	4	18 %	< 2,5	5,76
	TN4	03/09/2012	6,8	74	21	6	28 %	73	5,66
	TN5	21/10/2012	2,3	51	18	1	8 %	88	5,69
	TN6	05/03/2013	6,4	76	2	< 0,1	-	< 2,5	5,90
	TN7	06/03/2013	2,5	56	7	< 0,1	-	< 2,5	5,90
	TN8	06/03/2013	5,0	69	7	< 0,1	-	< 2,5	6,10
	TN9	28/03/2013	2,3	51	14	< 0,1	-	21	5,87
	TN10	28/03/2013	2,3	53	5	< 0,1	-	< 2,5	5,86
	TN11	29/03/2013	2,0	52	12	< 0,1	-	< 2,5	5,83
	TN12	19/6/2013	5,1	69	19	< 0,1	-	86	5,83
	TN13	17/07/2013	6,6	69	20	< 0,1	-	21	5,72
	TN14	01/08/2013	3,3	58	14	< 0,1	-	33	5,96
	TN15	04/09/2013	5,0	66					
Thunnus albacares	TJ1	05/12/2012	15,2	96	24	< 0,1	-	< 2,5	5,60
	TJ2	06/03/2013	9,6	90	20	< 0,1	-	< 2,5	5,91
	TJ3	22/03/2013	60,3	156	16	< 0,1	-	94	5,78
	TJ4	17/07/2013	41,2	139	22	< 0,1	-	50	5,80
Makaira nigricans	MB1	24/07/2012	65	190	22	6	26 %	25	5,64
	MB2	04/10/2012	60	180	25	< 0,1	-	< 2,5	5,57
	MB3	22/03/2013	84	210	5	< 0,1	-	< 2,5	5,90
	MB4	01/08/2013	22	71	15	< 0,1	-	62	5,86

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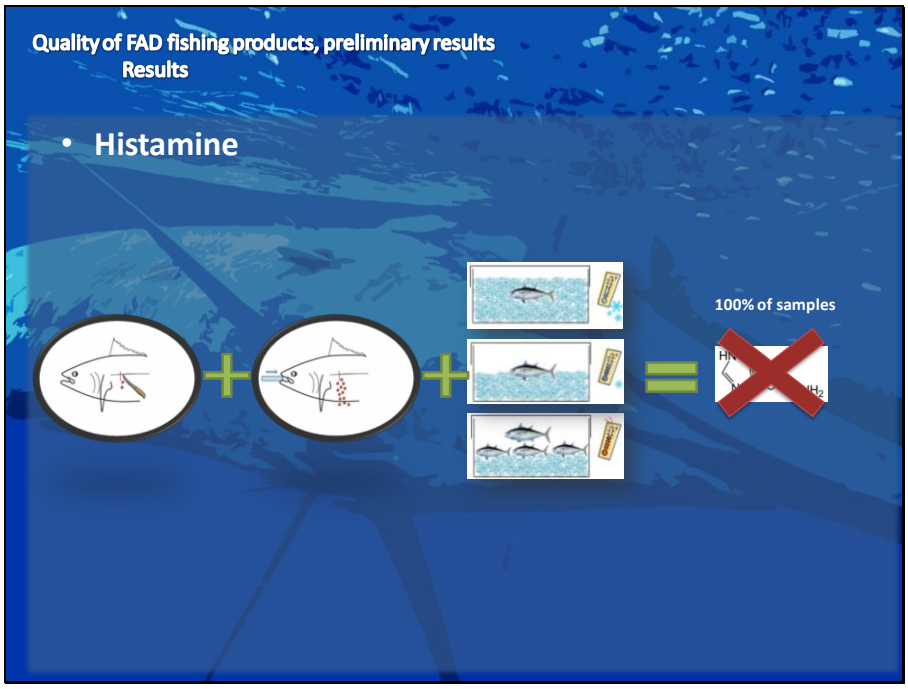

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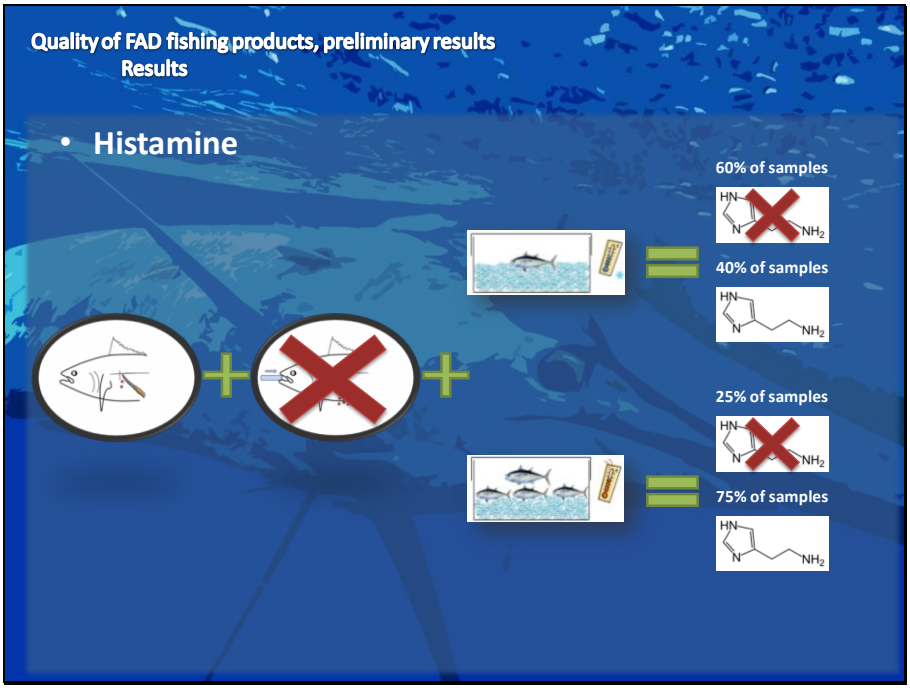

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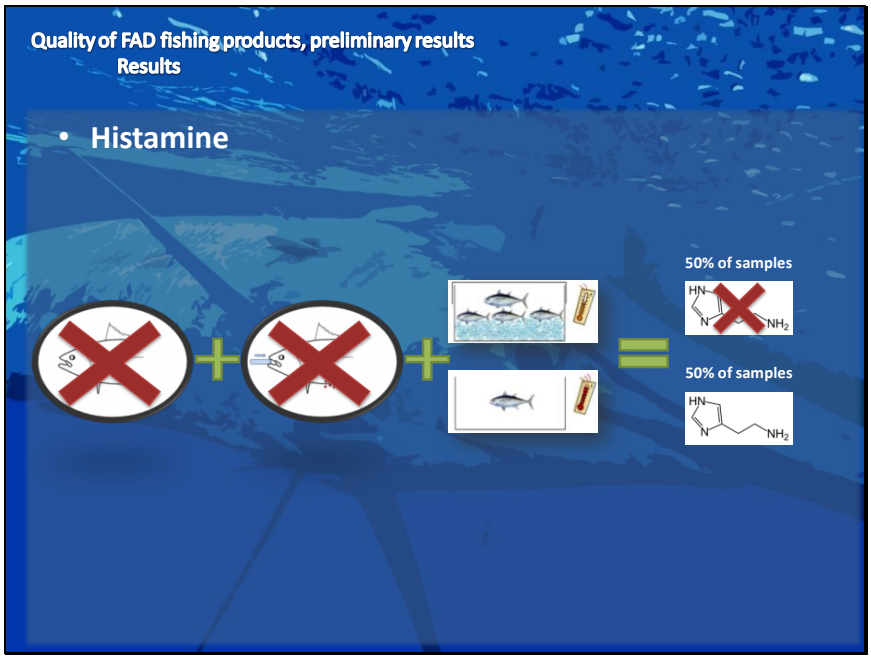
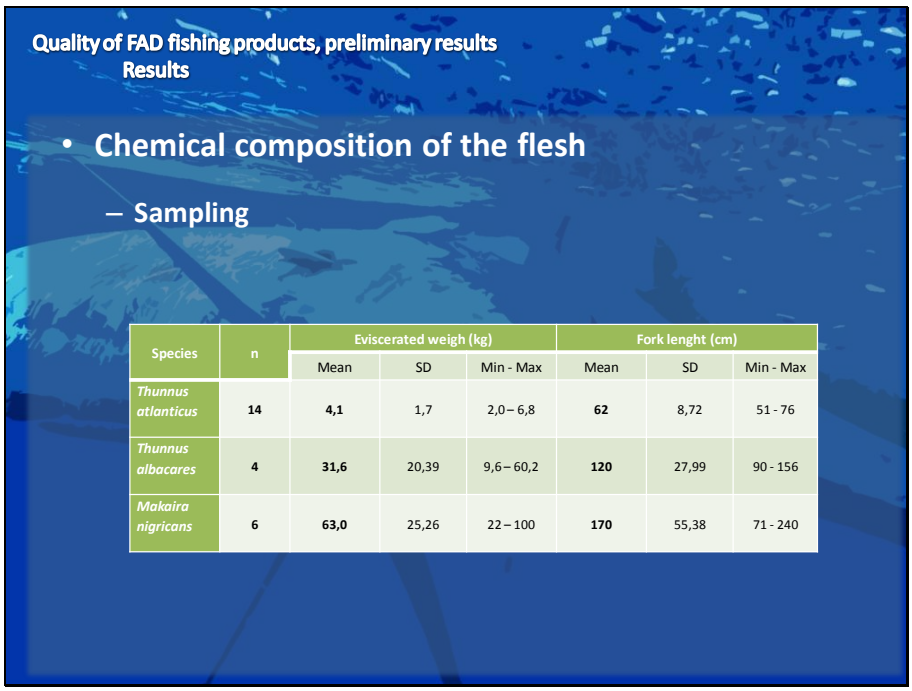
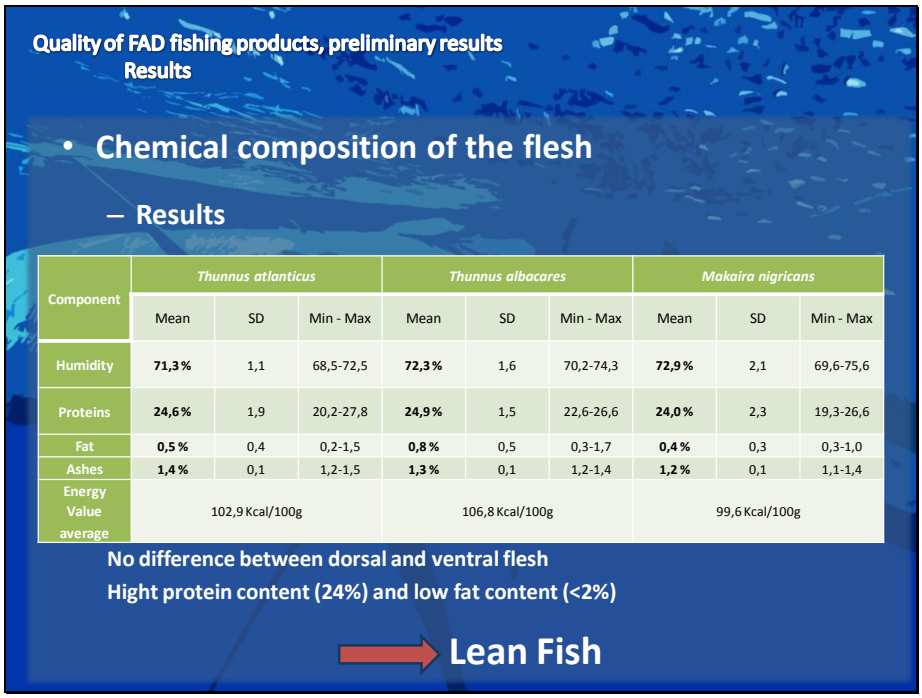


Slide 34



Species	n	Eviscerated weigh (kg)			Fork lenght (cm)		
		Mean	SD	Min - Max	Mean	SD	Min - Max
Thunnus atlanticus	**14**	**4,1**	1,7	2,0 – 6,8	**62**	8,72	51 - 76
Thunnus albacares	**4**	**31,6**	20,39	9,6 – 60,2	**120**	27,99	90 - 156
Makaira nigricans	**6**	**63,0**	25,26	22 – 100	**170**	55,38	71 - 240

Slide 35



Component	*Thunnus atlanticus*			*Thunnus albacares*			*Makaira nigricans*		
	Mean	SD	Min - Max	Mean	SD	Min - Max	Mean	SD	Min - Max
Humidity	**71,3 %**	1,1	68,5-72,5	**72,3 %**	1,6	70,2-74,3	**72,9 %**	2,1	69,6-75,6
Proteins	**24,6 %**	1,9	20,2-27,8	**24,9 %**	1,5	22,6-26,6	**24,0 %**	2,3	19,3-26,6
Fat	**0,5 %**	0,4	0,2-1,5	**0,8 %**	0,5	0,3-1,7	**0,4 %**	0,3	0,3-1,0
Ashes	**1,4 %**	0,1	1,2-1,5	**1,3 %**	0,1	1,2-1,4	**1,2 %**	0,1	1,1-1,4
Energy Value average	102,9 Kcal/100g			106,8 Kcal/100g			99,6 Kcal/100g		

No difference between dorsal and ventral flesh

Hight protein content (<2%)

→ Lean Fish

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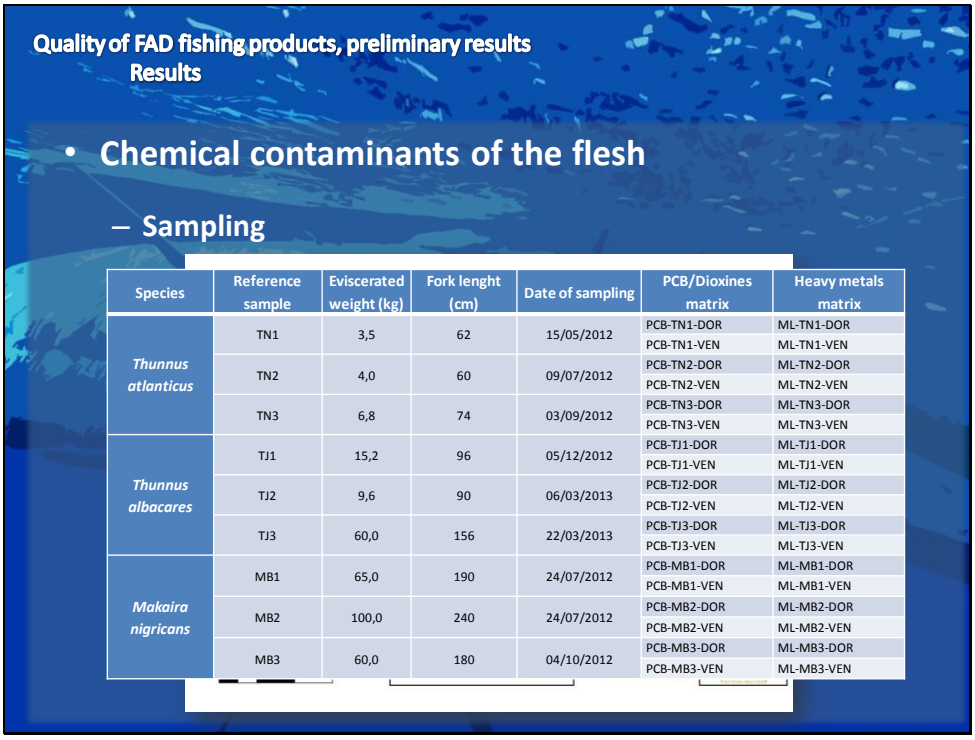

Species	Reference sample	Eviscerated weight (kg)	Fork lenght (cm)	Date of sampling	PCB/Dioxines matrix	Heavy metals matrix
Thunnus atlanticus	TN1	3,5	62	15/05/2012	PCB-TN1-DOR	ML-TN1-DOR
					PCB-TN1-VEN	ML-TN1-VEN
	TN2	4,0	60	09/07/2012	PCB-TN2-DOR	ML-TN2-DOR
					PCB-TN2-VEN	ML-TN2-VEN
	TN3	6,8	74	03/09/2012	PCB-TN3-DOR	ML-TN3-DOR
					PCB-TN3-VEN	ML-TN3-VEN
Thunnus albacares	TJ1	15,2	96	05/12/2012	PCB-TJ1-DOR	ML-TJ1-DOR
					PCB-TJ1-VEN	ML-TJ1-VEN
	TJ2	9,6	90	06/03/2013	PCB-TJ2-DOR	ML-TJ2-DOR
					PCB-TJ2-VEN	ML-TJ2-VEN
	TJ3	60,0	156	22/03/2013	PCB-TJ3-DOR	ML-TJ3-DOR
					PCB-TJ3-VEN	ML-TJ3-VEN
Makaira nigricans	MB1	65,0	190	24/07/2012	PCB-MB1-DOR	ML-MB1-DOR
					PCB-MB1-VEN	ML-MB1-VEN
	MB2	100,0	240	24/07/2012	PCB-MB2-DOR	ML-MB2-DOR
					PCB-MB2-VEN	ML-MB2-VEN
	MB3	60,0	180	04/10/2012	PCB-MB3-DOR	ML-MB3-DOR
					PCB-MB3-VEN	ML-MB3-VEN

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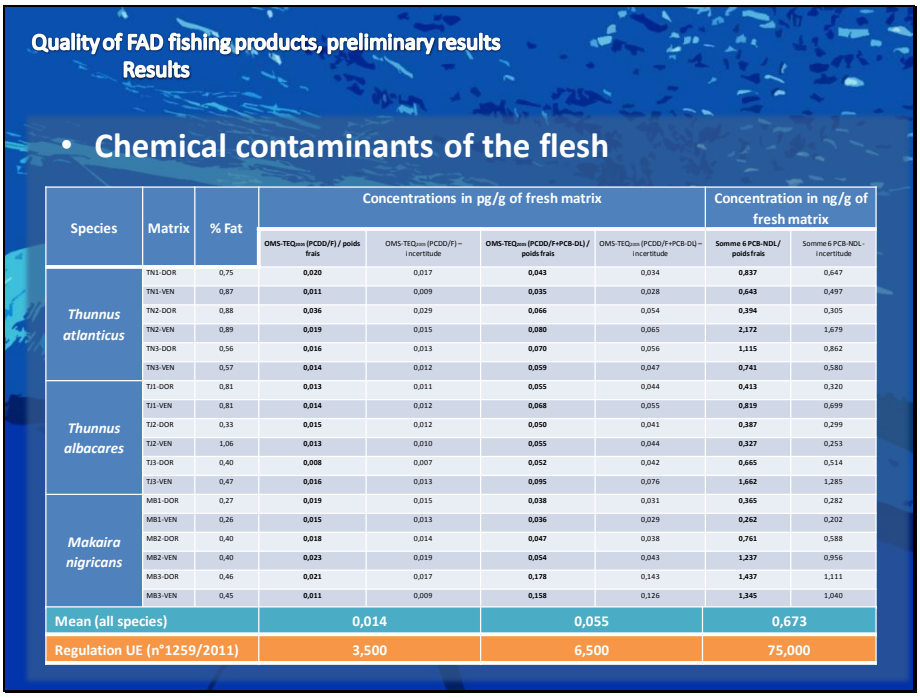
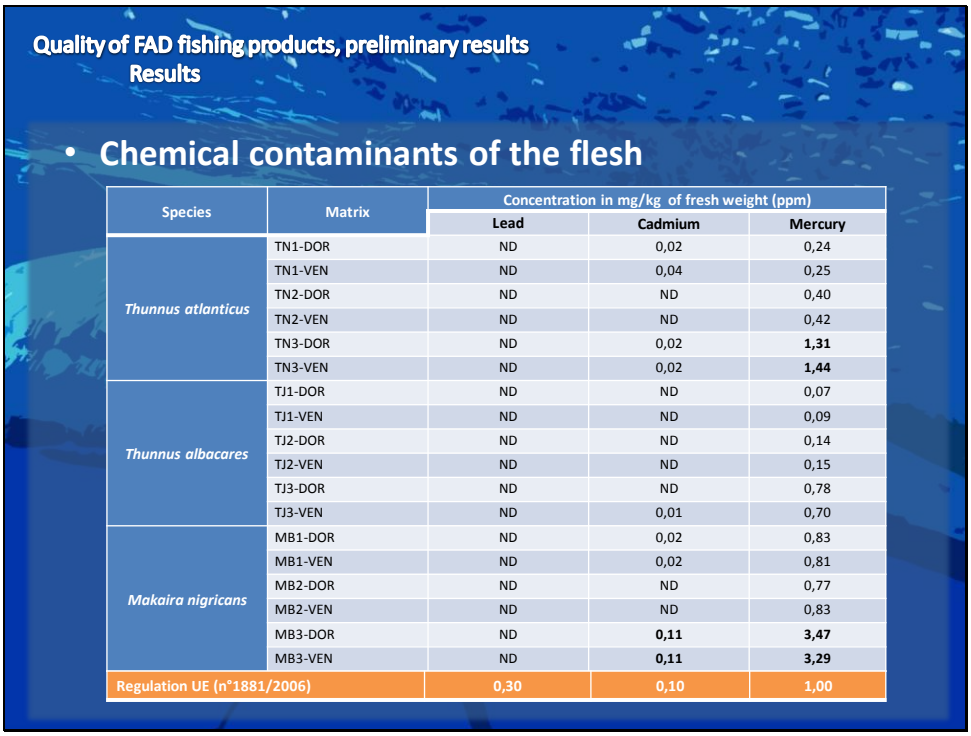


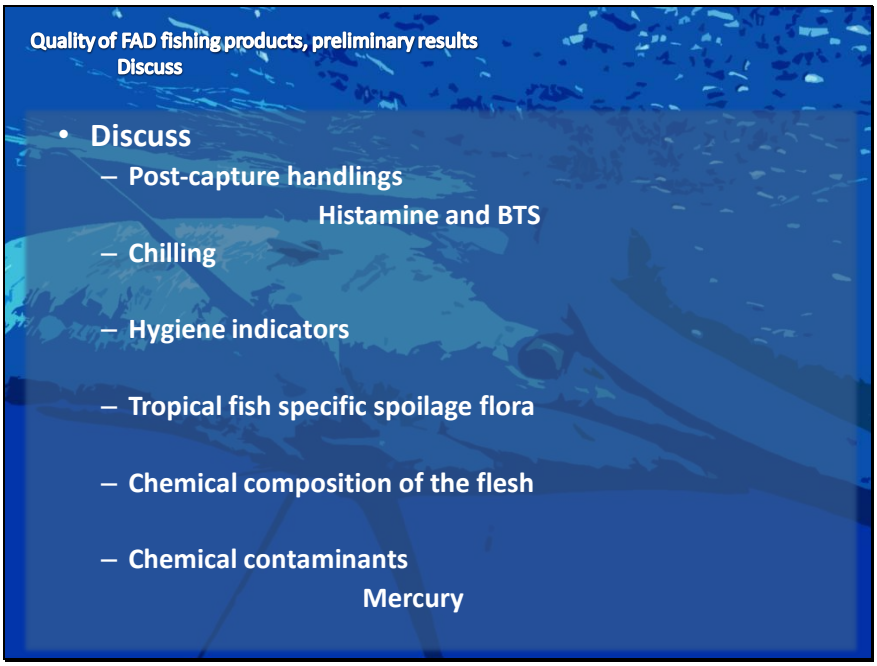
Species	Matrix	% Fat	Concentrations in pg/g of fresh matrix				Concentration in ng/g of fresh matrix	
			OMS-TEQ$_{2005}$ (PCDD/F) / poids frais	OMS-TEQ$_{2005}$ (PCDD/F) – incertitude	OMS-TEQ$_{2005}$ (PCDD/F+PCB-DL) / poids frais	OMS-TEQ$_{2005}$ (PCDD/F+PCB-DL) – incertitude	Somme 6 PCB-NDL/ poids frais	Somme 6 PCB-NDL - incertitude
Thunnus atlanticus	TN1-DOR	0,75	**0,020**	0,017	**0,043**	0,034	**0,837**	0,647
	TN1-VEN	0,87	**0,011**	0,009	**0,035**	0,028	**0,643**	0,497
	TN2-DOR	0,88	**0,036**	0,029	**0,066**	0,054	**0,394**	0,305
	TN2-VEN	0,89	**0,019**	0,015	**0,080**	0,065	**2,172**	1,679
	TN3-DOR	0,56	**0,016**	0,013	**0,070**	0,056	**1,115**	0,862
	TN3-VEN	0,57	**0,014**	0,012	**0,059**	0,047	**0,741**	0,580
Thunnus albacares	TJ1-DOR	0,81	**0,013**	0,011	**0,055**	0,044	**0,413**	0,320
	TJ1-VEN	0,81	**0,014**	0,012	**0,068**	0,055	**0,819**	0,699
	TJ2-DOR	0,33	**0,015**	0,012	**0,050**	0,041	**0,387**	0,299
	TJ2-VEN	1,06	**0,013**	0,010	**0,055**	0,044	**0,327**	0,253
	TJ3-DOR	0,40	**0,008**	0,007	**0,052**	0,042	**0,665**	0,514
	TJ3-VEN	0,47	**0,016**	0,013	**0,095**	0,076	**1,662**	1,285
Makaira nigricans	MB1-DOR	0,27	**0,019**	0,015	**0,038**	0,031	**0,365**	0,282
	MB1-VEN	0,26	**0,015**	0,013	**0,036**	0,029	**0,262**	0,202
	MB2-DOR	0,40	**0,018**	0,014	**0,047**	0,038	**0,761**	0,588
	MB2-VEN	0,40	**0,023**	0,019	**0,054**	0,043	**1,237**	0,956
	MB3-DOR	0,46	**0,021**	0,017	**0,178**	0,143	**1,437**	1,111
	MB3-VEN	0,45	**0,011**	0,009	**0,158**	0,126	**1,345**	1,040
Mean (all species)			0,014		0,055		0,673	
Regulation UE (n°1259/2011)			3,500		6,500		75,000	

Slide 38



Species	Matrix	Concentration in mg/kg of fresh weight (ppm)		
		Lead	Cadmium	Mercury
Thunnus atlanticus	TN1-DOR	ND	0,02	0,24
	TN1-VEN	ND	0,04	0,25
	TN2-DOR	ND	ND	0,40
	TN2-VEN	ND	ND	0,42
	TN3-DOR	ND	0,02	**1,31**
	TN3-VEN	ND	0,02	**1,44**
Thunnus albacares	TJ1-DOR	ND	ND	0,07
	TJ1-VEN	ND	ND	0,09
	TJ2-DOR	ND	ND	0,14
	TJ2-VEN	ND	ND	0,15
	TJ3-DOR	ND	ND	0,78
	TJ3-VEN	ND	0,01	0,70
Makaira nigricans	MB1-DOR	ND	0,02	0,83
	MB1-VEN	ND	0,02	0,81
	MB2-DOR	ND	ND	0,77
	MB2-VEN	ND	ND	0,83
	MB3-DOR	ND	**0,11**	**3,47**
	MB3-VEN	ND	**0,11**	**3,29**
Regulation UE (n°1881/2006)		0,30	0,10	1,00

Slide 39



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Quality of FAD fishing products, preliminary results
Thank for your attention
Pole Agroalimentaire Régional Martinique
Tel : +596 596 42 12 78
Website : www.parm.asso.fr
E-mail : eugene@parm.asso.fr
Impact MER
Between sea and land, independent consultants
in environnement and development
Tel : +596 596 63 31 35
Website : www.impact-mer.fr/en
E-mail : cdromer@impact-mer.fr

FAD fishing with "Boi-fouille" at Leogane, Haiti. Extreme situations

Slide 1

Slide 2

Slide 3

Slide 4

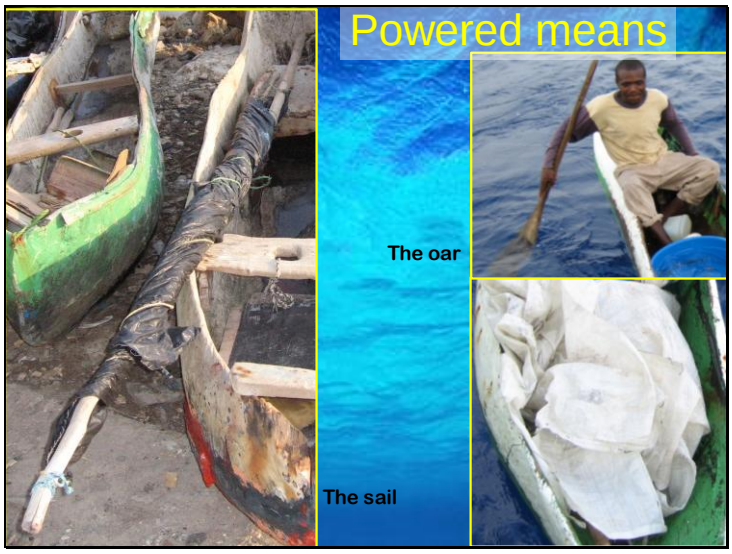
Slide 5


Fishing associated with FADs

Slide 6


The « Boi-fouillé »
Boi-fouillé with sail
Boi- fouillé with oar without sail

Slide 7



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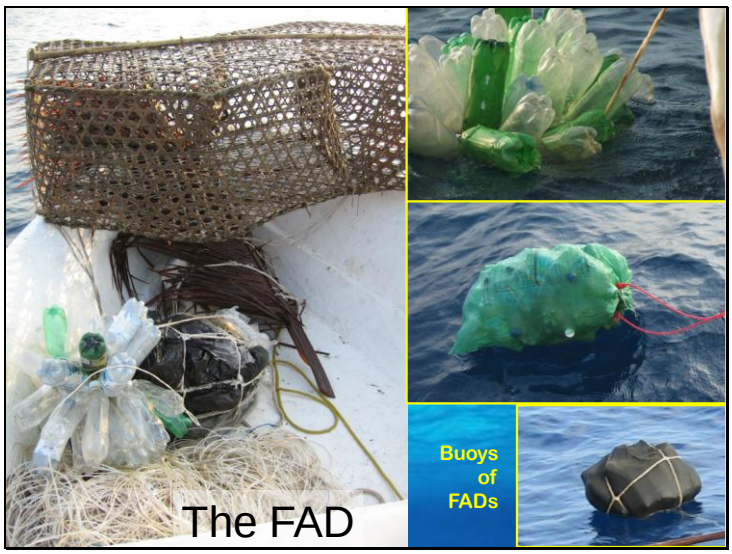

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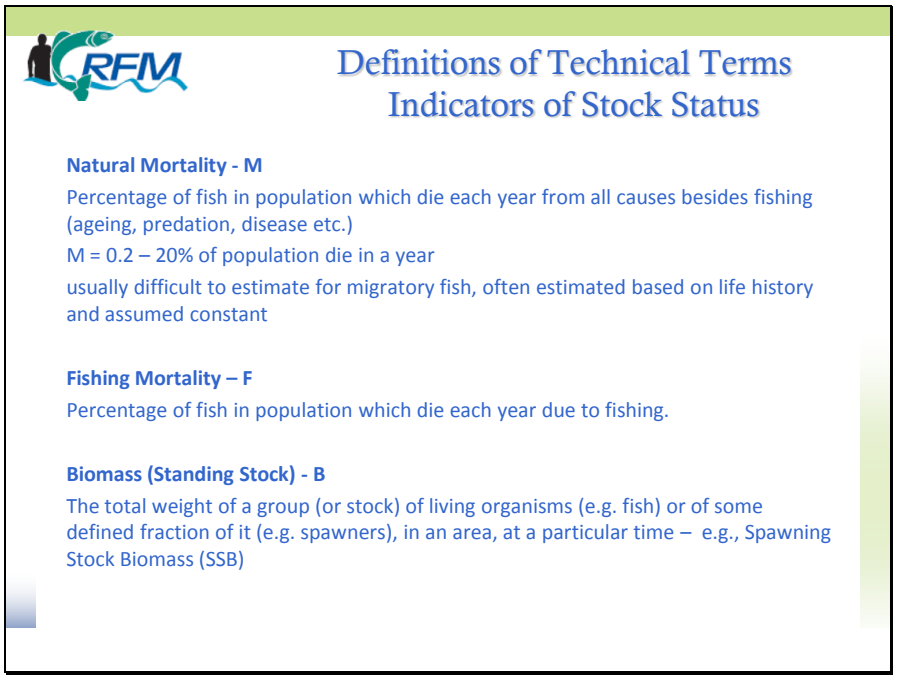
APPENDIX 9: TECHNICAL DISCUSSIONS – FISHERY RESOURCES

Present Status of Fish Resources Caught in Association with Fish Attraction Devices (FADs) and their Management

Slide 1

Slide 2



Slide 3

Definitions of Technical Terms Indicators of Stock Status

Maximum Sustainable Yield – MSY

The largest average catch or yield that can continuously be taken from a stock under existing environmental conditions.

Relative Biomass

Usually Biomass is expressed as a fraction of the biomass necessary for MSY (Bmsy) – e.g. B2007/Bmsy – is the biomass in 2007 relative to Biomass at Maximum Sustainable Yield (MSY) - Ideally if this fraction > 1 then stock is in good shape

Relative Fishing Mortality

Usually Fishing Mortality is expressed as a fraction of the fishing mortality at which the biomass necessary to generate MSY is achieved – e.g. F2007/Fmsy

Ideally if this fraction approaches 1, there is need to reduce fishing mortality through management measures that control fishing effort (e.g. # boats)

Slide 4

Species Caught in Association with FADs of relevance to CRFM Member States

Tropical Tunas (ICCAT)
Yellowfin Tuna
Bigeye Tuna
Skipjack Tuna

Temperate Tuna (ICCAT)
Albacore

Billfishes (ICCAT)
Blue Marlin
White Marlin
Sailfish
Swordfish

Pelagic Sharks (ICCAT)
Shortfin Mako
Blue Shark
Etc.

Small Tunas
Dolphinfish
Wahoo
King Mackerel
Blackfin Tuna
Serra Spanish Mackerel
Cero Mackerel
Little Tunny
Frigate Tuna
Bullet Tuna
Atlantic Bonito

Small Oceanic Pelagic
Four-wing flyingfish

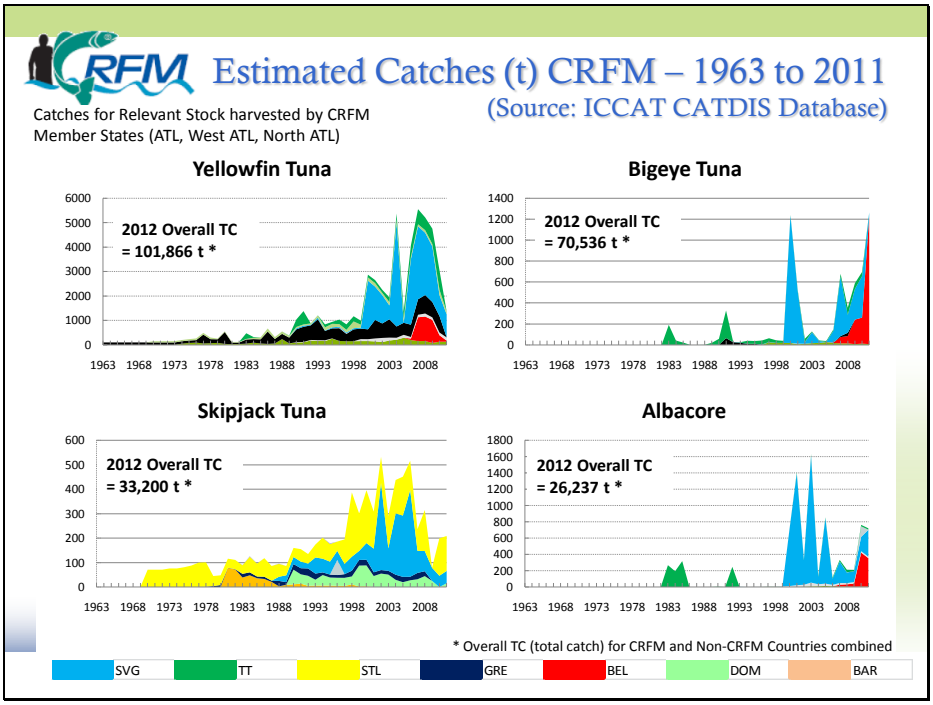
No information available on stock status and management

Others
Barracuda
Triggerfish

Currently Belize, St Vincent and the Grenadines, Barbados and Trinidad and Tobago are Contracting Parties to ICCAT.

Slide 5

Slide 6



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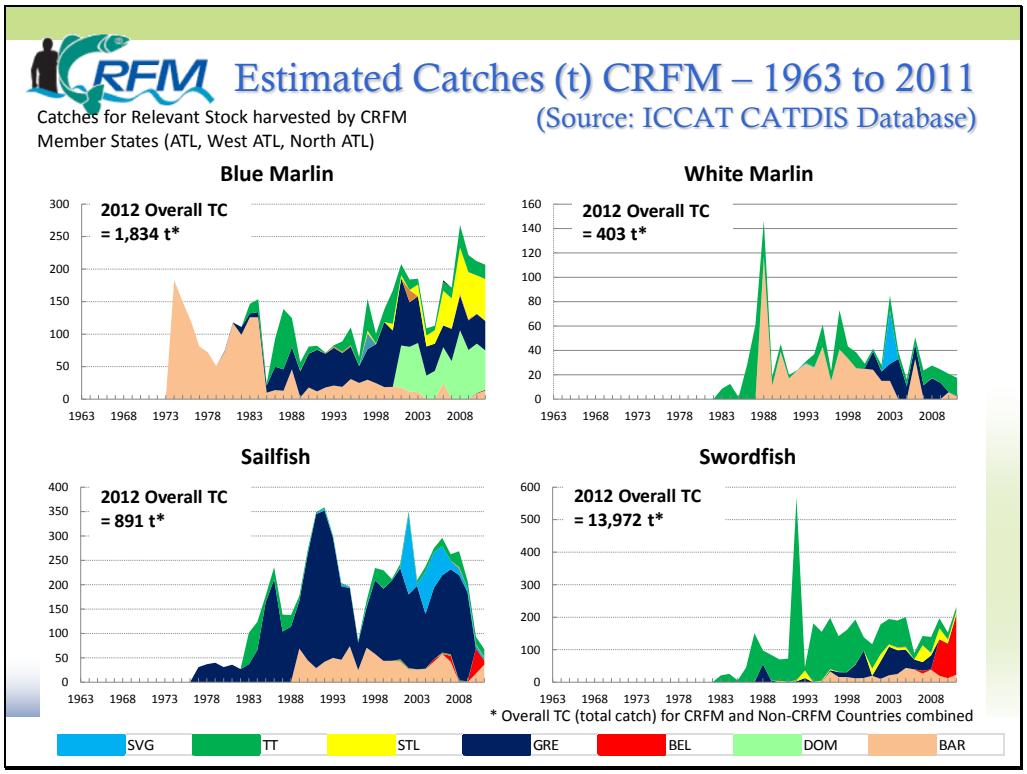

Slide 8

BIOLOGY

Common Name	Yellowfin Tuna	Bigeye Tuna	Skipjack Tuna	Albacore
Scientific Name	*Thunnus albacares*	*Thunnus obesus*	*Katsuwonus pelamis*	*Thunnus alalunga*
Distribution	Tropical, subtropical - mainly in the epipelagic oceanic waters	Widely distributed- tropical and subtropical waters of Atlantic. Geographical limit: 55°- 60 °N and 45°- 50°S.	gregarious, found in tropical, sub-tropical warm temperate waters	Widely distributed - temperate and tropical waters; from 45-50 °N to 30-40 °S (less abundant in surface waters between 10°N and 10°S)
Spawning Grounds	main ground - equatorial zone of the Gulf of Guinea (January to April); also in Gulf of Mexico, southeastern Caribbean Sea, and off Cape Verde,relative importance of these spawning grounds unknown	entire year, vast zone, around equator, with T > 24°C, from Brazil coast to Gulf of Guinea	breeds opportunistically throughout year over wide areas of the Atlantic	subtropical western areas of both hemispheres and throughout the Mediterranean Sea (spring and summer)
Maturity	Around 100 cm - 3 year old	Around 100-110 cm - 3 year old	depending on areas, 42 - 50 cm	Atlantic: 90 cm (age 5)
Life Span	Around 10 years	Around 15 years	Around 5 years	Atlantic: 15 years
Max. Size	Around 230 cm (180 kg)	Around 200 cm	Around 100 cm (18kg)	Atlantic: 130 cm (40 kg)
Natural Mortality	Assumed to be 0.8 for ages 0 and 1, and 0.6 for ages 2+	Assumed to be 0.8 for ages 0 and 1, and 0.4 for ages 2+	Assumed M = 0.8	Assumed M=0.3

Source: ICCAT SCRS 2013 Report

Slide 9

BIOLOGY

Common Name	Blue Marlin	White Marlin	Sailfish	Swordfish
Scientific Name	*Makaira nigricans*	*Tetrapturus albidus*	*Istiophorus albicans*	*Xiphias gladius*
Distribution	Widely distributed - subtropical and tropical waters, occasionally in temperate waters - from 50°N to 45°S, less abundant in eastern central and south central Atlantic	Widely distributed - subtropical and tropical waters - occasionally in temperate waters and in the Mediterranean Sea - from 55 °N to 45° S, less abundant in waters of eastern central south, central Atlantic.	Widely distributed - subtropical and tropical waters , occasionally in temperate waters and in the Mediterranean Sea - least oceanic of Atlantic billfishes; shows a strong tendency to approach continental coasts, islands and reefs.	Cosmopolitan species - in the tropical and temperate waters of all the oceans, between 45°N and 45°S,including the Mediterranean.
Spawning Grounds	Mainly in tropical western areas of both hemispheres	Mainly in the tropical western areas of both hemispheres	Tropical areas of both hemispheres (almost year round)	In subtropical western areas of both hemispheres and throughout the
Maturity	256 cm (females)	149-160 cm (females) / 139 cm (males)	147-160|180 cm LJFL (females) / 135.7 cm LJFL cm (males)	Atlantic: 180 cm (♀, age 5)
Life Span	11 years (tagging, longest time–at large in the Atlantic)	15 years (tagging, longest time–at large in the Atlantic)	13-15 years	Atlantic: 15 years
Max. Size	450 cm (910 kg); common sizes in the northwestern Atlantic are 180-300 cm LJFL	280 cm (82 kg); common sizes are 150-180 cm LJFL	up to 230 cm LJFL	Atlantic: 455 cm (537 kg)
Natural Mortality	Assumed = 0.139	Range from 0.15 to 0.30	Range from 0.15 to 0.30	Assumed = 0.2

Source: ICCAT SCRS 2013 Report

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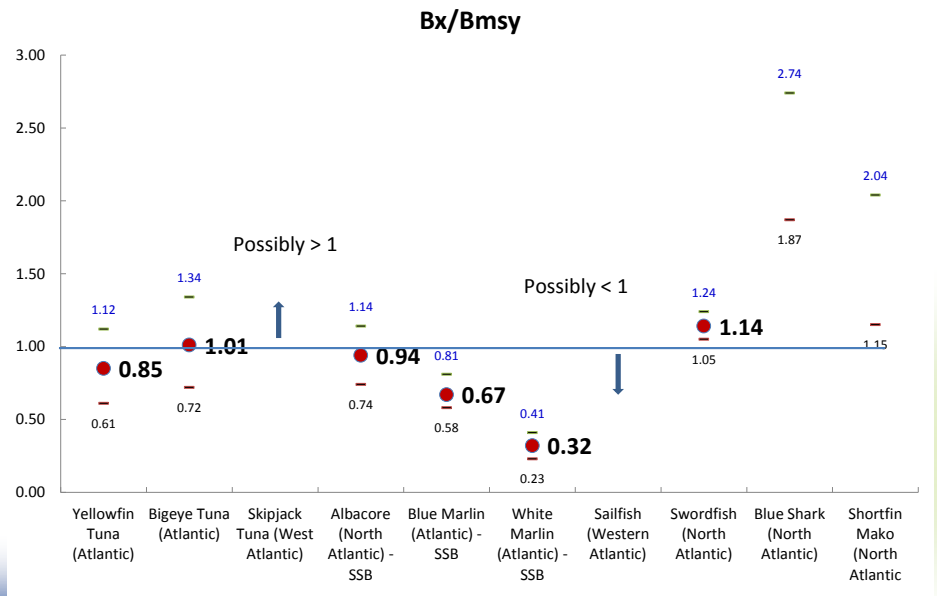
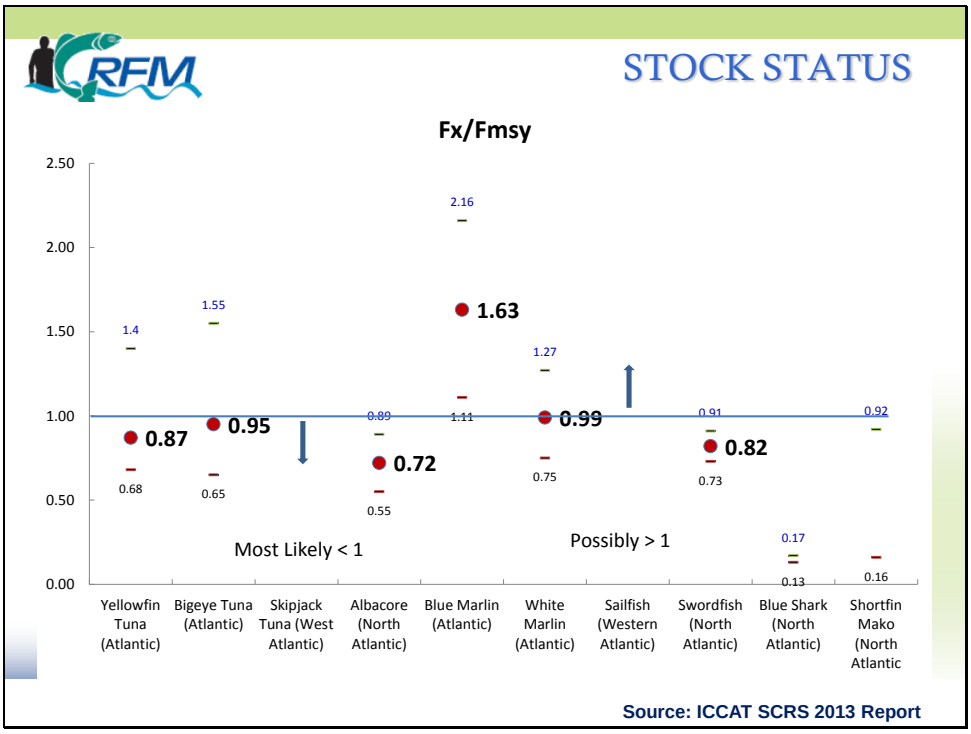
STOCK STATUS



Source: ICCAT SCRS 2013 Report

Slide 11



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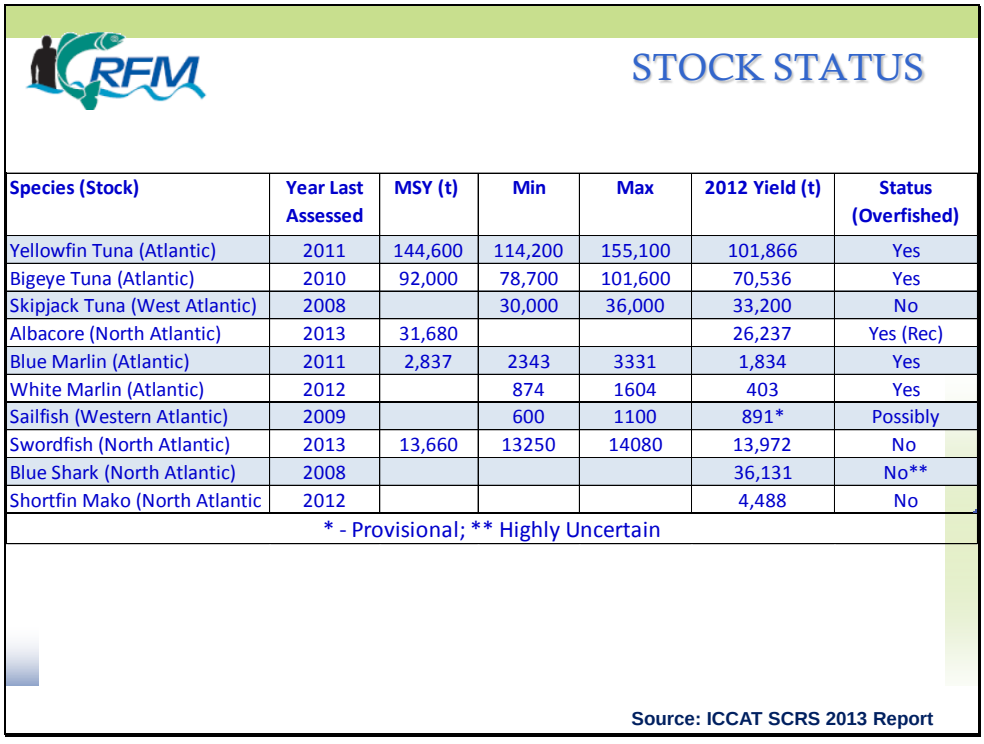

Species (Stock)	Year Last Assessed	MSY (t)	Min	Max	2012 Yield (t)	Status (Overfished)
Yellowfin Tuna (Atlantic)	2011	144,600	114,200	155,100	101,866	Yes
Bigeye Tuna (Atlantic)	2010	92,000	78,700	101,600	70,536	Yes
Skipjack Tuna (West Atlantic)	2008		30,000	36,000	33,200	No
Albacore (North Atlantic)	2013	31,680			26,237	Yes (Rec)
Blue Marlin (Atlantic)	2011	2,837	2343	3331	1,834	Yes
White Marlin (Atlantic)	2012		874	1604	403	Yes
Sailfish (Western Atlantic)	2009		600	1100	891*	Possibly
Swordfish (North Atlantic)	2013	13,660	13250	14080	13,972	No
Blue Shark (North Atlantic)	2008				36,131	No**
Shortfin Mako (North Atlantic	2012				4,488	No

* - Provisional; ** Highly Uncertain

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STOCK STATUS

Sharks: 2012 Ecological Risk Assessment on Atlantic stocks

Risk analysis to evaluate biological productivity and analysis to assess susceptibility to capture and mortality in pelagic longline fisheries

Stocks with lowest productivity were:
Bigeye thresher
Sandbar
Longfin mako
Night shark
South Atlantic Silky Shark

Most vulnerable stocks:
Bigeye thresher
Shortfin and Longfin mako
Porbeagle
Night Sharks

Source: ICCAT SCRS 2013 Report

Slide 14

MANAGEMENT

Effort controls:

YFT: Not to exceed 1992 level;
YFT & BET: Limit # LL and Purse seine boats for several countries; # Vessels limited to < avg. of 1991 and 1992; CPCs to authorize vessels > 20m LoA to fish in Convention Area
SKJ: None
ALB: fishing capacity limited to average of 1993 and 1995 levels

Total Allowable Catch:

YFT: 110,000 t (2013 onwards)
BET: 85,000 t (2013 – 2015)
SKJ: None
ALB: 28,000 t (2014 – 2016)
BUM: 2,000 t (2013 to 2015)
WHM: 400 t (2013 to 2015)
SAI: None
SWO: 13,700 t (2014 to 2016)

BUM & WHM: Annual amount harvested by pelagic longlines and purse seine vessels and retained for landing not more than 50% and 33% respectively of 1996 or 1999 landing levels, whichever is greater

Source: ICCAT SCRS 2013 Report

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MANAGEMENT

Time/Area Closure:

YFT: surface fishing on FADs from African coast to 10° S , 5° W to 5° E, during Jan-Feb in the Gulf of Guinea

No purse seines and bait boat fishing during November in area 0°- 5° N; 10° - 20° W

BET: No fishing with natural or artificial floating objects during January or February in the area encompassed by the African coast, 10° S, 5°E and 5°W

Minimum Size Limit

BUM Recreational fishery - 251 cm LJFL

WHM Recreational fishery - 168 cm LJFL

SWO: 125 cm LJFL with a 15% tolerance, or 119 cm LJFL with zero tolerance and evaluation of the discards

Catch and Trade Restrictions

BUM and WHM caught in recreational fishery

Source: ICCAT SCRS 2013 Report

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MANAGEMENT

Prohibition on retaining on board, commerce, etc.

SHARKS: Management recommendations, *inter alia*, prohibit vessels from retaining on board, transshipping, landing, storing, selling, or offering for sale any part or whole carcass of bigeye thresher sharks (*Alopias superciliosus* - ICCAT Rec. 09-07); oceanic whitetip sharks (*Carcharhinus longimanus* – ICCAT Rec 10-07); sharks of the family *Sphyrinidae* (except *Sphyrna tiburo* – Rec 10-08), silky sharks (*Carcharhinus falciformis* – ICCAT Rec. 11-08) and shark fins in general (ICCAT Rec 04-10).

Management Plans (Rec 11-01)…

FAD: *24. By 1 July of each year, CPCs with purse seine and baitboat vessels fishing for bigeye and yellowfin tunas in association with…FADs, shall submit to the Executive Secretary Management Plans for the use of such aggregating devices by vessels flying their flag, following the Guidelines for Preparation for FAD Management Plans suggested in Annex 2.*

SWO: Requirement to submit fishery development/management plans

Source: ICCAT SCRS 2013 Report

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MANAGEMENT

ICCAT Recommendation 13-01 Amending the Recommendation on Multi-Annual Conservation and Management Program for Bigeye and Yellowfin Tunas

Stringent measures for collecting and reporting information on FAD fisheries (purse seine and bait boats) – deployment and loss of FAD, relevant details (FAD identifier, type, design characteristics)

CPCs to update data collection systems or introduce FAD-logbooks; report Task II data; report details on vessels using FADs, promote FADs which design can reduce the entanglement of sharks, marine turtles or any other species.

CPCs may defer implementation to the 1st of January 2015 provided that they collaborate with the Executive Secretary, ICCAT.

Source: ICCAT SCRS 2013 Report

Slide 18

CONCERNS

YFT: Younger age classes of YFT (40 to 80cm) exhibit a strong association with FADs (natural or artificial) - increases vulnerability to surface gears, and may have negative impacts on their biology and ecology due to changes in feeding and migratory behaviours.

BET: similar as for YFT

ALB: Despite current TAC other provisions of recommendations allow for catches to exceed this level.

BUM & WHM: significant increase in non-industrial fisheries catches - these fisheries are not fully accounted for in current database; concern over effectiveness of current TAC in light of severe under-reporting in some fisheries

WHM: status of stock due to misidentification of spearfish in white marlin catches

SAI: artisanal fishermen harvest a large part of the sailfish catch of the western stock; data limitations

SWO: national regulations in some countries resulted in un-reporting of discarded fish in NA stock – implications for SA stock and future assessments

Source: ICCAT SCRS 2013 Report

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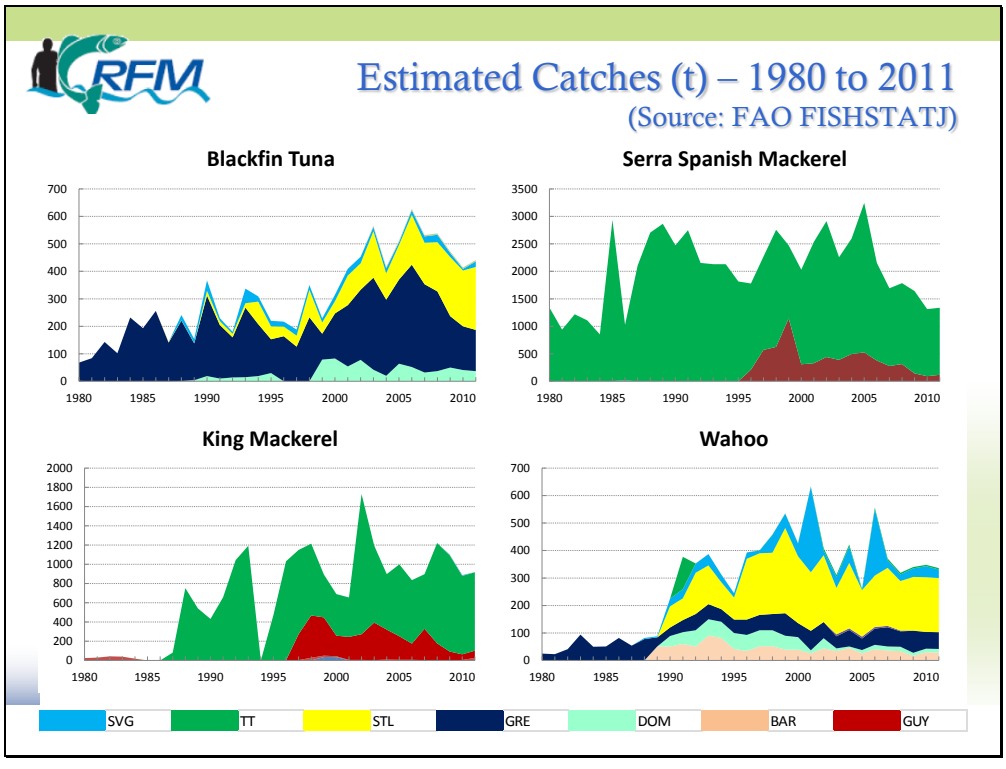
Slide 20



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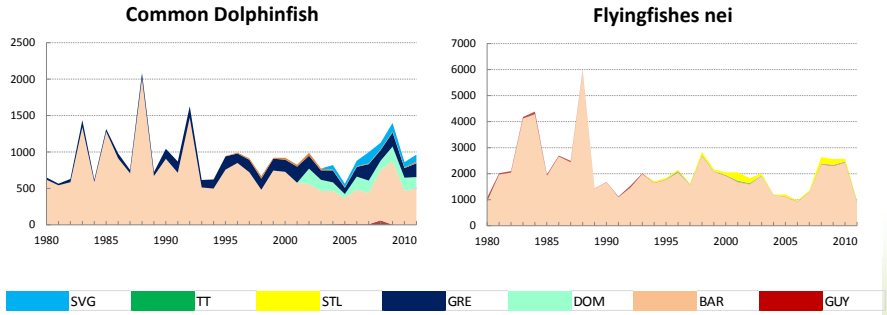
Estimated Catches (t) – 1980 to 2011
(Source: FAO FISHSTATJ)



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BIOLOGY

Common Name	Blackfin Tuna	Serra Spanish Mackerel	King Mackerel
Scientific Name	*Thunnus atlanticus*	*Scomberomorus brasiliensis*	*Scomberomorus cavalla*
Distribution	highly migratory, epipelagic - found over reefs, bays and offshore, confined to coastal waters warmer than 20°C; believed to occur only in western Atlantic from Massachussets to Rio de Janeiro, Caribbean and Gulf of Mexico	Western Atlantic: along the Caribbean and Atlantic coasts of Central and South America from Belize to Rio Grande do Sul, Brazil - does not migrate extensively, although some seasonal movement appears to occur off Trinidad.	the western Atlantic from Massachusetts, USA to Rio de Janeiro, Brazil; also reported in the mid Atlantic at St Paul's Rocks
Spawning Grounds	distinct spawning grounds throughout range; in Caribbean possibly between April and September, possible breeding ground in Lesser Antilles around May-June	? Spawning in Gulf of Paria, Trinidad, year round	western Gulf of Mexico (May to Sept); NE Caribbean (Apr to Sept); Trinidad and NE Brazil (year round; peaks Oct to Mar)
Maturity	Around 2 years (40 to 50 cm FL)	41.9; 42.3 cm FL (female; male – NE Brazil)	1-2 years
Life Span	Around 5 years		7-10 years (m,f; Trinidad); 14 years (Brazil)
Max. Size	110 cm FL	125 cm	184 cm TL
Natural Mortality			0.51 – 0.59

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BIOLOGY

Common Name	Wahoo	Common Dolphinfish	Four-wing Flyingfish
Scientific Name	*Acanthocybium solandri*	*Coryphaena hippurus*	*Hirundicthys affinis*
Distribution	circum-tropical; tropical and subtropical waters of Atlantic; including Mediterranean and Caribbean Seas, Pacific and Indian Oceans; seasonally may extend to temperate waters. In WCA extends from NE Brazil to Rhode Island, USA	highly-migratory pelagic species, in tropical and sub-tropical oceanic waters worldwide, bounded in N and S by 20°C isotherm. In WA ranges from Nova Scotia to Rio de Janeiro but most common from North Carolina, throughout Gulf of Mexico, Caribbean to NE coast of Brazil	: Eastern Atlantic: Guinea to Angola. Western Atlantic: Gulf Stream off Virginia, USA and northern Gulf of Mexico to northern Brazil, including the Caribbean Sea. Northwest Atlantic: Canada. Indo-Pacific: Arabian Sea.
Spawning Grounds	N. Gulf of Mexico – May to Aug (peak in June); N. Carolina – June to Aug (peak in June/July), Bermuda – May to Aug		In Eastern Caribbean – seasonal from November to June, peak spawning Nov-Jan and Apr –May; tagging studies and LEK suggest that shelf off NW Tobago may be a preferred spawning location.
Maturity	1 year; 86 to 101 cm TL (males and females considered)	3.5 - 7 months (40 - 73.5 cm)[3]	18 – 20.3 cm FL (5 – 7 months)
Life Span	5-6 years; possibly extending to 10 years	12 - 18 months (Southern Caribbean)[2]	18 months
Max. Size	250 cm TL	210 cm TL[3]	23 cm FL
Natural Mortality	uncertain – estimates are 0.38 – 0.44; 0.47	0.66, 2.56, High Uncertainty	Highly uncertain – but likely to be high

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STOCK STATUS & Management

Blackfin Tuna

2010: Review of available data - catch, catch rate, stock structure, biology (Neilson, J. and Minte-Vera, C.V.)

2011: Standardization of catch rates – Saint Lucia;
Paper (pres.) - Martinique and Guadeloupe Fleets targeting Dolphinfish, Flyingfish and Blackfin Tuna (L. Reynal);
Paper presented on Blackfin tuna catch, catch rates and size structure of Venezuelan fisheries (Arocha, F.)

2012: CRFM – draft sub-regional management plan developed; Detailed review of biology and country summaries of data collection systems, available data, estimation of total landings and recommendations for improved data coverage (St Vincent, Grenada, Dominica, Saint Lucia); Standardization of catch rates – Saint Lucia;

Status: No evidence that overfishing is occurring

Management: Currently no measures in effect.

Recommendations:
Catch levels should not be allowed to increase beyond current levels given concerns as regards impacts of recent catch increases likely due to FAD fishing and improvements in data collection

Source: CRFM Sci. Meet. – Theophile et al., 2012

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STOCK STATUS & Management

Serra Spanish Mackerel

2005 - Surplus production model (Trinidad - catch data from 1972 to 1991; 1995 to 2002; gillnet effort data; ICCAT landings data for 1977 to 2002)

Status: Overall, results inconclusive - conflicting results from runs with B1977 estimated and fixed; status sensitive to estimates of catches, and starting biomass level for which there is great uncertainty.

Management: Current measures in T&T include **mesh size restrictions** on gillnets and limitations in net dimensions as well as a size **limit** of 30.5 cm (12 inches) which may not be taken, sold or exposed for sale.

Recommendations:
Maintaining the status quo will be ok in the short-medium term but will be problematic in the long-term. Maintaining fishing mortality at 0.75 Fmsy would result in short term sacrifices and under-performance within next 10 years, but more sustainable in the long term.

Source: CRFM Sci. Meet. – Martin and Nowlis, 2005

King Mackerel

2006 & 2007:Length frequency analysis (Trinidad - 2006-2007) and Analytical Yield Per Recruit Model – Southern stock assumed – shared among Trinidad and Tobago, Venezuela and Guyana – recognized catches in Brazil and Grenada may be from same stock and so stock range may be incompletely defined.

Status: Overall, results inconclusive - status of the stock as measured by the target reference point (F0.1) and limit reference point (F20%SPR) varies greatly depending on growth/natural mortality parameter combination used in the analysis.

Management:
TT: current measures same as for Serra Spanish Mackerel
STL: recreational fishery – gear restrictions - limit number of fish caught – 18 King Mackerel, Dolphin and Wahoo

Recommendations:
Precautionary Approach - current levels of fishing effort should not be increased

Source: CRFM Sci. Meet. – Parker et al., 2005 and 2007

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STOCK STATUS & Management

Wahoo

2005 & 2007 - Non-equilibrium, surplus production model and length frequency analyses, catch and catch rate analyses - (2005 - Barbados, Dominica, Grenada, Saint Lucia, St Vincent; 2007 with data from 1994 to 2003 - Barbados and Saint Lucia with data for 1996 to 2006)

MSY (t): Assumed as peak catches taken in 1997 - 1999 (1400 - 1600 t)

Status: No declines in CPUE between 1995 and 2003; Local abundance of stock sustainable at 1996 - 2006 harvest levels, at least in the short term.

Management: Currently there are no management measures in effect except for recreational fishery in STL

Recommendations:
Precautionary Approach - no large increases in fishing pressure recommended until stock dynamics are better understood.

Source: CRFM Sci. Meet. – Parker et al., 2005 and 2007

Dolphinfish

2010- Catch and Catch Rate Analyses (Barbados, Saint Lucia, St Vincent - 1994 to 2010)

Yield: 1,200 t (2009 for EC countries)

Status: no evidence of decline in stock abundance over the period; current levels of harvest probably sustainable

Management: Currently there are no management measures in effect except for recreational fishery in STL

Recommendations:
Due to uncertainties in assessment, cannot make predictions on long-term stock sustainability – suggest precautionary approach to management – no further development until the stock structure and dynamics are better understood

Source: CRFM Sci. Meet. – Parker, 2010

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Ecological Risk Assessment: Large Pelagic Fisheries

CRFM Secretariat & CLME

2011 – 2012 – to assess relative risks to target, by-catch and threatened, endangered or protected species that could be impacted by pelagic fisheries.

Of 39 species considered, 18 target species were found to have low vulnerability to hazards identified and 21 had medium vulnerability (most being low-priority target species).

Conclusion: Full use of ERAEF requires investment in broader level monitoring and partnerships with research institutes and other sectors of government.

Source: Proudfoot and Singh-Renton, 2012

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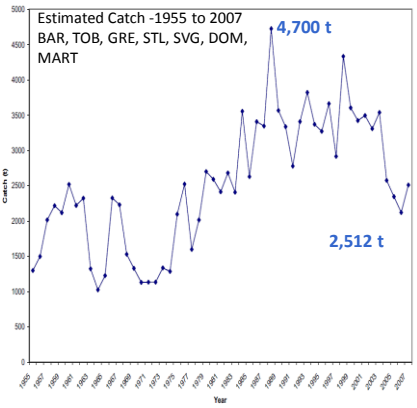
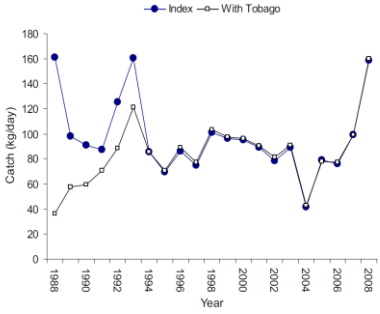
STOCK STATUS & Management

Fourwing Flyingfish (FAO Ad-Hoc WG)

2008 - Stock Recruitment Model and Risk Assessment; Catch and Catch Rate Analyses (C - all countries; CPUE - Barbados, Saint Lucia, Tobago)





Source: 3rd Meet. of FAO Ad-Hoc WG on Flyingfish – Medley et al., 2010

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STOCK STATUS & Management

Fourwing Flyingfish

	0.05	Median	0.95
R0	1.72	3.40	10.51
Unexploited biomass (tonnes)	10 870	26 351	131 428
Biomass 2007 (tonnes)	10 011	25 919	131 306
MSY (tonnes)	3 312	7 897	36 291
2007 yield (tonnes)		2 512	
B/B_{MSY}	1.97	2.71	4.17
F/F_{MSY}	0.03	0.17	0.50

Concerns:

Poor quality data; model & assessment not fully tested; no sensitivity analyses; need for rigorous testing to ensure management advice provided is sound.

Source: 3rd Meet. of FAO Ad-Hoc WG on Flyingfish – Medley et al., 2010

Status: not overfished and there is no overfishing at regional level (could not determine whether or not there are local depletions)

Management: Currently there are no management measures in effect. Draft Sub-Regional Management Plan (FAP, CLME, CRFM) – to be endorsed by Ministerial Sub-Committee

Recommendations: No measures recommended at the time. Catch trigger 5,000 t advised (max. annual catch est at 4,700t) - management measures required to safeguard against overfishing if catches approach trigger point - a freeze in development suggested until stock is reassessed and management measures adjusted accordingly

CRFM Secretariat & CLME

Evaluate multi-criteria analysis – improving information in multi-objective decision analysis in FF fishery.

Source: Campbell and Singh-Renton, 2012

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Trophic Analysis
Lesser Antilles Pelagic Ecosystem

FAO Project - Scientific Basis for Ecosystem-Based Management in the Lesser Antilles including Interactions with Marine Mammals and Other Top Predators and used to quantify abundance, fishing and natural mortality and trophic linkages among species or species groups in the pelagic ecosystem and to examine possible policy options for management of the respective fisheries.

Results suggested that prey availability is a stronger factor in the dolphinfish-flyingfish dynamics (dolphinfish being a key predator of flyingfish) than predator control.

Unexpected trophic interaction between yellowfin tuna and skipjack tuna as a consequence of yellowfin tuna feeding on skipjack and skipjack in turn feeding on yellowfin juveniles.

Skipjack tuna, controls the recovery of its own key predator.

Source: Mohammed et al., 2008 FAO Pub.

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Summary

	Species	Overfished
	Yellowfin Tuna	Yes
	Bigeye Tuna	Yes
	Skipjack Tuna	No
	Albacore	Yes (recovery in progress)
	Blue Marlin	Yes
	White Marlin	Yes (recovery in progress)
	Sailfish	Possibly
	Swordfish	No
	Shortfin Mako	No
	Blue Shark	No
	Blackfin Tuna	Possibly not at local level
	Serra Spanish Mackerel	Possibly
	King Mackerel	Possibly
	Wahoo	Possibly not at local level
	Dolphinfish	Possibly not at local level
	Fourwing Flyingfish	Not at regional scale

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Statistics and Research Recommendations

1. Need for **policy/decision-makers to guide scientists** – management objectives must be clear and measurable

2. Need to **delineate stocks** so as to identify those countries which must be included in assessment and management efforts [currently IFREMER (Martinique), Venezuela and the USA participate in CRFM Annual Scientific Meetings]

3. Need to **collect data to facilitate improved quality of assessments and management** advice provided:

- better data collection protocols and analysis – validation/verification
- estimate of all removals from fishing – total catch
- better estimate of fishing effort
- historical time series data of catch and effort
- improve biological parameter estimates- age; growth; natural mortality
- identify minimum data collection standards that can be sustained with given resources

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Statistics and Research Recommendations

5. Research on ecological impacts of fishing - FAD fishing – changes in species composition, diet, abundance etc.

6. Research – technological, behavioural change or other measures to reduce catches of juvenile fish

7. Licensing systems – limited entry – based on what management objective and information?
   - Resource sustainability
   - Conflict avoidance
   - Maintained profitability

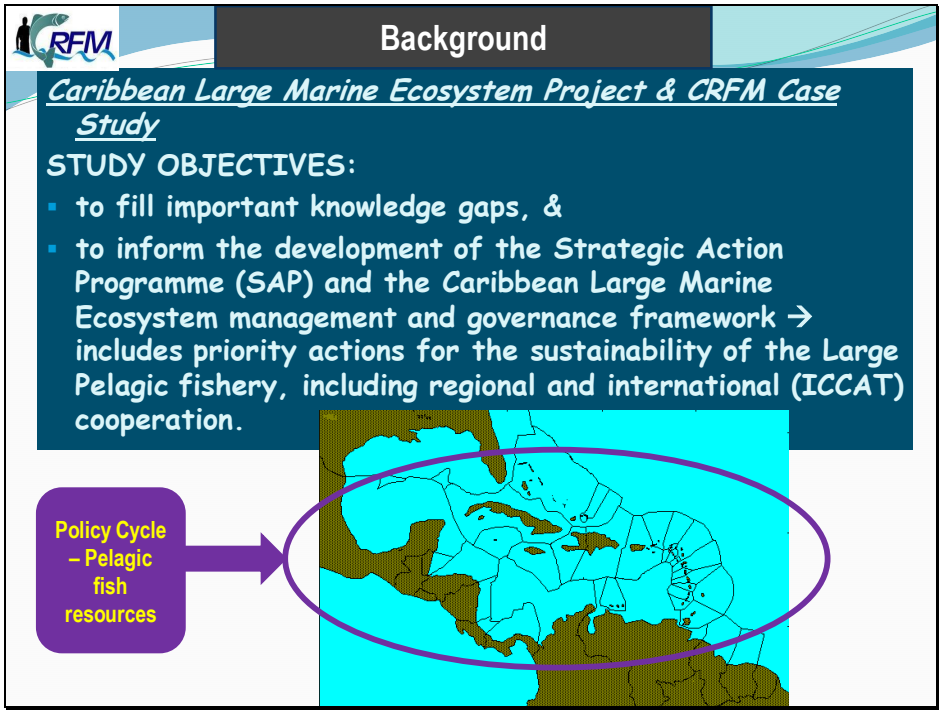
   Fishing effort data important - to equate fishing mortality with number of boats – give management advice that is relevant for limited-entry system

8. Social and Economic importance of FAD fisheries

An overview of sub-regional fisheries management plan for Black fin tuna fisheries in the Eastern Caribbean

Slide 1

Slide 2

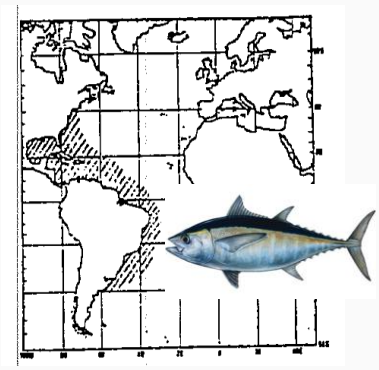


Slide 3

CRFM Scientific Meetings (2010-2011)

Review and some CPUE analyses of blackfin tuna

- Examination of available catch and catch rate data and trends, and identify data gaps
- Compile existing knowledge of biology (growth, reproduction, and stock structure.



- Inter-sessionally – attempts to obtain data from Cuba, Colombia, DR, to address major gaps in ICCAT database.
- 2011 – planned assessment. Catch & effort data were submitted by St Lucia, St Vincent and the Grenadines, Trinidad and Tobago, Jamaica, the French West Indies and Venezuela. The French West Indies also submitted species composition and length frequency statistics. Venezuela submitted CPUE and size statistics.
- 2011 – planned assessment was replaced with exploratory and demonstrative analyses of St. Lucia's catch per trip dataset

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CRFM Case Study → Blackfin tuna Sub-regional Management Plan

VISION: Caribbean Community Common Fisheries Policy →

an effective cooperation and collaboration among participating countries in the conservation, management and sustainable utilization of the blackfin tuna resource and the related ecosystems in the Eastern Caribbean region in order to secure the maximum benefits from those resources for the people and for the Caribbean region as a whole.

Slide 5

Objectives – same as adopted by CLME

The general objectives for the pelagic fisheries ecosystem for the CLME are divided into ecosystem quality objectives and societal benefit objectives.

TRANSBOUNDARY ISSUES	UNSUSTAINABLE FISHERIES	HABITAT DEGRADATION AND COMMUNITY MODIFICATION	POLLUTION
Ecosystem Quality Objective **Conservation, and restoration where necessary, of the health of the pelagic ecosystem within the WCR.**	Protection, and restoration where necessary, of the **health and natural balance of exploited fish populations** occurring within the marine ecosystem, adopting a **precautionary management strategy**, as needed.	Conservation, and restoration where necessary, of **the natural structure and function of the ecosystem, biological diversity, and ecosystem resilience**, adopting a precautionary management strategy, as needed.	Conservation, and restoration where necessary, of the **health of the aquatic environment**, with emphasis on **guaranteeing agreed standards of water and habitat quality**.

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Objectives – same as adopted by CLME

TRANSBOUNDARY ISSUES	UNSUSTAINABLE FISHERIES	HABITAT DEGRADATION AND COMMUNITY MODIFICATION	POLLUTION
Societal Benefit Objective **Provision of goods & services by the pelagic ecosystem such that it contributes to societal development needs of the WCR, and to preservation of the associated aesthetic, traditional, health, educational & scientific values.**	Sustainable and optimal use of living marine resources, for meeting the region's **food and nutrition security needs**, and **other social and economic benefits associated** with such exploitation.	Responsible and sustainable management of pelagic ecosystem goods and services, for fulfilling **social and economic development needs, while also preserving the full aesthetic, traditional, cultural, health, educational and scientific values of such goods and services**.	Fulfillment of social and economic development objectives, through responsible management of **environmental health, necessary for preventing risks to human health and well-being**.

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Present CRFM Management Advice – Blackfin tuna

1. No evidence of overfishing, but
2. Increasing use of FADs and improved reporting

Hence, in keeping with the principles of the *precautionary approach*,

The 8th CRFM Scientific meeting recommended that no significant increase in catch levels be allowed until more information becomes available on the status of the stock

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Other information sections included in plan

- **Biology & Ecology** (growth, diet, reproduction, stock structure, migration)
- **Legal Context**
- **Management Unit** (combined EEZs of the eastern Caribbean countries from Dominica south to Trinidad and Tobago)
- **Fishery Characteristics** (ecosystem services, countries with largest fisheries, nature of fisheries, including significance of FAD fisheries)
- **Status of the Fishery** (CRFM, ICCAT, IUCN listing, recognized poor information)
- **Management Objectives & Indicators (biological, socio-economic, ecological)**
- **Data, monitoring & research requirements**
- **Management advice & Implementation of the Plan** (ICCAT cooperation, national consultations, co-management, control & surveillance, financing, monitoring & evaluation)

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APPENDIX 10: WORKSHOP RECOMMENDATIONS

(Draft) RECOMMENDATION to the 15th session of WECAFC

ON THE SUSTAINABILITY OF FISHERIES USING FISH AGGREGATING DEVICES IN THE WECAFC AREA

The Western Central Atlantic Fishery Commission (WECAFC),

RECALLING that the objective of the Commission is to promote the effective conservation, management and development of the living marine resources within the area of competence of the Commission, in accordance with the FAO Code of Conduct for Responsible Fisheries, and address common problems of fisheries management and development faced by members of the Commission;

RECALLING the conclusions and proposals of the first and second meetings of the WECAFC ad hoc working group on the development of sustainable moored fish aggregating device fishing in the Lesser Antilles (Martinique, 8- 11 October 2001 and Guadeloupe, 5–10 July 2004);

REAFFIRMING its commitments, made at the 14th session of WECAFC, through establishing the IFREMER/WECAFC Working Group on Development of Sustainable Moored FAD Fishing in the Lesser Antilles. In this respect the 15th session will agree [agreed] to expand the Working Group into a joint Working Group on FADs in which WECAFC, JICA, IFREMER and CRFM will participate;

RECOGNIZING the conclusions and recommendations of the CRFM-JICA CARIFICO/ WECAFC-IFREMER MAGDELESA Workshop on FAD fishery Management, which was held in St Vincent and the Grenadines, 9th -11th December 2013;

RECOGNIZING the high quality of the scientific research and capacity building carried out on FADs by the EU funded MAGDELESA project, as well as the pilot activities on FADs conducted under the CRFM-JICA project on the "Formulation of a Master Plan on sustainable use of fisheries resources for coastal community development in the Caribbean";

RECOGNIZING also the significant contribution of the offshore pelagic fisheries to food and nutrition security, poverty alleviation, income, and employment for present and future generations in the Caribbean;

CONSIDERING that the International Commission for the Conservation of Atlantic Tunas (ICCAT) issued at its 23rd regular meeting, held in South Africa, November 18-25, 2013, a recommendation (13-01) amending the recommendation on a multi-annual Conservation and Management Program for Bigeye and Yellowfin tunas, which binds a number of WECAFC and CRFM members in terms of FAD fisheries by industrial fleets catching these tunas;

NOTING the ongoing effort of the CRFM through its annual scientific meetings and in collaboration with the CLME and ACP Fish II Projects, to improve conservation and management of the offshore pelagic resources;

REAFFIRMING the need for further action by all interested parties to ensure the longterm sustainable use and management of the offshore pelagic fisheries resources in the region based on the ecosystem approach to fisheries;

REAFFIRMING also its commitment to promote the use of co-management and other participatory approaches involving all affected parties in the development and implementation of relevant policies and programmes;

NOTING the concerns of the WECAFC/OSPESCA/CRFM/CFMC Working Group on Recreational Fisheries about the billfish stocks in the Caribbean and the untapped value of this resource in terms of catch-and-release fisheries.

NOTING that the fishery on fish-aggregating devices (FAD) in the Lesser Antilles has grown substantially in the last ten years, apparently increasing catches of pelagic species but also catches of vulnerable and already overexploited stocks of species.;

REAFFIRMING its commitment to the application of the precautionary approach, which establishes that lack of scientific evidence should not be used as a reason for not taking management measures for fisheries resources;

ACKNOWLEDGING the good efforts of various WECAFC and CRFM members to license FADs fishers, prepare legislation for FAD fishery, ensure disaggregated data collection and analysis in terms of FAD fishery, encourage best-practice design and training in FAD construction and use, promote safety-at-sea when fishing with FADs, reduce conflicts over the use of FAD, notify maritime authorities of FADs locations, establish co-management regimes for FAD fishery and promoting the proper maintenance of FADs.

NOTING that the exchange of information between researchers, fisheries managers and fishers on FADs fishery has improved in recent years and needs to be strengthened;

RECOGNIZING that the current development of FAD fisheries in the WECAFC area provides new opportunities for income generation, livelihoods and contributes to food security, as well as may reduce [temporarily] the pressure on coastal and reef fish stocks.

FURTHER RECOGNIZING the need to improve data and information to reduce uncertainties to stock assessment methodologies currently used and to monitor the long term impacts of these fisheries on the stocks;

CONSIDERING the need to conduct more research related to the potential impact of moored FADs on the migration patterns, size/age/sex structures and compositions of stocks, change in yields per recruit and other biological effects, as well as on the currently used concept of CPUE, co-management options, social and economic aspects, environmental and climate change, fishing techniques and technologies;

PENDING the delivery of additional information by the Working Group, CRFM annual scientific meeting and the Scientific Advisory Group (SAG);

ADOPTS in conformity with the provision of Article 6 (h) of the Revised Statutes of the WECAFC the RECOMMENDATION that:

1. Members of WECAFC [shall] prepare (if relevant) national level FADs fishery management plans, in line with the ICCAT measure, and put in place appropriate legislation in support of a sustainable FADs fishery.
2. Members of WECAFC [shall] apply a standard terminology (as determined by the Working Group on FADs) for the different varieties of FADs fishery and report in an agreed format on their total landings, catch and effort data of FADs fishery in FAO Area 31 to the Working Group on FADs in support of ongoing research, decision making and management processes at national and regional level.
3. Members of WECAFC [shall] in line with similar recommendations from ICCAT, IATTC and other RFBs aim to:
    - prohibit the transshipment at sea of FAD caught fish in the WECAFC area.
    - collect and analyze biological, ecological, social and economic data and information to inform decision making processes on FAD Fishery.

4. WECAFC, CRFM, and as appropriate OSPESCA, [shall] support the regional harmonization of national FAD fishery management plans and related legislation, in accordance with the best available information (including scientific evidence and local and traditional knowledge) and consistent with international best practices, and present the progress made to the respective regular sessions of these RFBs.
5. Members [shall] communicate to the Working Group on FADs the measures taken to adhere to the above paragraphs.

The Working Group on FADs [shall] support the Members, in the establishment of stakeholder- and public outreach and communication campaigns, including addressing the need to transfer research findings on FAD fisheries and communicate best-practices to the fishers and facilitate inputs from stakeholders.

APPENDIX 11: WORKSHOP CONCLUSIONS

The CRFM-JICA CARIFICO / WECAFC-IFREMER MAGDELESA Workshop on FAD Fishery Management, held in Kingstown, St Vincent and The Grenadines, 9- 11 December 2013:

Recalls that moored FAD fisheries began to develop in the Caribbean Islands at the end of the eighties. This activity is still developing in several states. Moored FADs allow small-scale artisanal vessels easier access to off-shore pelagic resources by aggregating them at fixed locations. Their use leads to different fishing practices and consequently, may impact different resources, depending on the local circumstances. The communities involved in this type of fishery, consist to a great extent of fisherfolk with low incomes and limited other livelihood options, and the fishery contributes significantly to local food and nutrition security.

Seeks attention from policy makers and fisheries managers to contribute to this development in order to:

- Adapt (as required) the fishing operations (i) to increase safety at sea and improve working conditions for the fishers and (ii) to prepare and preserve their catch with the aim to ensure food safety for the final consumer of the fish.
- Improve landing and market sites to ensure proper sanitary conditions and increase value addition to the landed fish.
- Determine minimal standards for FAD construction, particularly :
    - **A sufficient mooring weight** in relation to the lines (diameter and length) and the buoy (volume), to avoid FAD dragging, so as to prevent possible damages to critical submarine habitats and infrastructures, such as cables, pipes and to marine traffic at the surface.
    - **Correct night and day markings** to prevent from navigational hazard.
    - **An adapted buoy volume** to resist to local currents to reduce the FAD losses and the generation of debris in the marine environment.
- Collect, analyze and disseminate disaggregated and standardized official fisheries statistics, taking into account the multi-gear characteristics of the fisheries and in which FAD fishery is identified as separate fishing activity.
- Direct research on fishing capacity related to FADs and the anticipated impact of that capacity if it's realized.
- Establish specific access conditions to FADs that take in consideration the local social, economical and environmental factors and the rights of other fishers. These conditions should consider:
    - Interactions between FADs, because too close FADs favor unstable fish aggregations. To reach optimal space utilisation, fisherfolk organisations or communities should be involved in the placing of the FADs.
    - Possible conflicts between fishers using inadequate and /or incompatible fishing gears (e.g. lines or net, …) or conflicts generated by the use of FAD financed (private) or attributed (public) or maintained by other groups of fishers.
    - The need to allocate fishing opportunities in a responsible manner, using agreed principles and procedures that are fair, equitable and transparent to all concerned.
- Minimize the catch of juveniles.
- Promote and encourage further research on FADs for a better knowledge of:
    - The exploitation level of the fisheries resources and their dynamics
    - Interactions between FADs and species
    - Optimal FADs density and optimal time of use for a sustainable FAD fishery
    - Relationship between FAD fishery and other fishing techniques on other resources and possible impact of these interactions
    - Co-management experiments and their impact on the sustainable development of moored FAD fisheries

    - Technologies and best management practices that can help reduce the take of small and juvenile fish at FADs
    - Social and economic aspects of the FADs fisheries
    - The social customs that help to characterize formal and informal FAD governance arrangements
    - Markets and product development and SPS issues
    - Environmental degradation and climate change and variability issues.
- Support a better exchange of information between researchers, fisheries managers and fishers on FADs and related subjects. As an example, to encourage the development of communication tools directed toward fishers and/or the formation of extensionists to organise the fishermen and to bring together groups of fishers around efficient projects for sustainable development of fisheries.
- Support engagement processes and the introduction tools to foster collaboration and information sharing among fishers that can help distribute use and reduce competition at FADs.

Proposes that the current IFREMER/WECAFC Working Group on Development of Sustainable Moored FAD Fishing in the Lesser Antilles, will be transformed into a joint Working Group on FADs with the possible participation of JICA, IFREMER, CRFM and WECAFC.

Proposes draft Terms of Reference (TORs) for the period 2014 -2015 of the new joint Working Group on FADs and a new convener. This information will be forwarded by the secretariat to the 15th session of WECAFC for endorsement.

Prepared a draft recommendation on the sustainability of fisheries using fish aggregating devices in the WECAFC area, for consideration by the 15th session of WECAFC.

Thanked the current convener, Mr. Lionel Reynal, for his outstanding contributions to the research on FADs in the region and the guidance provided to the working group since 2001. The workshop noted with pleasure that Mr. Reynal agreed to continue to assist in future FAD Working Group activities with his technical advice through the coordinating Committee.

Expressed its appreciation to JICA-CARIFICO, IFREMER, the EU funded MAGDELESA project, CRFM, WECAFC, the Government of St Vincent and the Grenadines and the other member countries for their gracious support to the workshop.