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# Fisheries management planning for the Grenada sea urchin fishery

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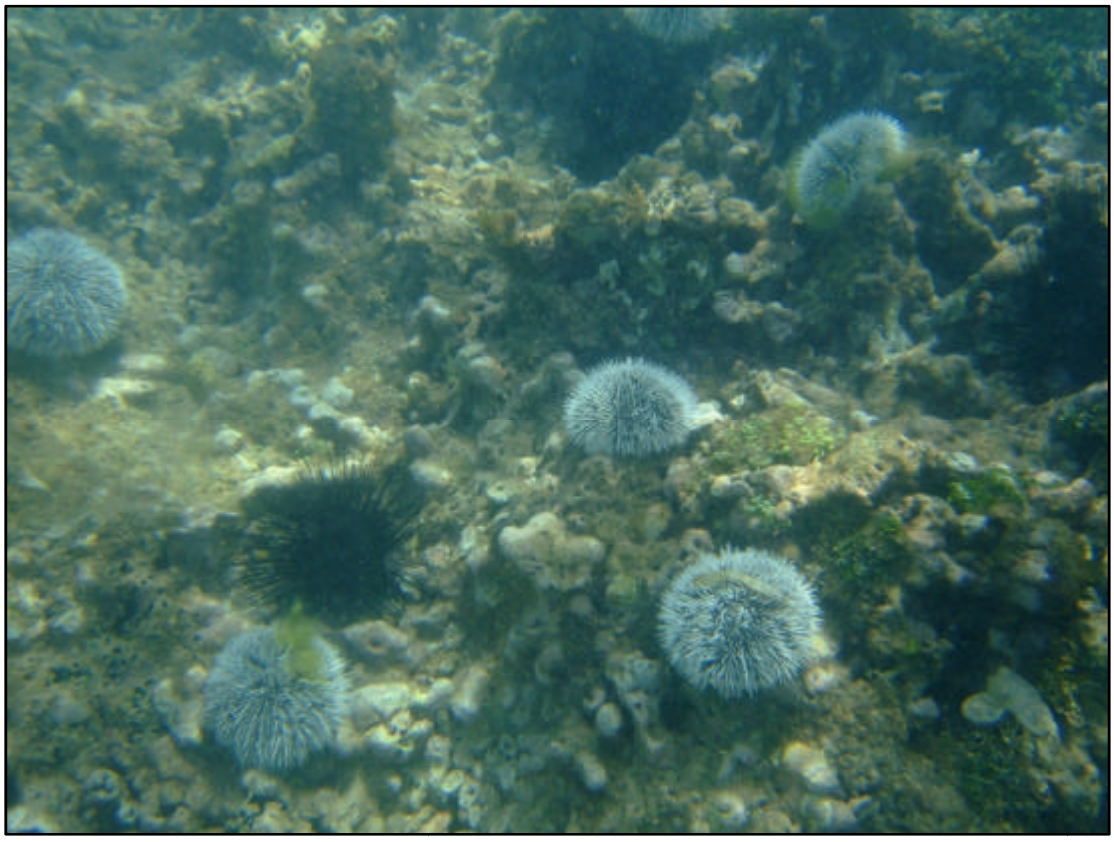

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**ABSTRACT**

The depletion of sea urchins around Grenada, caused mainly by heavy commercial fishing for an export market, prompted the closure of the fishery by the government over a decade ago. Since then there has been continuous illegal harvest and only modest recovery of urchin populations. This pattern is quite similar to that of the fisheries in Barbados and St. Lucia where the closures have not been for as long a period, but the fisheries have not been sustainable either. Pressure from resource users for the fisheries authority to open the fishery increased in 2008. Partly in response to this, but mainly as a continuance of its fisheries governance strategy, the Fisheries Division initiated a process for the participatory development of a fisheries management plan for the sea urchin fishery that would apply whether the fishery was opened or not. From April 2008 to mid-2009 there were surveys at sea to determine urchin distribution and abundance, workshops and meetings to share results with fishers and involve them in planning, and sessions of drafting followed by public consultation. This paper reports on the fisheries management planning process which may provide lessons applicable to similar situations.

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# 1 INTRODUCTION

The tri-island state of Grenada is located between latitude 012° 10'N and 012° 30'N, and longitude 061° 25'W and 061° 40'W (Figure 1). To the south lies Trinidad and Tobago and to its north is St. Vincent and the Grenadines. Grenada consists of three main islands – mainland Grenada to the south and Carriacou and Petite Martinique to the north. In between are the Grenada Grenadine islets. Grenada possesses a land area of 344 km² with a coastline of 121 km. The Exclusive Economic Zone (EEZ) of Grenada covers an area of 7,700km² of which 900km² consists of shelf.


**Figure 1 Location of Grenada**

In 1996 the drastic decline in local populations of white sea urchins (*Tripneustes ventricosus*) precipitated an immediate indefinite no-take moratorium on the harvesting of this species. The objectives of the moratorium were:

- To permit severely depleted populations to recover over time.
- To conduct quantitative assessments over time to determine the extent, if any, of recruitment on depleted grounds.
- To generate, in the interim, a management plan for the fishery that ensures sustainability.

The first objective was in accordance with the existing proposed draft management plan (CRFM 2008). In addition the Fisheries Division was aware of some problems related to the governance of this fishery in Barbados which may have had some bearing on the then current status of the local fishery. As a consequence of this, the Fisheries Division at the outset took a conscious decision to partner with fishers and other stakeholders in an effort to come to grips with the problem of resuscitating the fishery.

Throughout most of the moratorium the Fisheries Division was not able (due to organizational capacity constraints) to systematically study recruitment levels and thus was unable to generate the data and information necessary to inform desired consultations with stakeholders. At the same time, however, the Fisheries Division determined that there was continuous moderate to heavy illegal harvesting of sea urchins especially along the east and south coasts of

the island. The west coast contains no significant sea urchin aggregations. This widespread poaching further confounded efforts of the Fisheries Biology Unit to gauge the effects of the moratorium on urchin populations.

While the Fisheries Division enjoyed some success in prosecuting poachers, unfortunately the risks associated with, and clandestine nature of, illegal harvesting drove the value of sea urchin roe to between EC$25 and EC$30 per pound (2.2 lbs =1kg). At such prices illegal harvesting fed upon itself. At the same time, for reasons not yet fully explained, the demand for roe appeared to increase.

Both fishers and the general public became impatient with the prolonged no-take moratorium. Their discontent eventually prevailed upon policymakers who, in turn applied pressure in 2008 on the fisheries authorities to undertake some form of definitive action (preferably re-opening the fishery).

In April of 2008 the Fisheries Division received a grant through the Centre for Resource Management and Environmental Studies (CERMES) at the University of the West Indies (UWI) under the Marine Resource Governance in the Eastern Caribbean (MarGov) small grant program for a sea urchin governance project in Grenada. The Agency for Rural Transformation (ART), a local NGO, was written into the project mainly to assist with financial transactions.

## 2 CERMES – MARGOV SEA URCHIN GOVERNANCE PROJECT

The purpose of the project was to develop a draft Fisheries Management Plan (FMP) and governance arrangements for the Grenada sea urchin fishery using an ecosystem approach to fisheries with attention to social and ecological systems and networks.

Under the project the following activities were to be undertaken:

- Engaging stakeholders (especially fishers) in a partnership to arrive at a satisfactory governance strategy
- Conducting ecological surveys to determine the recruitment and population levels (biomass) of sea urchins
- Conducting social-ecological surveys of fisheries settlements
- Data analyses
- Workshop/consultations among stakeholders to examine management options
- Workshop/consultations among stakeholders to develop a draft FMP
- Final reporting, possibly at the Gulf and Caribbean Fisheries Institute (GCFI) including a summary of lessons learnt.

## 3 DESCRIPTION OF THE WHITE SEA URCHIN FISHERY IN GRENADA

The Grenada sea urchin fishery was small scale and traditional. Urchins were harvested close to shore either using small oar-powered open wooden pirouges or from the shore with feed bags to contain the catch. The main gear used by fishers was a diving mask occasionally supplemented with a snorkel and diving fins.

There were very few regular sea urchin harvesters. Sea urchin harvesting was occasional as well as opportunistic. Harvesters ranged from school children to executives – in between were the

low income groups and those residing on the coast that simply made use of the easy access to the resource. The roe was mostly consumed by the harvesters themselves but sometimes it was processed by roasting within the test and sold locally in the village or nearest town to augment income. Thus traditionally, and almost up to the moratorium, the harvesting of sea urchins was at best subsistence in nature. However, it is important to note that sea urchin harvesting was never important in Carriacou and Petite Martinique and it is true to say that they never had a viable sea urchin fishery.

Due to the supplementary and/or subsistence nature of the fishery it is very difficult to determine accurately the quantity of persons involved in the fishery. With the onset of the moratorium this became even more difficult because of the natural reluctance of persons to admit to an illegal activity.

Although a draft FMP existed for the fishery there were no attempts to institute active management. The fisheries authorities did not perceive a need for specific management measures given the fact that the resource had been utilized for generations in its traditional manner without any apparent ill effects. However, during the term of the Peoples' Revolutionary Government (1979-83) management was imposed in the form of a closed season. This closed season was applied to all shellfish (lobsters, turtles and sea urchins) from May to August. It is not clear why, except to manage in a general way, sea urchins were included in a closed season that previously applied to only lobsters and turtles.

The subsistence sea urchin fishery was transformed to a commercial one during the latter half of the 1980s and this continued into the first half of the 1990s. This was occasioned by a sharp increase in the demand for urchin roe on the export market. Fisheries Division data records show that during that period 28,324 kg of roe valued at EC$952,765, were exported. Prior to this very little, if any, roe was exported commercially. The main export markets were Barbados followed by Canada and French Martinique. The increase in demand elevated fishing effort in terms of time fishers devoted to harvesting and the fishing gear employed. In the south harvesters began to utilize scuba gear and the fisheries authorities suspected that this gear may have been used elsewhere on the east coast.

The draft FMP for the sea urchin fishery recognizes under the heading *Resource Status* that the "sea urchin is particularly vulnerable to overfishing because it occurs close to shore, is virtually immobile and harvested for its gonads." The fishing pressure exerted on the resource in order to satisfy the growing external market did not allow for sustainable fishing and as a result the populations collapsed. It was the view of the Fisheries Division, as well as that of the fishers themselves, that the fishing onslaught alone negated any environmental factors that could (or may) have contributed to sea accelerated urchin mortality. Under the circumstances the Fisheries Division felt it had no other recourse than to declare an immediate and indefinite no-take moratorium on this fishery.

## 4 THE GOVERNANCE PROCESS

The governance process was launched at a meeting/consultation in April 2008 at the town of Grenville on the east coast. Those invited to participate (apart from fishery officials) included fishers from the community who were known to harvest sea urchins prior to the moratorium.

Also in attendance was Dr. Patrick McConney (who monitored the project) and researchers from the University of Manitoba accompanying their graduate student, Ms Roxann Nayar[1].

During that meeting Dr. McConney described the sea urchin fishery in Barbados, in particular the process utilized there to arrive at an effective management strategy. This process depended to a large measure on fisher input aimed at arriving at some co-management arrangement for the fishery (Parker 2005). A similar process was employed in St. Lucia (De Beauville-Scott 2008). In the two countries governance initiatives went as far as bringing groups of fishers from Barbados and St. Lucia together to share experiences and assist each other at arriving at a sustainable management strategy for the fishery (CCA, CANARI and LFCC 2003). The Grenadian fishers present were enlightened by the experiences in Barbados and St. Lucia and took the opportunity to compare the Grenada situation with the others and thus, even at that stage, anticipate what the governance process would entail.

The intended steps to be followed in developing an urchin FMP in Grenada that would be both workable and acceptable to stakeholders were explained by fishery officials. These included ecological and socio-economic surveys and consultations. The reasons for those and the expected outputs were also clarified. Of equal importance was the role fishers and other stakeholders were expected to perform throughout the process. It was at this meeting that the fishers pledged their support in executing the activities under the project.

### 4.1 Ecological survey

The impact of the moratorium on sea urchin populations had to be scientifically determined as far as was possible. In a similar way the Fisheries Division was interested in measuring the negative effects of illegal harvesting. In order to accomplish this, the Fisheries Biology Unit selected 12-16 index sites. Four of these index sites were at Carriacou although Carriacou does not have a history of sea urchin harvesting. The sites at Carriacou served as comparisons (fished vs un-fished) to the sites surveyed in Grenada (Figures 2 and 3).

Except for Carriacou each index site was surveyed by divers using 30m x 1m randomly placed belt transects. The number of transects per site was not uniform since some sites were larger than others. At the same time a sample of urchins was taken and examined onboard the boat. The examination consisted of measuring the diameter of the test using a calipers and then cracking the test to expose the gonads in order to determine the stage of development.

From the transect results, density per site (expressed as number of urchins/$m^2$) was estimated. Gonad maturity and an estimate of gonosomatic index were determined during test examination. In the case of the latter the surveyors concluded that this part of the survey needs to be repeated. Table 1 is a summary of the ecological survey.

[1] Ms. Nayar was about to commence her MSc research programme on the sea urchin fishery in Grenada.

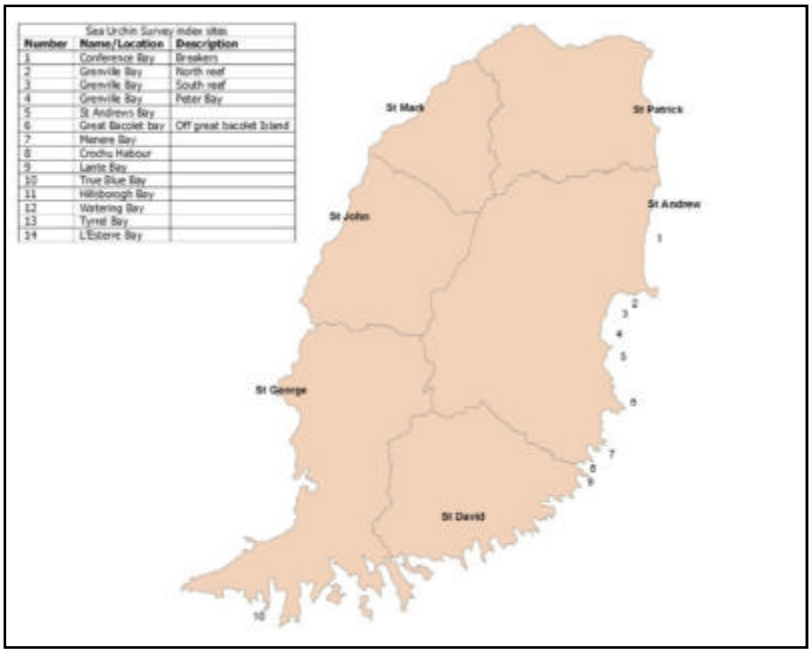


**Figure 2 Grenada index sites**

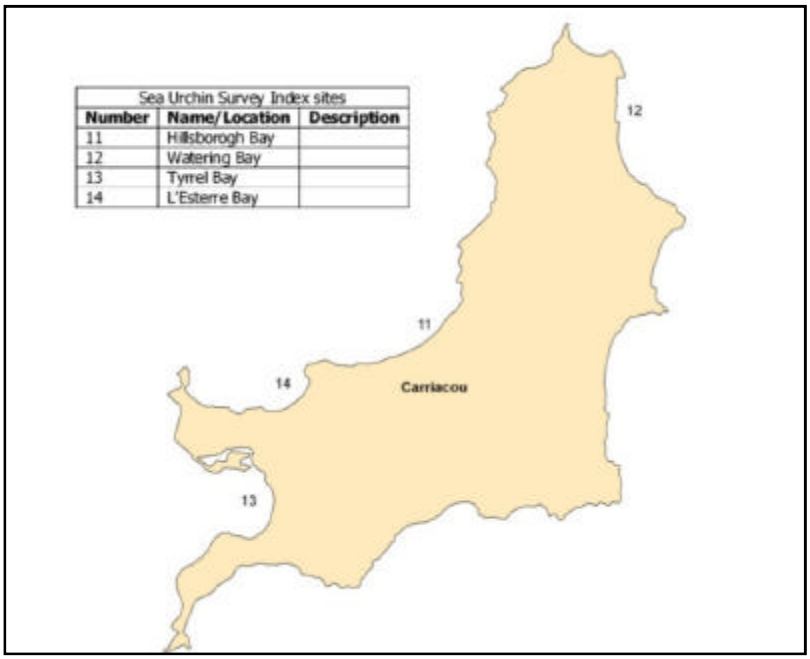


**Figure 3 Carriacou index sites**

Strictly speaking the sites at Carriacou were not index sites in the sense of being areas of active harvesting historically. Since Carriacou never had an active fishery these sites were chosen on the basis of being the most likely to be targeted for harvesting in an open fishery. This assessment was based on their accessibility to coastal communities. The surveys there consisted of random rover dives with rough video transects.

**Table 1 Summary of 2008 ecological survey results**

| SITE/AREA | ASSOCIATED BENTHOS | AVG. DENSITY (#/m²) | SIZE RANGE (mm.) | OBSERVATIONS |
|---|---|---|---|---|
| **Conference bay** | Dead coral substrate with algae and algal turf | 5.5 | 75 - 90 | Mature SE.<br>Even distribution, no clusters |
| **Great Bacolet Bay** | Sandy substrate with brown algae | | 71 - 85 | Mature SE.<br>Did not merit survey.<br>Evidence of poaching. |
| **Grenville bay** | Turtle grass interspersed with sand and coral rubble | 1.18 | 73 - 111 | |
| **Grenville bay (Marquis island)** | Mainly sand with patches of brown algae and coral rubble. | 22.6 | 84 - 110 | Mature SE.<br>Mainly large clusters made counting difficult. |
| **Grenville bay (South reef)** | Hard coral with algal turf | 3.4 | 72 - 93 | Most mature or ripe.<br>No clusters but individuals fairly close. |
| **Hope/Crochu bay** | Coral rubble and sand | Very low | - | Few SE.<br>Evidence of poaching. |
| **Menere bay** | Coral rubble and sand | Very low | - | Did not merit a survey.<br>Evidence of poaching. |
| **Offshore Bacolet island** | Coral rubble and sand | Very low | - | Did not merit a survey.<br>Evidence of poaching |
| **Peter bay** | Coral rubble and sand | Very low | - | Did not merit a survey.<br>Evidence of poaching. |
| **South Glovers island** | Sand with coral rubble interspersed with turtle grass. | | - | |
| **North Glovers island** | Coral rubble with algae and sea grasses. | | - | |
| **Bamboo** | Sand coral rubble and algae. | | - | |
| **Hillsborough bay** | Sand with thick green filamentous algae and mid-rib sea grasses | Small clusters | - | Basically two (2) belts of SE at approximately 5 and 70 -90 m. offshore |
| **Windward bay** | Turtle grass and coral | High | - | Lower density of SE on sea grasses than on reef.<br>Evidence of spawning. |
| **Tyrrel bay** | Mid-rib sea grasses in sand | Fairly dense and uniform | - | Distribution fairly uniform throughout.<br>Evidence of spawning. |
| **Paradise Bay** | Patches of turtle grass in sand | Fairly dense | - | SE dispersed in sea grass patches. Opened test indicate higher volume of roe than other areas. |

Based on analysis of the survey results the surveyors concluded the following:

- There is a vast difference in densities of sea urchins in the areas surveyed which implied that poaching continued to be a problem in the sea urchin fishery, especially in the east and south east of mainland Grenada
- The Carriacou populations are basically intact
- Maturity of the gonads vary from site to site (i.e. not strictly temporal)

Low to non-existent recruitment observed in certain sites was cause of concern especially in connection to post-planktonic settling of juveniles. The recovery of such sites is very uncertain.

### 4.2 Socio-economic survey

This activity proved problematic because of lack of personnel, logistical arrangements and reluctance of citizens to divulge information. The latter arose from the fact that harvesting of sea urchins is illegal and so persons were suspicious of even innocuous questions – bearing in mind the number of persons goaled for this activity. This too is another activity that has to be revisited.

### 4.3 Stakeholders' consultations

Having completed the ecological surveys and engaged fishers in informal discussions the Fisheries Division thought it appropriate to meet with stakeholders in a second consultation. This consultation too was held in the town of Grenville (31 January 2009) and was attended by fishers from both the south and east of the mainland. The Chief Fisheries Officer also participated in this consultation (Figure 4). During this activity those present deliberated on the following main topics:

- Review of the governance process and progress to date
- The results of the ecological survey of index sites
- Specific management issues that arose from the above and others to be considered
- The main options to be included in the draft FMP together with an action plan

Presentations were made by the biologists of the Fisheries Division concerning progress made since last meeting as well as results and conclusions concerning the ecological survey. From the outset participants made it clear that their livelihoods were not dependent on sea urchins although everyone agreed that limited access to the fishery was desirable. During general discussions the participants agreed that any FMP for the fisheries should include the following options:

- Prohibition of exports of urchin roe (considered to be the main driver of overfishing)
- A complete ban on the use of scuba gear to harvest sea urchins
- Open and closed seasons
- Consideration of a permit system to control access to the fishery
- Designated landing site (to ensure appropriate data collection and monitoring of fishing)
- Continuous monitoring of harvesting sites to avoid population depletion and to monitor environmental factors such as water quality and pollution.
- Mapping of sites to determine the extent of sea urchin distribution.

**Figure 4 Stakeholders discussing draft sea urchin FMP for Grenada**

Despite the above, participants were not clear on how a permit system should operate in practice (e.g. determining the criteria for issuing permits, the total number of permits, transferability etc). The question of the appropriate time of year for opening the season was debated but not agreed upon, as well as the suitable length of the open season. However, participants arrived at consensus on the need to eliminate bad practices by harvesters especially with regard to "testing" the maturity of the urchin before proceeding to harvest. Of critical importance also was the issue of compliance. Fishers felt that they had the motive and the means to assist fisheries authorities directly provided they were empowered (by being legally deputized) to do so.

Some issues that were discussed concerned the ecosystem, especially that of habitat change and/or destruction mainly as a result of hurricanes Ivan and Emily (2004 and 2005 respectively). Some fishers reported large aggregations of urchins offshore in what are normally conch grounds and speculated that there had been large migrations from shallow waters. Concerns were also raised regarding other factors of an environmental nature that may have influenced low densities in shallow waters such as sustained high water temperatures and land-based pollution.

The Fisheries Division was charged with distilling the discussions into a draft FMP for the sea urchin fishery and circulation of the same to participants and other stakeholders for consideration and feedback prior to the next consultation to develop a final draft (see Appendices).

The third stakeholder consultation on sea urchin governance in Grenada was held on 31 August 2009, at the Fisheries Division conference room in St. George's. Although there was reduced attendance due to the fact that fishers from the south of Grenada were unable to attend, they communicated their wishes regarding preferable management options. This consultation was chaired by the Acting Chief Fisheries Officer and was attended by Dr. Patrick McConney from CERMES as well as Ms Roxanne Nayar from the University of Manitoba.

Having already studied the draft FMP participants dealt with dispatch with the issues that were troubling during the last meeting (e.g. the permit system, length and time of open season and compliance). Participants developed a *Provisional management plan (PMP) for the sea urchin fishery in Grenada* (Table 2). This plan is relatively complex in that it calls for detailed operational activities. For example, the management of the permit system is somewhat administratively involved as well as regulating the open sea seasons. On the positive side the PMP is characterized by its co-management qualities in that it incorporates specific roles for fishers and fishery authority. As it stands the PMP is envisaged to succeed only with inputs from

both partners. Another important feature arising out of this consultation was the acceptance of "closed areas" to fishing. This was not accepted prior to this meeting because "closed areas" were considered unmanageable at best, causing excessive fishing pressure on the "open areas", at worst. Its present acceptance was partly due to the recognized need to protect certain populations (perhaps for seed stock) and partly to the fact that certain sites were not expected to be fished in any event (due to accessibility, unsavory taste of the roe from urchins in the north of the mainland).

There was consensus that the following options must be part of the PMP:

a) There will be a permit system with permits purchased at a fee and valid for one season. These permits will be of limited total number and will be non-transferable.
b) Persons awarded permits must attend a briefing session to be informed of the "best practices" to be followed during harvesting.
c) Sea urchins must be landed at a designated site if the fisher is using a boat. If the fisher is swimming from shore he must report landings to an authorized person.
d) During the open season urchins may be harvested only during designated fishing days which will normally not exceed two consecutive days. Between fishing days fisheries authorities and fishers will conduct joint assessments of the stocks.
e) Use of scuba gear is prohibited.
f) Export of roe will not be permitted.

Given the prolonged moratorium, no one can reliably predict exactly how the PMP will operate in practice. However, there is general agreement that whatever deficiencies may be present, will only be identified and addressed by actual implementation of the plan. Therefore the fist open season will be considered a trial run.

### 4.4 Co-management: Commitments/Roles of Fisheries Authorities and Fishers

The implementation of the PMP will depend on separate inputs from both fisheries authority and fishers for its success. Each party's commitments and roles are outlined below:

FISHERIES AUTHORITY

- Invoke the relevant section(s) of the Fisheries Act with the aim of legally empowering selected fishers for the purposes of monitoring, data collection and ensuring compliance
- Train selected fisheries personnel in field techniques of scientific monitoring of populations, habitats and environmental parameters
- Establish and maintain a continuous monitoring regime for population assessments, habitats and environmental parameters
- Provide counterpart resources (financial, technical, human) to facilitate monitoring
- Arrange for the administration of the permit system and implement same (including the inclusion of specified conditions)

FISHERS

- Participate in required training activities
- Participate in joint monitoring , data collection and reporting
- Commit required resources (boats, personnel) to be used in monitoring activities.

**Table 2 Outline of the provisional management plan for the sea urchin fishery in Grenada**

| | |
|---|---|
| **TARGET SPECIES** | White sea urchin (*Tripneustes ventricosus)* |
| **LIFE HISTORY** | **Distribution** – Adults live on sea grass beds and coral rubble; eggs and larvae are planktonic for several weeks. Juveniles appear to settle in the same area as adults.<br>**Growth** – N/A, Grenada ripen seasonally<br>**Mortality** – 3 – 4 years (max)<br>**Spawning** – sexually mature at one year |
| **FISHING METHODS** | The sea urchin fishery is small scale. Sea urchins have traditionally been harvested close to shore by skin divers but just prior to the moratorium scuba was being used particularly on the south coast of Grenada. The gonads are considered a delicacy which has led to their high value as an export item. |
| **MANAGEMENT UNIT** | Since Grenada and SVG share the same shelf, joint management is indicated. Notwithstanding, the island shelf for juveniles and adults is more practical for management purposes. |
| **RESOURCE STATUS** | There are no estimates of potential yield available. The sea urchin is particularly vulnerable to overfishing because it occurs close to shore, is virtually immobile, and is harvested for its gonads. However, a marked decline in abundance resulted in a no-take moratorium being instituted in 1996. There is some concern that stocks in the south become unmarketable due to contamination from domestic sewage. This needs to be investigated.<br>In addition, survey results indicate extensive illegal harvesting in certain areas along the east coast to the extent that severely denuded grounds may deter post planktonic stage settling. Some other areas have shown satisfactory recovery (recruitment) while Carriacou has remained relatively stable due to the lack of a fishery. |
| **CATCH HISTORY** | There are no catch data available post moratorium declaration. Export data indicate that 28,324.2 kg of roe was exported from 1988 to 1997 (valued at EC$952,765). |
| **CURRENT REGULATIONS (NEW)** | 1. Institute **open and closed seasons** but with specific ***fishing days*** within each season which would not normally ***extend beyond 2 consecutive days***.<br>2. Institute **a permit system** – only persons in possession of permits may harvest. ***Special conditions*** will be attached to the permit.<br>3. Use of scuba is prohibited<br>4. Export of roe is prohibited<br>5. No-take moratorium at certain sites |
| **MANAGEMENT OBJECTIVES** | **Maintain current stock levels** in recovered areas. Continue **stock re-building** activities in depleted sites. |
| **ADDITIONAL MANAGEMENT MEASURES & PRACTICES** | Conditions of Permit:<br>• Compulsory attendance at briefings on **"Best Practices**" for harvesting urchins.<br>• Land catch at **designated landing site and/or compulsory reporting** of catch and effort to designated officer.<br>• **Improved data collection** of catch and effort and resource response to fishing pressure.<br>• **Continuous monitoring** of ecosystem and water quality parameters. |

## 5 CONCLUSION

The Barbados and St. Lucia experiences should inform governance of Grenada's sea urchin fishery. Demand for roe will maintain high prices which in turn will drive fishing pressure. Theoretically fishery management is the control of fishing effort, yet empirically it has been demonstrated worldwide that market forces alone can daunt even comprehensive attempts to impose best management practices. In modern times fishers have been driven to harvest species at ever lower trophic levels occasioned by the failure of management to protect higher value stocks (Pauly 2009).

In Grenada the white sea urchin roe became, pound for pound, the highest-valued fishery product. This ranking did not augur well for the survival of the stock but led instead to its failure to sustain a viable fishery. It is hoped that the joint approach initiated by Barbados and St. Lucia will continue until a satisfactory governance strategy is implemented for this fishery.

Throughout the process it emerged that certain factors need to be borne in mind in order for success to be achieved. These findings along with other information were shared regionally at the 2009 meeting of the Gulf and Fisheries Institute (GCFI). Among lessons learned were:

- A no-take moratorium on an easily accessible, sedentary species is virtually impossible to enforce. This is exacerbated if the moratorium is prolonged. Without an effective Monitoring, Control and Surveillance (MCS) program moratoria seem to have very little positive value.
- With increasing competition for access to resources (such as sea urchins, conch and lobsters), together with limited state resources, there may be no alternative to governance outside of co-management arrangements.
- Fishery management agencies should avoid allowing large gaps to occur in their knowledge of demersal resources. In this case the failure of the Fisheries Division to conduct regular assessments of urchin stocks – especially after two hurricanes, placed it at a serious disadvantage when engaging fishers because it had little knowledge to bring to the table.
- It is important to establish regular contacts with resource users. During this exercise the Local Knowledge (LK), as well as Traditional Ecological Knowledge (TEK) provided by fishers was critical in gaining insight into the positions they held regarding governance.

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# 7 APPENDICES

## 7.1 Small grant letter of agreement

**Letter of Agreement between the CERMES MarGov Project and the Grenada Fisheries Division in association with the Agency for Rural Transformation (ART) for a small grant to conduct research on "*Sea urchin fishery governance in Grenada*" (Implementation period May to November 2008)**

Background

The MarGov project will assist the Fisheries Division of Grenada to develop a draft fisheries management plan and governance arrangements for the Grenada sea urchin fishery, using ecosystem-based and sustainable livelihood approaches to fisheries management. The Fisheries Division is undertaking this in association with the Agency for Rural Transformation (ART) which will assist some implementation but mainly provide financial administration services on terms arranged with the Fisheries Division.

This grant seeks to contribute to MarGov project research at national and local levels of investigation by:

- Developing a fisheries management plan (FMP) for the Grenada sea urchin fishery, that has been closed since 1995, taking into account ecological, economic, social, cultural, and political information.
- Devising participatory governance arrangements that involve networks of fishers and their organisations in decision-making, with adaptive co-management as an arrangement for governance
- Capacity building among fishers to improve their effectiveness in communicating and influencing policy that enables self-organisation and develops adaptive capacity for governance and livelihoods.

Responsibilities

a) Of MarGov
- Provide funds according to the disbursement schedule as agreed to under the financing terms
- Advise applicant on research and reporting to ensure that the activity aligns with the MarGov project
- Provide technical and scientific support where feasible, or advise on sources of assistance
- Submit progress information to a multi-stakeholder monitoring and evaluation panel for review
- Use and share information on the activity widely as part of MarGov's communication strategy

b) Of the Grenada Fisheries Division in association with ART
- Implement the small grant activity as set out in the attached approved application which forms part of this letter and is subject to revision within the grant budget by mutual agreement from time to time
- Maintain the standards for research and information gathering that apply to the MarGov project
- Inform the MarGov project manager of difficulties or issues that threaten the success of the activity
- Hold intellectual property rights over data and outputs while providing MarGov free license for use
- Ensure that the grant is cost-effective, with tasks and spending completed within the grant period
- Maintain and submit records and reports to facilitate all monitoring, evaluation and communication

Financing terms

The grant is limited to BBD$17,500 or equivalent. The grant period may be re-negotiated. Payment will be made in three disbursements: 40% on commencement, 40% upon acceptance of an interim progress and financial report, and 20% upon completion and acceptance of all final outputs. The grantee will account for expenditure, but no receipts need be submitted except upon request. MarGov may terminate the grant due to failure to uphold responsibilities. Unused funds will be returned to MarGov at project end or upon termination of the agreement. MarGov has no obligation to cover expenses that exceed the grant amount.

Agreed to on 8 May 2008 by:

| | | |
|---|---|---|
| Patrick McConney<br>MarGov project | Justin Rennie<br>Fisheries Division | Sandra Ferguson<br>ART |

Attachment: Approved application dated 25 April 2008

## 7.2 Draft action plan for conducting a sea urchin population survey and generating a management plan

This work plan item has been frustrated over the past 5 years by lack of administrative and logistical support. As a consequence the FD has been unable to make any positive moves with regard to this fishery. The lifting of the fishing moratorium must be predicated on having the necessary information to determine where, when and how the various localized populations can withstand varying levels of fishing pressure. In the meantime the public is becoming impatient and the moratorium is often violated necessitating that some officers spend time and energy in prosecutions. There is a perception among some divers that there is an abundance of sea urchins. These same divers, understanding the basic requirements for reopening the fishery are willing to participate in whatever activity that the FBU considers their input helpful. Anecdotal evidence seems to indicate that in certain locations (including Carriacou) sea urchin populations are indeed robust.

This work plan item is aimed at answering this simple question: ***On what basis is the FBU recommending the re-opening of the sea urchin fishery (in whatever form) or the continuation of the no-fishing moratorium?***

| ACTIVITY | DEADLINE | REMARKS |
|---|---|---|
| 1.Review of status of survey & confirmation of additional data needs (*spawning times, review of survey sites, time lines)* | Jan. 31 | |
| 2.Sorting out of logistical requirements | Feb. 15 | Gear (including camera), boat readiness, ground transportation, arrangements for Carriacou, personnel (including volunteers – budget for technical support) |
| 3. Conduct & complete survey | Apr. 31 | |
| 4. Data analyses & mapping (GIS) | May 31 | |
| 5. Consider limited opening of the fishery | May 31 | |
| 6. Generate draft MP for discussion | Jun. 31 | With alternatives & recommendations |

## 7.3 Index sites for ecological surveys

***{Please note that the following index sites were selected for ecological surveys. Adjacent communities that may be targeted for the socioeconomic surveys may extend beyond the bays mentioned.}***

| **PRIMARY INDEX SITES** | **SECONDARY INDEX SITES** |
|---|---|
| 1. True Blue Bay & Glovers Island<br>2. Woburn Bay<br>3. Petite Bacaye<br>4. La Tante Bay<br>5. Chrochu Bay<br>6. St. Andrew's Bay<br>7. Marquis<br>8. Conference Bay<br>9. Windward | a) Petite Trou<br>b) Requin Bay<br>c) Marene Bay<br>d) River Antoine<br>e) Sandy & Green Islands<br>f) Sauteurs Bay<br>g) Isle de Rhonde |

| | |
|---|---|
| 10. Hillsborough Bay<br>11. L'Esterre Bay/ Harvey Vale Bay. | |

## 7.4 Interim report

Paul E. P Phillip and Crafton J. Isaac

Fisheries Biology Unit, Fisheries Division, Ministry of Agriculture, Forestry and Fisheries

1 September 2008

**INTRODUCTION**

The tentative scheduling for the implementation of this project (April to October) prudently factored in unforeseen circumstances that may serve to militate against the smooth progression of the project. The following all negatively affected the timely execution of different project activities and cumulatively resulted in the delay by a magnitude of 5 to 6 weeks.

- Key officers absence from the state
- Substantive duties
- The period of campaigning leading up to the general elections
- National carnival celebrations
- Availability of boat weather

Fortunately the availability of three volunteer assistants[2] restricted the extent of the delays. These assistants were both reliable and valuable in terms of their input in actual field work especially during the ecological surveys component of the project.

The initial activity related to this project was the inception workshop held at Grenville on April 17, 2008. The primary objective of that workshop was to introduce Miss Roxann Nayar to the sea urchin fishery in Grenada. Miss Nayar was about to commence graduate work (MSc) regarding Grenada's sea urchin fishery. In addition opportunity was also provided for interaction between officials from CERMES and the University of Manitoba. As well as to generate general discussion concerning the sea urchin fishery. Consequently that workshop served as foundation for the launch of the governance project as well as identifying key participants for the life of the projects.

Ecological surveys (population density, distribution, maturity) commenced on July 22 at index sites on the east coast of Grenada. Sites in Carriacou were surveyed on August 8. At present, index sites in the south are being surveyed.

A questionnaire for the gathering of socioeconomic information was developed but so far has been served only in Carriacou.

**ECOLOGICAL SURVEY METHODOLOGY**

Local scientists were grateful for a copy of the study conducted by Christopher Parker of the Fisheries Department of Barbados on sea urchin population dynamics at index sites in Barbados. In particular Grenada researchers

[2] Roxann Nayar – University of Manitoba graduate student, Zenisha Philbert – graduate of SGU marine biology major, Vanessa Sanderson – Data collector Trainee, Fisheries Division.

would have liked to repeat gonadosomatic investigations but time constraints and lack of adequate facilities precluded this aspect of the research. However, it is intended that data collection and determination of indicators in Grenada will commence as soon as circumstances permit.

A total of twelve (12) index sites were selected for the ecological survey (Appendix I). An index site is defined as an area with a history of commercial sea urchin harvesting. However it is important to note that the 3 sites at Carriacou do not strictly adhere to this definition since sea urchin harvesting has never been an important activity to the people of Carriacou.

At each site a specific "location" was selected and its longitude and latitude noted using a GPS. At location population densities and distribution were studied. For example the index site Grenville Bay had study/survey locations at *"North Reef"*, "*South Reef"* and "*Island Reef*" (these are all local names).

At each location quantitative assessments of population were conducted using a 30m x 1m belt transect. This consisted of a 30m fiberglass tape placed randomly along the bottom over which the surveyor swims from one end to the next holding a 1m stick centered along the tape. All urchins over which the meter stick passes are counted (Fig 1).

Fig1. Diver conducting transect survey of sea urchins in Grenada. Note the 1meter stick and the fiberglass tapeline which together are used to form the 30 sq. m. transect

In addition general notes were taken of the substrate type, sea conditions and weather. Bottom conditions at each site were photographed. A sample of sea urchins (>6) were removed from each transect location, the tests broken open onboard and the roe qualitatively determined for the following:

- Full or ripe
- Ripe & running (spawning)
- Spent
- Developing.

Because the sites around Carriacou were not strictly index sites the question of recovery from harvesting (or over harvesting) does not strictly apply. However, the four sites indentified (Hillsborough Harbour, L'Esterre Bay, Tyrrel Bay and Watering Bay) were selected based on the following considerations:

- They are well known by locals and mainland fishers alike to be "sea urchin areas"
- They are close to shore and are therefore easily accessible
- Arising from the above they are most likely to be targeted if and when the moratorium is lifted.

Surveys of the sites at Carriacou consisted of rover snorkel dives estimates of abundance through simulated video transects. Here also tests were opened and gonads inspected

Fig. 2. Sea urchin ground at Watering Bay in Carriacou.

A short questionnaire was developed in order to gather minimal socioeconomic information regarding perceptions of communities adjacent to survey sites concerning the sea urchin fishery. Three of these questionnaires were actually served in Carriacou. Attempts to serve additional questionnaires were deemed not necessary given that all other persons approached did not hold a particular opinion or had no interest in the fishery. The questionnaire has yet to be served on the mainland.

**NEXT STAGE**

It is hoped that toward the middle of October a second consultation will be held with stakeholders for the purpose of presenting and discussing survey results as well as generating a draft Management Plan for the fishery.

## 7.5 Report on the second stakeholders' consultation – sea urchin governance in Grenada. 31 January 2009

By Paul E. Phillip[3] and Crafton J. Isaac[4]

**VENUE: BAINS CONFERENCE ROOM, GRENVILLE, ST. ANDREW'S**

**1.BACKGROUND**

1.1 After a 12-year no take moratorium on the sea urchin fishery in Grenada there exists a general feeling among stakeholders (primarily fisheries) that there is a desire to consider re-opening the fishery. It is within this context that the SEA URCHIN GOVERNANCE IN GRENADA PROJECT was undertaken in order to develop a management strategy for the sustainable exploitation of this resource.

1.2 Funding for this project was provided by NOAA through the UWI-CERMES in Barbados. An initial consultation among stakeholders was conducted in August 2008 during which the activities under this project were launched. These activities (namely; ecological and socioeconomic surveys) are intended to provide the prerequisite information upon which stakeholders may base an adaptive Management Plan (MP) for the fishery during subsequent consultations. Hence the second stakeholders' consultation on January 31, 2009.

2.**THE CONSULTATION**

2.1 The consultation was attended by a total of 13 participants (including the project officers and the Chief Fisheries Officer) (Appendix 1.) Prior to the meeting a letter of invitation and an agenda were circulated to invited stakeholders (Appendix 2).

2.2 The consultation was opened with prayers and brief welcoming/housekeeping remarks by the Chairman (Crafton J. Isaac). Mr. Justin Rennie, Chief Fisheries Officer, then welcomed the participants and made brief remarks with reference to the importance of the exercise in developing a management strategy for the fishery. He expressed the hope for a greater number of participants.

2.3 In addition to the agenda a handout consisting of a summary table of the ecological survey results together with a discussion guideline was distributed to the participants (Appendix 3)

2.4 The first of two PowerPoint presentations (Appendix 4) was delivered by Crafton J. Isaac. During his presentation Mr. Isaac provided a brief background of the project as well as illustrations of the work done up to the time. These included the ecological surveys in Grenada and Carriacou as well as the methodology employed. It was recognized that the socioeconomic survey, especially on the mainland, was deficient as a result of time and human constraints. The people of Carriacou, with virtually no history of a sea egg fishery, displayed no particular interest in sea eggs or the future of the fishery. The presentation briefly touched on the results of the ecological survey especially to note the continued incidences of poaching on the east coast of Grenada.

2.5 The brief discussion which followed the first presentation centered around the need for comprehensive socioeconomic surveys (CFO), the problem of poaching (gain vs risks). Mr. Isaac pointed out that the discussion and those to follow will assist in forming a basis for a Draft Management Plan (MP) for the fishery.

[3] Fisheries Officer I (Biologist)
[4] Fisheries Officer II (Assistant Biologist)

2.6 The second PowerPoint presentation was by Mr. Paul E. Phillip (Appendix 5). This presentation focused primarily on the population surveys. During this presentation it emerged that:

- Some sites, particularly on the east of Grenada, had very low densities (<1.0/m² - 3.4/m²). In some cases no sea eggs were observed. Based on reports concerning these sites there is ground to suspect heavy poaching.[5]
- Populations at Carriacou appeared stable. This was expected given the fact that there is no fishery there.
- One location at Grenville Bay had a relatively high density (22.6/m²) which was probably due to the fact that its less accessible (depth) and highly visible -conditions that deter poachers.
- Most urchins were mature
- Overall, population density was not deemed a sound scientific basis for re-opening the fishery especially at some sites.

2.7 During discussions following the second presentation it was revealed by some divers who fish on the north east shelf of the mainland that sea urchins appeared in abundance on conch grounds. This raised the question as to whether the urchins were "driven" offshore (probably by inhospitable conditions). However the consensus was that the Fisheries Division needed to investigate the extent of this phenomenon.

2.8 Participants agreed to proceed to general conditions regarding management during the coffee break in the interest of bringing the consultation to an earlier conclusion. The following table summarizes the issues raised, suggestions made to resolve issues and consensus arrived at where applicable. The handout on management challenges and management options was used to guide discussions.

| MANAGEMENT ISSUES | POINTS DISCUSSED | SUGGESTIONS/CONSENSUS | REMARKS |
|---|---|---|---|
| COMPELLING REASONS TO OPEN THE FISHERY? | a)Lack of scientific (i.e. pop/biomass) basis<br>b)Harvest to protect sea moss beds (Calliste)<br>c)Lack of compelling livelihood issue . | a) Some areas can withstand limited harvesting<br>b)Illegal harvesting will continue regardless (high market) price | It was noted that many persons may wish to re-open the season for traditional/cultural reasons. But the consensus was that nobody actually made a living from sea eggs |
| OPEN & CLOSED SEASONS | a)There should be an open season not exceeding 3 months<br>b) Area restrictions?<br>c)Effort/access restrictions - licenses | a)The season should be opened from Feb to Apr but with the option for earlier closure if circumstances merit<br>b) There should be no area restrictions lest selected areas become overfished due to concentrated effort. Carriacou and Grenada should be opened at different times (why?)<br>c) A licensing system is | a) Fisheries felt that irresponsible harvesting (e.g. not testing the ground) does much damage. Therefore the FD should conduct public awareness campaign to promote responsible harvesting.<br>b) The issue of whether to permit use of scuba was not resolved but FBU is not supportive of the idea.<br>c) The question of issuing day |

[5] Some of the volunteers who accompanied the surveyors reported abundant sea eggs during their last spear fishing expedition in some of the areas.

| MANAGEMENT ISSUES | POINTS DISCUSSED | SUGGESTIONS/CONSENSUS | REMARKS |
|---|---|---|---|
| | | preferable to limit access only to knowledgeable/ conscientious fishers – but difficult to implement in practice | permits was also raised |
| MONITORING, CONTROL & SURVEILLANCE | a)The necessity of monitoring fishing activity was accepted<br>b)The need for data collection & fisher reporting was accepted<br>c) Restrict effort by banning the exportation of roe<br>d) Post season assessment is critical for adapting management plan | a)Fishers are willing to participate in monitoring fishing activity provided the FD cover expenses and issue appropriate IDs<br>b) Having designated/approved landing site will assist in data collection. Fishers should cooperate by providing reports as necessary<br>c) Export of sea egg roe should not be permitted<br>d)The FD must conduct a post season assessment to determine weaknesses/strengths, response of the resource & lessons learnt | a) Commitment to monitor came only from the fishers<br>b) No commitment of resources toward data collection was made by the FD<br>c) No commitment toward enforcement & post season assessment was made by the FD |

2.9 The issue of licensing generated much discussion and no solution to address this administrative problem emerged. With regard to licensing the following were noted:

- How many licenses to issue and to whom?
- How equitable will the licensing regime be (some fishers are members of co-operatives while some are not. Some fishers have boats while others do not)?
- Who decides on the criteria to be used to issue licenses?

**3. DRAFT MANAGEMENT PLAN**

3.1 The attached DRAFT MANAGEMENT PLAN FOR GRENADA THE SEA URCHIN FISHERY (Appendix 6) was generated from suggestions and points made during the consultation. It would be accurate to say that this draft MP represents (with one or two exceptions) the consensus arrived at concerning management issues raised.

3.2 Attached to the Draft Management Plan is an ACTION PLAN (Appendix 7) aimed at resolving specific issues that may mitigate against the MP being effective. Both documents will be circulated to participants in addition to fishery officials, co-operatives, SGU, UWI-CERMES and other selected individuals for their consideration.

**Agenda**

Welcome and housekeeping (Chair)
0910-0915- Brief remarks (CFO)
0915-0945- Progress report (C. Isaac)
0945-1000- Discussion
1000-1015- COFFEE BREAK
1015-1045- Presentation of survey results (P. Phillip)
1045-1130- CHALLENGES FOR GOVERNANCE -Round table discussion
1130-1200- Summary of discussion & preparation for group discussions of options
1200-1300- LUNCH
1300-1330- Group work - Governance options
1330-1400- Group report
1400-1430- Summary & way forward
1430-1435- Closure

**List of Participants**

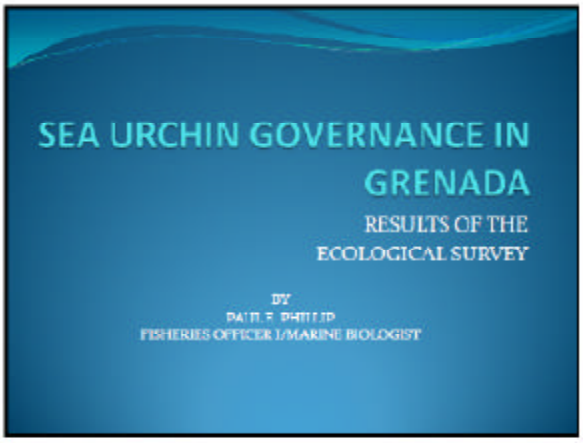
| | NAME | ORGANIZATION | CONTACT |
|---|---|---|---|
| 1 | Zeneshia Philbert | Undergraduate volunteer | |
| 2 | Vanessa Sanderson | Soubise, research volunteer | 536-9277 |
| 3 | Cathy Pope | Calliste Fishermen& Divers Co-operative | 439-0892/416-7088 |
| 4 | Alston Pope | Calliste Fishermen& Divers Co-operative | 439-0892/414-5037 |
| 5 | Javonson Plenty | Calliste Fishermen & Divers Co-operative | 444-2451/536-9037 |
| 6 | Raymond Caesar | Grand Bras, Fisher | 415-8467 |
| 7 | John Alexander | Soubise, Fisher | 420-7457 |
| 8 | Justin Rennie | CFO, Fisheries Division | 440-3814 |
| 9 | Agustus Williams | Tivoli, Fisher | 438-0058/456-5542 |
| 10 | Anthony Charles | Telescope, Fisher | 415-5885 |
| 11 | Donald Henry | Post Royal, Fisher | 403-0900 |
| 12 | Crafton Isaac | Fisheries Division, Project Officer | 440-3814/405-4363 |
| 13 | Paul Phillip | Fisheries Division, Project Officer | 440-3814/405-4357 |

## 7.6 Action plan for sea urchins in Grenada

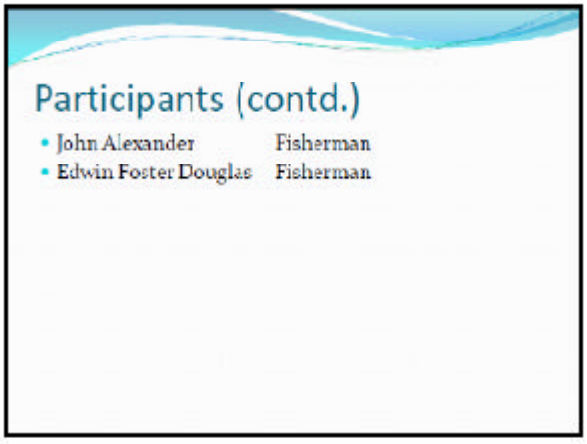
| ISSUES | ACTION | IMPLEMENTATION STRATEGY | RESOURCES REQUIRED |
|---|---|---|---|
| Unregulated fishing effort | Introduce relevant management measures | -Open & closed seasons<br>-Ban on scuba<br>-Licensing<br>-MCS | -Administrative<br><br>Admin/person/transport<br>-Admin<br>-Person/transport/equip |
| Habitat degradation & destruction | Control land-based pollution and coastal development particularly around south & east coast of | -Regular monitoring of habitats & water quality at and close to index sites and at control sites | Logistical/Admin/person /equip – including laboratory facilities |

| ISSUES | ACTION | IMPLEMENTATION STRATEGY | RESOURCES REQUIRED |
|---|---|---|---|
| | Grenada | | |
| Unknown extent of sea urchin distribution | Initiate efforts to map dispersal of populations | -Visits, survey & map sites especially based on fisher reports (LK &TEK) | Logistical/Admin/ accommodation/person /financial/equip/ participating stakeholders & other volunteers. |
| Inadequate resource information | Access available research info. Improve monitoring of landings and obtain fishing effort data | -Review of research data of B'dos & St. Lucia<br>-Restrict landings to designated sites<br>-Set up & implement data collection regime at designated sites supplemented with fisher interviews & observer trips | Logistical/Admin/ accommodation/ Person/financial/equip/ volunteers &<br>Fishers with boats |

## 7.7 Slides on the results of the ecological survey





## Methodology

- ***Equipment:***
- 30 meter transect line used with 1 meter measuring stick.
- Recording clipboard / paper
- Camera
- ***Method:***
- Transect Line is set on bottom, diver swims along the line and all sea eggs falling under the stick was counted

***Density*** = Number of sea eggs/30

E.g. # of sea eggs counted – 100

Density – 100/30

= **3.3 sea eggs/m²**

**Average Density = Density/# of transects**

## Results - Grenada

| SITE | ASSOCIATED BENTHOS/ SUBSTRATE | AVE DENSITY (#/M²) | SIZE R RANGE (cm.) | OBSERVATION |
|---|---|---|---|---|
| Conference bay | Dead coral substrate with algae/turf | 5.5 | 75-90 | Even distribution, no clusters |
| Great Bacolet bay | Sandy with brown algae | | 71-85 | Mature sea eggs Evidence of poaching |
| Grenville bay | Turtle grass, sand & coral | 1.18 | 73-111 | |
| Grenville bay (Marquis Is.) | Sand with brown algae & coral rubble | 22.6 | 84-110 | Mature sea eggs Large clusters difficult to count |

## Results (contd.)

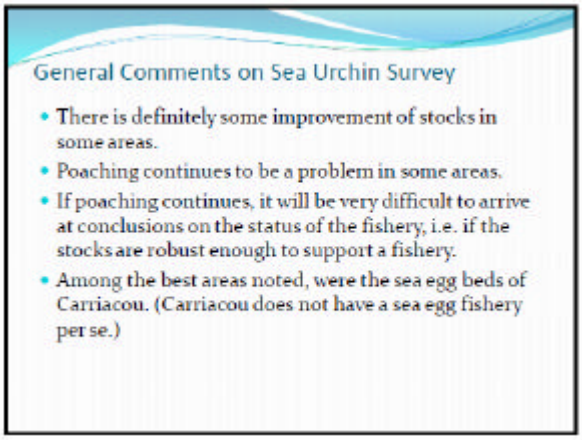
| SITE | SUBSTRATE | DENSITY | SIZE RANGE | OBSERVATION |
|---|---|---|---|---|
| Grenville (South bay) | Hard coral, algal turf | 1.4 | 72-93 | No clusters, even distribution |
| Hope/ Crochu | Coral rubble, sand, soft coral | Very low | | Very few sea eggs Evidence of poaching |
| Mt.view bay | Coral rubble, sand, soft coral | Very low | | Very few sea eggs Evidence of poaching |
| Offshore Bacolet Is. | Coral rubble, sand, soft coral | Very low | | Very few sea eggs Evidence of poaching |

## Results (contd.)

| SITE | SUBSTRATE | DENSITY | SIZE RANGE | OBSERVATION |
|---|---|---|---|---|
| Peter bay | Coral rubble, sand, soft coral | Very low | | Very few sea eggs Evidence of poaching |
| South Glover's Is. | Sand with coral rubble, turtle & manatee grass | 3.9 | 77-103 | Healthy sea grasses, evidence of recovery Last survey – 1.09/m² |
| North Glovers Is. | Coral rubble, algae, sea grasses | Very low | | Did not merit survey, last survey – 0.4 /m² |
| Bamboo | Sand, coral rubble, sea grasses | 1.2 | 75-98 | Survey interrupted by strong currents |

## Results - Carriacou

| SITE | SUBSTRATE | DENSITY | SIZE RANGE | OBSERVATION |
|---|---|---|---|---|
| Hillsborough bay | Sand, thick green filamentous algae, mid/rth sea grass | Small clusters | | Two belts of sea eggs at ~ 5 m. and 70-90 m. offshore |
| Windward bay | Turtle grass, coral | High | | Lower density than on reef, spawning noted |
| Tyrrell bay | Mid-rib sea grass in sand | Fairly dense and uniform | | Distribution fairly uniform throughout area, spawning noted |
| Paradise bay | Patches of turtle grass in sand | Fairly dense | | Dispersed on sea-grass patches |





## 7.8 Summary of consultation with sea urchin stakeholders to finalize management plans for the fishery

**Date: 31 August 2009**

**Venue: Melville St. Fishing Complex Conference Room**

**PARTICIPANTS**

| | NAME | ADDRESS | TELEPHONE # |
|---|---|---|---|
| 1. | Raymond Caesar | Grand Bras, St. Andrew's | 415-8469 |
| 2. | Anne Caesar | Grand Bras, St. Andrew's | 415-8469 |
| 3. | Anthony Charles | Telescope, St. Andrew's | 415-5885 |
| 4. | Donald Henry | Post Royal, St. Andrew's | 403-0900 |
| 5. | Sherman Henry | Post Royal, St. Andrew's | 403-0900 |
| 6. | Crafton Isaac | Fisheries Div., MSFC | 440-3831/405-4363 |
| 7. | Paul Phillip | Fisheries Div., MSFC | 440-3831/405-4357 |
| 8. | Patrick McConney | UWI-CERMES, Barbados | |
| 9. | Johnson St. Louis | Fisheries Div., MSFC | 440-3831/405-4358 |
| 10. | Roxann Nayar | Univ. of Manitoba, Canada | |

(N.B. No attendance by the fishers from Calliste although they did indicate that the consensus among themselves is that the exportation of sea urchin roe must be prohibited)

**AGREEMENTS**

That the sea urchin fishery be opened seasonally but not for extended periods and only under the following conditions:

- That government institutes **a permit system** that is valid only for **one season** at a time and for a fee. Permits will be limited in number and will **not be transferable**.
- Even during the open season **fishing for sea urchins without a permit is illegal**.

(N.B. Fisheries law states that all fishers must be licensed)

- Persons awarded permits **must** attend a briefing session in order to be informed of the "**best practices"** to be followed when harvesting urchins.

- Sea urchins **must be landed at designated landing sites** if the fisher is using a boat. If the fisher is operating from the shore (i.e. not using a boat) the he/she must report landings to authorized persons

- During the open season sea urchins can only be harvested during the designated fishing days which will normally be 2 consecutive days. After each of the consecutive fishing days a joint assessment of the stocks will be conducted prior to returning (or not returning) to continued fishing days.

- The use of scuba to harvest sea urchins will be prohibited.

- Exportation of sea urchin roe will not be permitted

**OTHER MANAGEMENT ISSUES**

**Monitoring**: The monitoring of sea urchin catches and population will be jointly conducted by the FD and fishers (using fishers' boats). However, the following conditions will have to be met :

- The FD will have to invoke the Fisheries Act in order to **empower selected fishers** to be effective monitors and reporters of fishing activities

- The FD recognizes that government **must commit technical (human & equipment) and financial resources** in order to monitor the fisheries as well as defray expenses associated with Monitoring, Control and Surveillance (MCS) of this fishery.

- The above must include the ability of the FD to deter fishing after the season closes

- The willingness of stakeholders (fishers) to play an active role in management was noted and welcomed.

**STOCK ASSESSMENT**

Frequent assessments of populations at index sites (i.e. fishing grounds) during and after the open season is necessary to avoid population collapse from overfishing.

The suggestion to keep certain sites closed (at least subject to very little fishing) was deemed worthy of revisiting. This has become especially important given the observed **zero and/or low recruitment** in sites that have been virtually fished out.

**ECOSYSTEM BASED ISSUES**

Participants noted that the damage occasioned by hurricanes Ivan and Emily to habitat integrity. They may have also impacted on the spatial distribution of certain populations (e.g. outside Bathway). The following were also discussed:

- The apparent movement of large numbers of urchins to conch grounds

- The possible effects of near shore warm/elevated temperatures on sea urchin movements

- The probable impact of near shore pollution on sea urchin movements

Therefore it was suggested that biophysical and biochemical parameters be considered during assessments and general monitoring.

## 7.9 Draft management plan for the sea urchin fishery in Grenada developed during the second stakeholders' consultation

| | |
|---|---|
| **TARGET SPECIE** | White sea urchin *(Tripneustes ventricosus)* |
| **LIFE HISTORY** | **Distribution** - Adults live on sea grass beds and coral rubble; eggs and larvae are planktonic for several weeks. Juveniles appear to settle In same area as adults.<br>**Growth-** N/A, Grenada ripen seasonally<br>**Mortality** – 3 – 4 years (max)<br>**Spawning** – sexually mature at one year |
| **FISHING METHODS** | The sea urchin fishery is small scale. Sea urchins have traditionally been harvested close to shore by skin divers but just prior to the moratorium scuba was being used particularly on the south coast of Grenada. The gonads are considered a delicacy which has lead to their high value as an export item. |
| **MANAGEMENT UNIT** | Since Grenada and SVG share the same shelf, joint management is indicated. Notwithstanding, the island shelf for juveniles and adults is more practical for management purposes. |
| **RESOURCE STATUS** | There is no estimate of potential yield available. The sea urchin is particularly vulnerable to overfishing because it occurs close to shore, is virtually immobile, and is harvested for its gonads. However, a marked decline in abundance resulted in a no-take moratorium being instituted in 1996. There is some concern that stocks in the south became unmarketable due to contamination from domestic sewage. This needs to be investigated.<br><br>In addition, survey results indicate extensive illegal harvesting in certain areas along the east coast to the extent that severely denuded grounds may deter juvenile settling. Some other areas have shown satisfactory recovery (recruitment) while Carriacou has remained relatively stable due to lack of a fishery. |
| **CATCH HISTORY** | There are no catch data available post moratorium. Export data indicate that 28,324.2 kg of roe was exported from 1988 to 1997 (valued at EC$ 952,765). There were no records of exports for 1988, 1989,1995 and 1996. |
| **CURRENT REGULATIONS** | None |
| **MANAGEMENT OBJECTIVES** | Maintain current stock levels in recovered areas. Continue stock rebuilding activities in depleted areas (How?) |
| **MANAGEMENT OPTIONS** | **Gear restrictions** – restricting and/or prohibiting the use of scuba gear<br>**Effort reduction** – no exportation, issuing of licenses, no scuba, closed season<br>**Co-management arrangements**<br>**Improved enforcement of best practices, (testing before harvesting)**<br>**Designated landing sites**<br>**Improved data collection** of catch & effort and resource response to fishing pressure.<br>**Habitat quality** (including water) monitoring to determine status |

## 7.10 Abstract of presentation made at 2009 GCFI

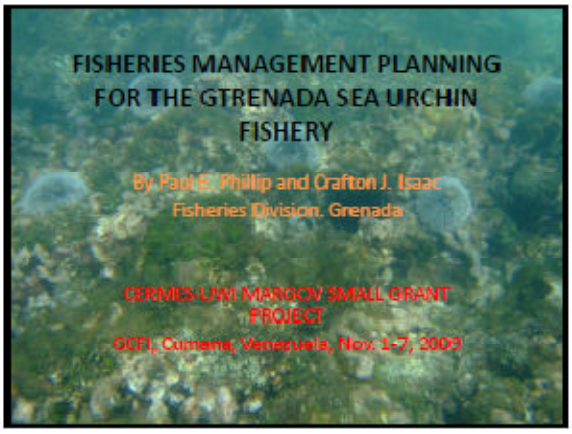
### Fisheries management planning for the Grenada sea urchin fishery

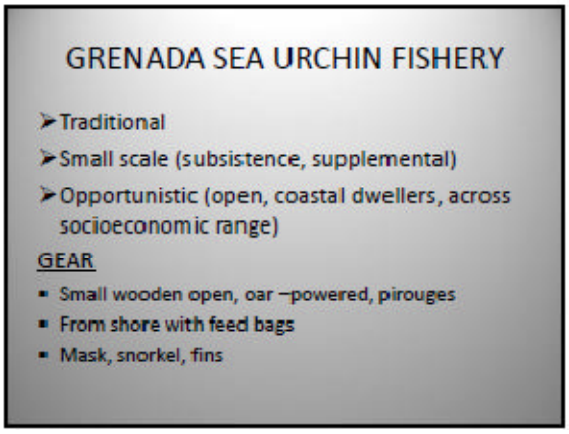
*Crafton Isaac and Paul Phillip, Fisheries Division, Ministry of Agriculture, Forestry and Fisheries, Grenada*

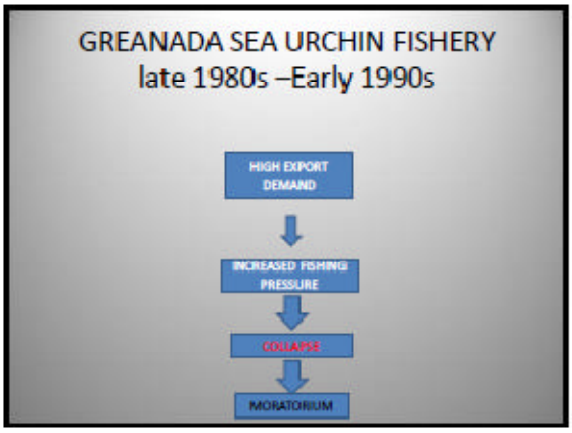
The depletion of sea urchins around Grenada, caused mainly by heavy commercial fishing for an export market, prompted the closure of the fishery by the government of Grenada over a decade ago. Since then there has been continuous illegal harvest and only modest recovery of urchin populations. This pattern is quite similar to that of the fisheries in Barbados and St. Lucia where the closures have not been for as long a period, but the fisheries have not been sustainable either. Pressure from resource users for the fisheries authority to open the fishery increased in 2008. Partly in response to this, but mainly as a continuation of its fisheries governance strategy, the Fisheries Division initiated a process for the participatory development of a fisheries management plan for the sea urchin fishery that would apply whether the fishery was opened or not. From April 2008 to the present there have been surveys at sea to determine distribution and abundance, workshops and meetings to share results with fishers and involve them in planning, and sessions of drafting followed by public consultation. This paper reports on a fisheries management planning process which may provide lessons applicable to similar situations.

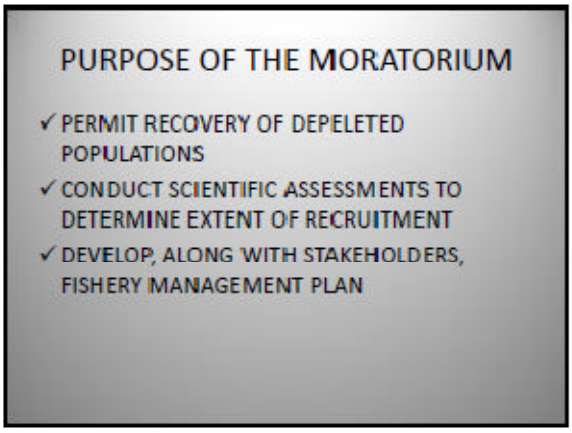
Key words: fisheries, governance, Grenada, urchins

## 7.11 GCFI presentation slides



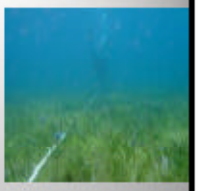



## THE PROBLEM OF ILLEGAL HARVESTING

## POACHING

## SURVEY METHODOLOGY & RESULTS



- ECOLOGICAL:
- SELECTION OF INDEX SITES
- BELT TRANSECTS , MATURITY
- & GONOSOMATC INDICES

- ECOLOGICAL
  - ☐ Great differences in sea urchin densities in surveyed site, implying that
  - ☐ Poaching still at high levels
  - ☐ Carriacou sites basically intact
  - ☐ Maturity varied within and between sites
  - ☐ SOCIOECONOMIC – Reluctant respondents

## CONSULTATIONS

## THE SEA URCHIN GOVERNANCE PROJECT 2008 MARGOV

- PURPOSE
- To develop a draft Fisheries Management Plan (FMP) and governance arrangements for the Grenada sea urchin fishery using an ecosystem approach to fisheries with attention to social and ecological systems and networks

## SEA URCHIN GOVERNANCE PROJECT (Con't

- ACTIVITIES
  - ✧ Engage stakeholders (fishers) in partnership - lead to governance strategy
  - ✧ Ecological surveys – recruitment
  - ✧ Socio-economic surveys
  - ✧ Data analyses
  - ✧ Workshops/consultations – FMP
  - ✧ Reporting

## MANAGEMENT PLAN FOR THE SEA URCHIN FISHERY IN GRENADA DRAFT Second Consultation

| | |
|---|---|
| CATCH HISTORY | There are no catch data available post moratorium. Export data indicates that 28,324.2Kg of roe was exported from 1988 to 1997 (valued at EC$ 952,765). There were no records of exports for 1988, 1989, 1995 & 1996. |
| CURRENT REGULATIONS | None |
| MANAGEMENT OBJECTIVES | Maintain current stock levels in recovered areas. Continue stock rebuilding activities in depleted areas (How?) |
| MANAGEMENT OPTIONS | Gear restrictions – restricting and/ prohibiting the use of scuba gear<br>Effort reduction – no exportation, issuing of licenses, no scuba, closed season<br>Co-management arrangements<br>Improved enforcement of best practices, (hatches before harvesting)<br>Designated landing sites<br>Improved data collection of catch & effort and resource response to fishing pressure.<br>Habitat quality (including water) monitoring to determine status |

## PROVISIONAL MANAGEMENT PLAN

After Review of Draft FMP

- 1.Institute open and closed seasons - but with specific fishing days within each season which would not normally extend beyond 2 consecutive days.
- 2.Institute a permit system – only persons in possession of permits may harvest. Special conditions will be attached to the permit.
- 3.Use of scuba is prohibited
- 4.Export of roe is prohibited
- 5.No-take moratorium at certain sites
- MANAGEMENT OBJECTIVES
- Maintain current stock levels in recovered areas. Continue stock re-building activities in depleted sites.
- ADDITIONAL MANAGEMENT MEASURES & PRACTICES
- 1.Conditions of Permit:
- Compulsory attendance at briefings on "Best Practices" for harvesting urchins
- Land catch at designated landing site and/or compulsory reporting of catch & effort to designated officer.
- Improved data collection of catch & effort and resource response to fishing pressure
- Continuous monitoring of ecosystem and water quality parameters.

## MAKING IT WORK: Committments

- Fisheries Authority
  - Legally empower fishers to monitor and report
  - Provide training to fishers in field monitoring techniques
  - Establish and maintain continuous monitoring program
  - Provide financial and other resources
  - Administer the permit system

## Commitments (con't)

- Fishers
  - ✓Participate in training
  - ✓Participate in joint monitoring, data collection, reporting
  - ✓Provide resources (boats, personnel) for monitoring etc

## LESSONS LEARNED

1. EXTENDED NO- TAKE MORATORIUM ON EASILY ACCESSIBLE SPECIES – DIFFICULT
2. SEA URCHIN AND SIMILAR RESOURCES RELY ON CO-MANAGEMENT ARRANGEMENTS
3. AVOID LARGE INFORMATION GAPS ON DEMERSAL STOCKS
4. MAINTAIN REGULAR CONTACTS WITH RESOURCE USERS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