

PETER A. MURRAY
OECS Fisheries Unit
Cane Garden
P.O. Box 846
Kingstown
St. Vincent and the Grenadines
West Indies

ABSTRACT

The thrust of fisheries resource management in the Organization of Eastern Caribbean States is perceived as being focused on the cautious increase in the exploitation of the demersal resources and an extensive development and management programme for the pelagic resources within the context of a common fishery zone policy. The OECS Fisheries Data and Information System provides the basis for the collection, compilation and storage of information necessary to facilitate the regional management programme. The characteristics and stock status of the fisheries of OECS Member States are broadly similar. These States have with similar fisheries-related problems for resolution. Some fisheries may still have scope for development even though overfishing and stock depletion can pose major problems. Recent studies have suggested a range of potential yield estimates for the reef fisheries, as well as for several tuna and tuna-like species within the region. The approach to fisheries management within the OECS is geared toward the co-ordination of the efforts of Member States in the exploration, exploitation, and management of Common Fisheries Zones in keeping with the provisions of the United Nations Convention on the Law of the Sea.

KEY WORDS: OECS, Fish Demersal, Overfishing

INTRODUCTION

The Organisation of Eastern Caribbean States (OECS) was established by treaty in June, 1981 to promote co-operation among its Member States, and to assist them in the realization of their obligations and responsibilities to the international community. Prior to the 1982 United Nations Convention on the Law of the Sea (UNCLOS), eastern Caribbean States pursued their fisheries management and development objectives individually and, some might say, in an ad hoc manner. From 1977 to 1981 the average contribution, at constant prices, of fishing to the Gross Domestic Product (GDP) of the islands that were to form the OECS was EC\$

Proceedings of the 47th Gulf and Caribbean Fisheries Institute

2.83 million (OECS Economic Affairs Secretariat, unpubl. data, 1994).

With the advent of extended maritime jurisdiction, and the obligatory provisions of UNCLOS, OECS members were placed in an established position to meet their fisheries management and development requirements within the framework of a harmonized fisheries programme. In 1991 OECS Member States signed an agreement establishing Common Fisheries Surveillance Zones. From a fisheries development perspective, the logical follow-up to the Common Fisheries Surveillance Zones would be the extension of the concept of common zones to include provisions that would reduce intra-OECS restrictions for the exploitation of Member States' fisheries resources. Subsequently, the OECS Authority agreed to extend the Common Fisheries Surveillance Zone agreement to a Common Fisheries Zone (CFZ) concept and, in 1992, agreed that the Common Fisheries Zone should be comprised of four separate zones based on the geographical location of its Member States.

At present in the Organization of Eastern Caribbean States (OECS) fisheries employ an average of about 2.8% of the workforce (Charles and Neverson, 1990). Fisheries contributed, at constant prices, an average of EC \$ 3.78 million to the national Gross Domestic Product for 1989-1993 (OECS Economic Affairs Secretariat, unpubl. data, 1994). Within the OECS Agricultural sector fisheries, with an output of EC \$ 55.9 M (US\$ 20.6 M), has been ranked second only to the Crop sub-sector in 1992, in terms of its contribution to agricultural output (Anon., 1994). On the average of EC \$ 6.3 M (US\$ 2.3 M) per quarter have been paid out as loans by commercial banks in the OECS to the fisheries sector (ECCB, 1993).

FISHERIES DATA AND INFORMATION SYSTEM

Within a common fishery zone policy context, the thrust of fisheries resource management in the OECS is perceived as being focused on the cautious increase in the exploitation of the demersal resources and an extensive development and management programme for the pelagic resources. The OECS Fisheries Data and Information System (FDIS) provides the basis for the collection, compilation and storage of information necessary to facilitate the regional management programme.

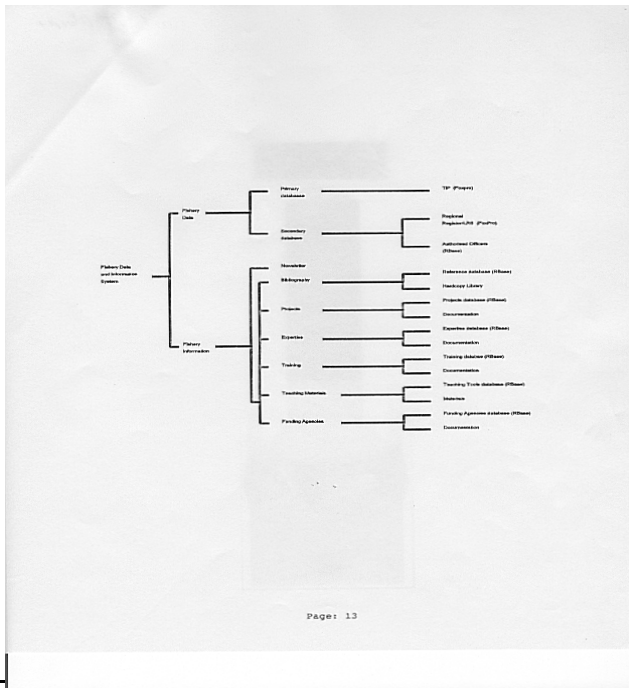


Figure
Fisheries Data and Information System.

1. OECS

The term FDIS can be used to refer to any of three specific, related aspects: the organization, the databases, and a network of information sources. In fact the term can also be used to refer to an overall “system” combining all aspects. In this section the system of databases will be the primary focus.

This system was initially designed to be made up of two major components: a Fisheries Data component and a Fisheries Information component. The data component being comprised of a primary and a secondary database. The primary database was envisaged as including five tables which would describe the structure of fisheries in the region. The Fisheries Data component of the system would also contain (as part of the secondary database) information on foreign fishing activity geared toward assisting Member States in the determination of the level of exploitation of regional fishery resources by extra-regional vessels. The secondary database containing historical fisheries data from OECS Member States, would

Proceedings of the 47th Gulf and Caribbean Fisheries Institute

include data from projects being carried out in the region, as well as any miscellaneous, or special, fisheries data.

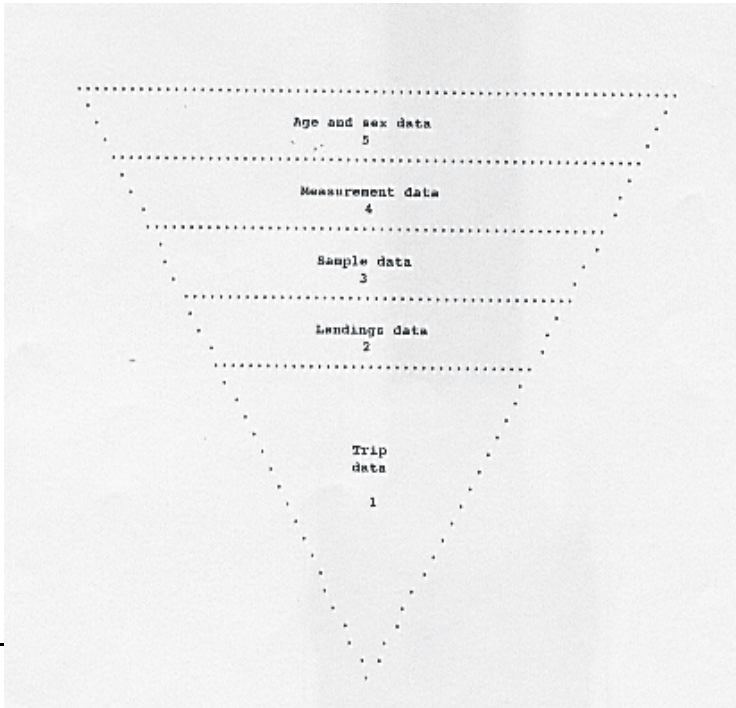


Figure 2.
Data

levels in the Trip Interview Program

As a result of a number of consultations on the FDIS, including the Mooney report on the implementation of the FDIS (Barry Mooney and Associates, 1990), the endorsement of the OECS Third Meeting on Fisheries Management and Development, and, more recently, initiatives within the wider Caribbean region such as the CARICOM Fisheries Resources Assessment and Management Program (CFRAMP; c.f. Anon., 1993), specific aspects of the system were perceived as requiring change from the original proposals. A new structure for the System has been devised (Figure 1). The functions of the primary databases will be achieved by use of the Trip Interview Program (TIP) developed by the US National Marine

Proceedings of the 47th Gulf and Caribbean Fisheries Institute

Fisheries Service's South-East Fisheries Science Center (NMFS/SEFSC) and adapted for use in the region with input from the OECS Fisheries Unit and CFRAMP. The program is written using the FoxPro data management system and the kinds of data which may be stored in this database are summarized in figure 2 (after Gold, 1990).

Fisheries structure information for each Member State would essentially be housed in a frame survey database within TIP. As well, a significant amount of the information on local vessels, fishers, processing plants, etc. would be stored in the national licensing and registration databases (LRS; c.f. figure 3), designed in conjunction with CFRAMP and programmed in the FoxPro data management system (Miller and Miller Ltd, 1993), based on the OECS Fisheries Registration and Licensing Scheme.

The foreign fishing activity aspect originally envisaged will be tied to the concept of the regional register which is to accommodate vessel registration data from all OECS Member States. As perceived at present, the register will be decentralized with individual Member States maintaining their national databases, while the OECS Fisheries Unit will maintain data on OECS, as well as foreign, vessels, that have been endorsed to fish within and among the Common Fisheries Zones. Overall, the registration and licensing system gives recognition to the need to strengthen the provisions governing conservation, enforcement, administration and management of fishing activities, including provisions in respect of registration, inspection and seaworthiness, vessel markings, catch and effort reporting procedures, and safety standards for local fishing vessels.

The secondary database containing historical and special fisheries data is essentially enshrined between the legal history database file of LRS (which also serves as the basis for the regional Monitoring, Control and Surveillance (MCS) system), and the information databases (figure 1).

The Fisheries Information System retains the content originally envisaged. The newsletter, "On Board" is seen as an integral part of the information system and is aimed at targeting the fishing industry in general. A two-page insert addressing market trends and related issues will from time to time be included.

The bibliography provides information on the authors of fisheries publications held at the OECS Fisheries Unit, the subject areas of study, reference titles and year of publication, as well as the disposition of the reference. The hard-copy library will be divided into six major categories:

1. Monographs
2. Serials
3. Abstracts
4. FAO documents
5. Workshop/Conference reports
6. References.

The projects database serves as a source of information on proposed and

Proceedings of the 47th Gulf and Caribbean Fisheries Institute

on-going fisheries research and development projects within the region. The expertise database provides access to information regarding fisheries experts in the Caribbean region. The training database provides information on training courses available to individuals from OECS Member States. The teaching materials database is to contain information on tools and materials for the dissemination of fisheries information among schools, fisheries co-operatives, technical institutions, and to fishermen within the OECS region. The funding agencies database contains information on organizations or agencies that provide assistance for fisheries development or research, contact persons within those agencies, the nature of the organization (whether governmental or non- governmental), the preferred type of agreement, and the nature of the assistance usually offered. As stated above, the data collection systems devised in the 1987 OECS/ICOD workshop on Fishery Data Collection Systems (Mahon and Rosenberg, 1988), with adaptations arising out of the 1992 CFRAMP Fisheries Data and Information Systems Sub-project Specification Workshop (Anon., 1993) and subsequent activities, serve as the basis for the gathering of fisheries data among OECS Member States with data and information flow as shown in figure 4.

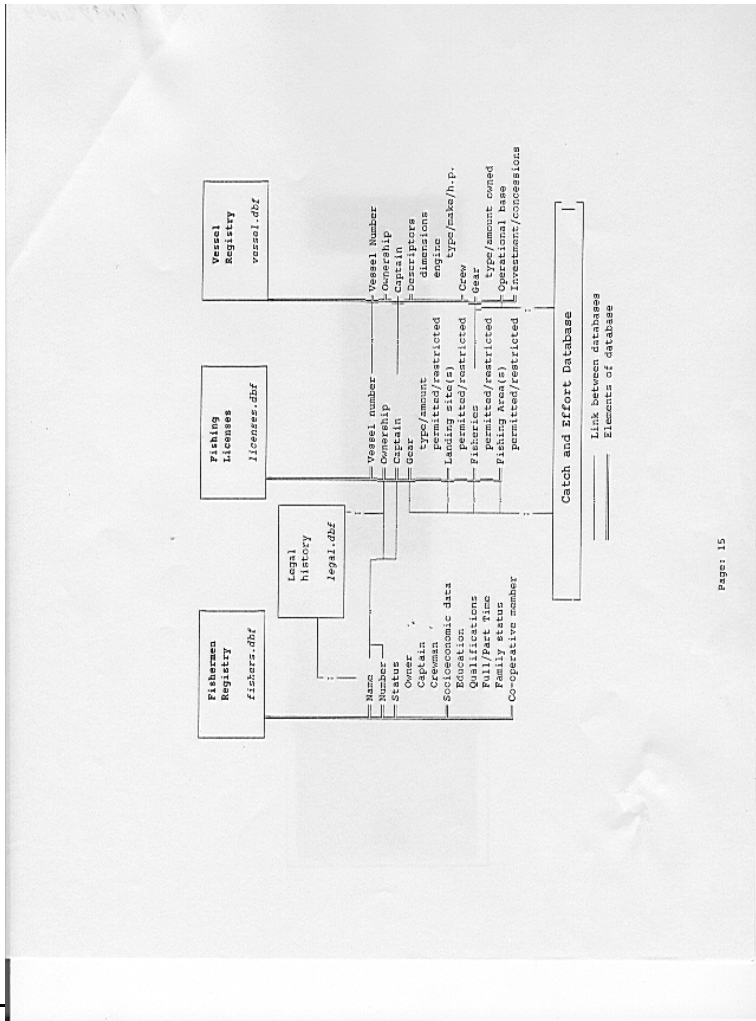


Figure 3. Licensing and Registration System: major elements of the database.

FISHERIES MANAGEMENT PLANNING

The characteristics and stock status of the fisheries of OECS Member

Proceedings of the 47th Gulf and Caribbean Fisheries Institute

States are broadly similar, and in all States, similar fisheries related issues need to be resolved. Some fisheries may still have scope for development even though overfishing and stock depletion may prove to be major constraints. For these island States, demersals and coastal pelagics are the species groups which appear to be the major targets for sustainable management initiatives, with the offshore pelagic fishery having scope for further expansion and development. In general, the major management objectives of Member States are to: develop their fisheries; rebuild stocks; and, achieve or maintain sustainability of stocks. The major developmental goals are to improve and increase employment; income from the fisheries; foreign exchange; food production; and, community stability. Major management concerns range from the question of the actual management measures of choice, to the likely impacts on fisherfolk, of the management measures instituted by the OECS Member States.

It is generally accepted within the OECS that the product of sub-regional data management efforts should be utilized within a fisheries management planning process that is characterized by sustainability, proactiveness, and flexibility. As part of this strategic planning process, consideration would need to be given, not only to fish population dynamics, but also to social and economic issues, the extent of community participation, as well as administrative procedures and mechanisms. The Organization's nearly 10,000 fishermen (OECS Fisheries Unit, unpubl. data) do not form a homogeneous group and hence selective yet incisive fisheries management strategies would need to be devised. It is felt that, though the fisheries should be managed to ensure their sustainability, management strategies should nonetheless be able to engender the conditions to either increase or stabilize fishers' earnings; thus, neither encouraging them to abandon nor to oppose these strategies. This approach is consistent with the concept that fisheries management should be more concerned with the management of the activities of the fishermen than the management of the fish.

Proceedings of the 47th Gulf and Caribbean Fisheries Institute

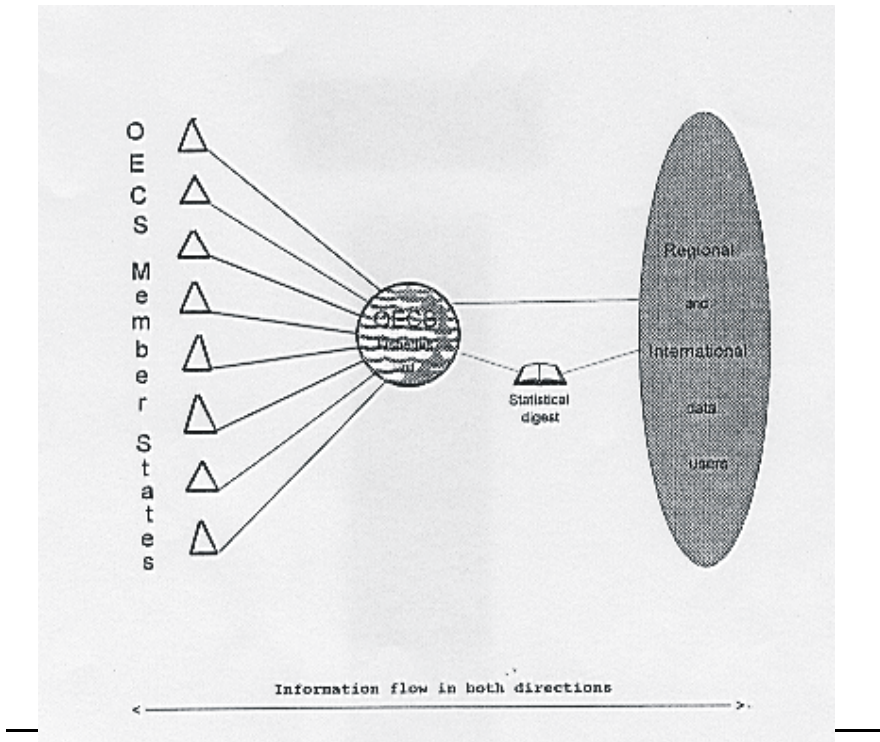


Figure 4. Approved fisheries data flow within the OECS.

It is the view of OECS Member States that the approaches to the development of implementation schedules for national fisheries management plans must therefore include consultations with resource users; the identification of critical developmental factors; the development of a case for management; quantification of the costs of management and enforcement; the regulatory process; monitoring, control and surveillance; and the need to determine whether national management plans should be customized within, or harmonized among, the States. It has already been determined, in the latter regard, that harmonization of national management plans should take place if and when possible or practicable.

It is felt that linkages between the fisheries management planning process, and other sectoral plans and institutions, should be facilitated with and through: MCS

Proceedings of the 47th Gulf and Caribbean Fisheries Institute

programmes; Tourism Departments, Ports Authorities, and other Coastal Zone users; Legal Affairs Departments; Planning and Finance Departments; Non- Governmental Organizations (whether conservation oriented or otherwise); and Community Development Ministries and Departments. These linkages, of course, would have to take cognisance of the very real issue of the nature of the stocks being exploited.

In general terms there are four basic types of fishery resources in the region:

- stocks that lie more or less completely within a single national jurisdiction
- stocks that are non-migratory but may be distributed over adjacent marine zones, with continuous availability in all zones
- stocks which undertake seasonal migrations across boundary areas and are available in each zone for a specific period of time during its migration
- stocks that occur in the high seas and are only partially available inside one or more national zones. (after Caddy, 1987)

The reef, deep slope, and bank, as well as the lobster, conch, and sea urchin fishery resources fall into either (and even both) of the first two categories, species like the wahoo and dolphinfish are now thought most likely to fall into the third, while the large tuna, billfish and some sharks find themselves being placed primarily in the fourth category.

THE ISSUE OF SHARED RESOURCES

In the OECS, pelagic fisheries are most important in the southeastern islands of St. Lucia, St. Vincent and the Grenadines, and Grenada (Gomes, et al., 1994). These islands exploit, inter alia, flyingfish (*Hirundichthys affinis*), dolphinfish (*Coryphaena hippurus*), kingfishes (Scombridae), wahoo (*Acanthocybium solandri*), and tunas. The fisheries are largely seasonal, primarily because of the migratory nature of many of them (ibid.). In general, most OECS Member States, including those located in the northeastern Caribbean for which the demersal species have traditionally been the more important, are increasing, or considering increasing, exploitation of their oceanic pelagic fish resources. It has been suggested (Hunte, 1987) that since preliminary analysis of relatively long time-series of catch and effort data from Barbados and the United States Virgin Islands showed no sharp decline in abundance, careful expansion of pelagic fisheries is probably justified. There is, however, the caution (ibid.) that:

(a) we remain ignorant of the stock structure of the majority of these species and, hence, do not know whether suggestions based on catch and effort data from one country are applicable to others

Proceedings of the 47th Gulf and Caribbean Fisheries Institute

(b) the suggestion that there has been no depletion of pelagic stocks was based on time-series of data from only two countries

(c) while preliminary information exists on the life history characteristics of two species of oceanic pelagics in the region (dolphinfish and flyingfish), short lived stocks like these are notorious (Hunte, 1987) for providing little indication of overfishing before a sudden collapse.

Recent studies within the Caribbean have supported the suggestion that the movements of regional pelagic stocks are not restricted to any single OECS EEZ (c.f. Neilson, et al., in press; Singh-Renton, 1994). Thus, effective management can only be achieved through co-operation between all States concerned, and stock assessment analyses require knowledge of stock distribution. Of similar importance are species like lobster, conch, and the snapper/grouper complex, which may be considered transboundary as a possible consequence of the random dispersal of their planktonic early life history stages across adjacent EEZs (Appeldoorn, et al., 1987).

The two main approaches to managing these stocks are: catch or effort allocations, and co-ordinated conservation oriented regulation (Mahon, 1987b). If catch or effort are to be allocated among States Parties, then a total allowable catch (TAC) or total allowable effort (TAE) will have to be estimated. Where States already “recognize that there is inadequate data for determining a TAC, ... they (have chosen) to implement co-ordinated regulations aimed at biological conservation” (ibid.). The harmonization of Fisheries Acts with the standardization of close season for lobster between St. Vincent and the Grenadines and Grenada, is an instance which exemplifies this approach.

STOCK STATUS

Notwithstanding the fact that on the broad regional scale, the choice has been to utilise methods of length-based analysis to obtain the necessary growth and mortality parameters required as inputs into holistic stock assessment models, at the very least, estimates of potential yield can be an important starting point in assessing the feasibility of fisheries development projects.

REEF, SLOPE, BANK, LOBSTER AND CONCH RESOURCES

These species are primary contributors to the relative diversity of OECS Member States being, in the main, directed towards local consumption. Lobster and conch are however often targeted for export. While the available data on these species are limited, recent studies on the coral reef fisheries in the Caribbean (Neilson et al., 1994) have suggested that the range of potential yield is 1.7 - 2.3 t km⁻² y⁻¹. Most recent annual landings of reef-associated species in Grenada as being 251 t, with the lower limit of potential yield of these species for that country being 2712 t (ibid.). Such an estimate may suggest that landings are considerably less

Proceedings of the 47th Gulf and Caribbean Fisheries Institute

than potential, but this does not necessarily mean that these fisheries are underexploited and ready to be expanded. Neither does it necessarily mean that catches are all being under-reported. While it might be argued that regional and national fisheries data collection systems are not as yet functioning as desired, the resultant biases do not appear likely to completely account for the differences between potential yield and estimated landings (Neilson, et al., 1994). On the contrary, it may be that the discrepancy observed is due to overexploitation. In fact, many published reports throughout the region (eg. Mahon, 1987a) have suggested that demersal stocks are overexploited.

The Caribbean Fishery Management Council (1993) has suggested that the removal of coral reef resources through harvest is likely to result in a net loss of these resources making them non-renewable in the typical fishery sense. This would mean that typical fishery management approaches may not directly apply to reef resources.

PELAGIC FISHERY RESOURCES

Recent estimates of potential yield of several tuna and tuna-like species within the wider CARICOM region, have been made (Singh-Renton and Neilson, 1994) based on ICCAT Maximum Sustainable Yield estimates (see table 1). There are notable discrepancies between the MSY-based estimates and the actual country yields. In countries such as Grenada and St. Lucia, with relatively high pelagic fishing effort, the actual yields meet or exceed the estimated yields. One of the possible reasons for these discrepancies, is that the assumption of uniform stock distributions, on which these estimates are based, may not be realistic (ibid.). These estimates can thus, of course, only be considered preliminary.

The assessment of the pelagic species can only be properly addressed if the information available is relevant to the whole area through which the stock is distributed. The standard methods of assessment assume that all the life stages of the stock have been adequately sampled over the whole range of stock distribution. In the case of migratory pelagic species the stock may not be accessible to the individual national fishery during certain periods or in particular areas of its distribution; additionally, samples from different areas may represent different components of the stock. Thus, lack of an accurate understanding of migration routes and stock structure can result. This means that there is first a need to examine stock distribution, structure and migration to assist in the determination of how management among countries can be co-ordinated, providing support to national, zonal, and sub-regional fisheries resource management, to allow for sustainable development of the pelagic fisheries of OECS Member States.

Proceedings of the 47th Gulf and Caribbean Fisheries Institute

Table 1. Possible share of large pelagic resources for some OECS Member States based on ICCAT MSY estimates prorated on the basis of size of marine area (after Singh-Renton and Neilson, 1994).

COUNTRY	Possible share of Species (t)						
	YFT	SKJ	BET	BLM	WHM	SWO	SAI
ANU	76	146	119	8	3	36	3
DOM	10	20	16	1	0	5	0
GND	19	37	30	2	1	9	1
MON	8	15	12	1	0	4	0
SKN	8	15	12	1	0	4	0
SLU	11	21	17	1	0	5	0
SVG	22	43	35	2	1	11	1

Legend to table 1.

COUNTRY	Species common name		
Antigua and Barbuda	ANU	bigeye tuna	BET
Dominica	DOM	blue marlin	BLM
Grenada	GND	sailfish	SAI
Montserrat	MON	skipjack tuna	SKJ
St. Kitts and Nevis	SKN	swordfish	SWO
St. Lucia	SLU	white marlin	WHM
St. Vincent and Grenadines	SVG	yellowfin tuna	YFT

STOCK ASSESSMENT INITIATIVES

While a number of preliminary studies have taken place within the sub-region

Proceedings of the 47th Gulf and Caribbean Fisheries Institute

(Finlay and Rennie, 1988; Goodwin et al., 1986; Mahon et al., 1990; Murray et al., 1992; Murray and Jennings-Clark, in press; Murray and Joseph, in press, etc.), in the absence of the necessary mechanisms these could not have had the sub-regional “flavour” necessary to pursue a Common Fisheries Zones (CFZs) policy. Regional stock assessment activities which maximise their perceived benefit, must now be developed among OECS Member States. At the wider CARICOM level, a number of such activities have been planned. These include studies on the:

- migration patterns of small tuna and tuna-like species;
- migration patterns and stock structure of Atlantic billfishes and large tunas
- marine habitat mapping

- mapping of the areas affected by ciguatera
- reef fish natural mortality and dispersal
- age and growth of fish.

Among the OECS Member States though, species perceived as warranting specific assessment work, either because they can serve as indicators of the status of the multi-species stock, or because they are themselves of importance to the fisheries of individual OECS Member States, include:

Pelagic fishes

dolphinfish, wahoo, yellowfin tuna, king mackerel, skipjack tuna, ballyhoo, jacks, robins, blackfin tuna.

Reef fishes

red hind, coney, blackbar soldierfish, doctorfish, yellowtail snapper, longspine squirrelfish, queen triggerfish, Nassau grouper.

Bank and slope fishes

yellow grouper, queen snapper, silk snapper, red snapper, vermilion snapper.

Invertebrates

lobster, conch, whelks.

The assessment activities must provide raw data which, when analysed, will assist and guide the formulation of appropriate, implementable, management actions, both at the national and sub-regional levels.

CONCLUSION

The holistic approach to fisheries management espoused by OECS Member States is geared, inter alia, toward: the development of the capacity of Member States to harvest the resources of the Common Fisheries Zone and fishery waters on a viable and sustainable basis; the co-ordination of the efforts of Member States in the exploration, exploitation and

Proceedings of the 47th Gulf and Caribbean Fisheries Institute

management of their Common Fisheries Zones and fishery waters based on the provisions of the United Nations Convention on the Law of the Sea; and, the development of the human resources of States Parties for the efficient management of their marine resources on a co-operative basis.

In all cases the assessment, and subsequent management, of the living marine resources of the OECS sub-region can only be adequately addressed if there is available information from the entire area of stock distribution. The range of stock assessment approaches normally considered in managing nationally owned stocks will have to come into play in managing these stocks. The States Parties to the OECS CFZ agreement(s) will have to agree on the management approach(es) to be utilized.

LITERATURE CITED

- Anonymous, 1989. Library Policy. Organization of Eastern Caribbean State Fisheries Unit. Unpublished mimeograph. 10p.
- Anonymous, 1993. Report of the subproject specification workshops for 1.1.2 Data and Information Systems, and 1.1.4 Licensing and Registration Systems. CARICOM Fish. Res. Doc. 11. CARICOM Fisheries Management Unit, Belize City, Belize. 122p.
- Anonymous, 1994. Review of Economic Performance of the OECS: lessons, experiences and actions to be taken. EAC 93/22/03. OECS Economic Affairs Secretariat, St. John's, Antigua and Barbuda. 64p.
- Appeldoorn, R., G.D. Dennis and O. Monterossa Lopez, 1987. Review of shared demersal resources of Puerto Rico and the Lesser Antilles region. pp. 36-106 in R. Mahon (ed.), 1987. Report and proceedings of the Expert Consultation on shared fishery resources of the Lesser Antilles region. Mayaguez, Puerto Rico, 8-12 September, 1986. FAO Fish. Rep. 383.
- Barry Mooney and Associates, Inc., 1990. Analysis and proposed implementation of a Fisheries Data Collection and Management System in the Organization of Eastern Caribbean States. ICOD contract 481 for Project 870132. 33p.
- Caddy, J.F., 1987. Types of resource sharing relevant to Lesser Antilles stocks. pp. 115-124 in R. Mahon (ed.), 1987. Report and proceedings of the Expert Consultation on shared fishery resources of the Lesser Antilles region. Mayaguez, Puerto Rico, 8-12 September, 1986. FAO Fish. Rep. 383.
- Caribbean Fishery Management Council, 1993. Draft Fishery Management Plan for Corals and Reef Associated Plants and Invertebrate for Puerto Rico and the United States Virgin Islands. Caribbean Fishery Management Council, San Juan, Puerto Rico. 192p.
- Charles, D.O. and S. Neverson, 1990. Report of the Eastern Caribbean Seafood Marketing Strategy Project. OECS Fish. Rep. 4. in m.s.
- Eastern Caribbean Central Bank (ECCB), 1993. Commercial Banking Statistics, December, 1993. mimeograph summary.

Proceedings of the 47th Gulf and Caribbean Fisheries Institute

- Finlay, J. and J. Rennie. 1988. Length frequency of selected species of oceanic pelagics from line catches of Grenada. pp. 73 - 78 in Western Central Atlantic Fishery Commission, 1988. National reports and selected papers presented at the Fifth session of the Working Party on assessment of marine fishery resources. St. George, Bermuda, 3-7 November, 1986. FAO Fish. Rep. 376(suppl).
- Gold, S.M., 1990. User's Guide for the Micro Computer based Data Entry Program of TIP, Trip Interview Program, Data Entry System Version 3.0. NOAA/NMFS/SEFSC. 233p.
- Gomes, C., R. Mahon, S. Singh-Renton and W. Hunte, 1994. The role of drifting objects in pelagic fisheries in the southeastern Caribbean. CARICOM Fisheries Resource Assessment and Management Program (CFRAMP) Large Pelagic, Reef and Slope fishes Assessment Subproject Specification Workshop, St. Kitts, 18-26 January, 1994. LPRSF Assessment SSW/WP/32:36p.
- Goodwin, M.H., S.J. Heyliger, and R.M. Wilkins, 1986. Progress report on the development of a management plan for the spiny lobster fishery. Fisheries Division, Ministry of Agriculture, Lands, Housing and Development, Basseterre, St. Kitts. 19p. Unpubl. MS
- Hunte, W., 1987. Summary of the available data base on oceanic pelagic fisheries in the Lesser Antilles. pp. 125-176 in R. Mahon (ed.), 1987. Report and proceedings of the Expert Consultation on shared fishery resources of the Lesser Antilles region. Mayaguez, Puerto Rico, 8-12 September, 1986. FAO Fish. Rep. 383:278p.
- R. Mahon (ed.), 1987a. Report and proceedings of the Expert Consultation on shared fishery resources of the Lesser Antilles region. Mayaguez, Puerto Rico, 8-12 September, 1986. FAO Fish. Rep. 383:278p.
- Mahon, R., 1987b. An overview of the management of shared stocks. pp. 185-191 in R. Mahon (ed.), 1987. Report and proceedings of the Expert Consultation on shared fishery resources of the Lesser Antilles region. Mayaguez, Puerto Rico, 8-12 September, 1986. FAO Fish. Rep. 83:278p.
- Mahon, R., F. Murphy, P. Murray, J. Rennie and S. Willoughby. 1990. Temporal variability of catch and effort in pelagic fisheries in Barbados, Grenada, St. Lucia and St. Vincent: with particular reference to the problem of low catches in 1989. FI:TCP/RLA/8963 Field document 2. FAO. 74 p.
- Mahon, R. and A.A. Rosenberg, 1988. Fishery data collection systems for Eastern Caribbean islands: proceedings of an OECS/ICOD workshop (Holetown, Barbados, June 15 - 19, 1987). OECS Fish. Rep. 2. 185p.
- Miller and Miller Ltd., 1993. Draft report on the preparation of a Licensing and registration manual for use with CFRAMP's LRS software package. Miller and Miller Ltd., Belize City, Belize. 95p.
- Murray, P.A., L.E. Chinnery and E.A. Moore. 1992. The recruitment of the queen snapper, *Etelis ocellatus* Val., into the St. Lucian fishery: recruitment of fish and recruitment of fishermen. Proc. Gulf Caribb. Fish. Instit. 41:297 - 303.
- Murray, P.A. and S. Jennings-Clark, in press. A preliminary look at exploitation of the

Proceedings of the 47th Gulf and Caribbean Fisheries Institute

- spiny lobster, *Panulirus argus*, in the St. Lucian Fishery. Proc. Gulf Caribb. Fish. Instit. 43.
- Murray, P.A. and W.B. Joseph. In press. Trends in the exploitation of the wahoo, *Acanthocybium solandri*, by the St. Lucian pelagic fishery. Proc. Gulf Caribb. Fish. Instit. 44.
- Neilson, J.D., K.A. Aiken, and R. Mahon, 1994. Potential yield estimates for reef and slope fisheries: a review of approaches and their limitations with special reference to the Caribbean. Presented at the CFRAMP Large Pelagics, Reef and Slope Fishes Assessment Subproject specification Workshop. St. Kitts and Nevis, January 1994. LPRSF Assessment SSW/WP/17:31p.
- Neilson, J.D., P.A. Murray, J.A. Finlay and J. Rennie, in press. Wahoo landings in the Lesser Antilles: biased samples cause problems for stock assessment. Contrib. #57, Proc. Gulf Caribb. Fish. Instit. 46.
- Singh-Renton, S., 1994. Preliminary determination of migration patterns of small tuna and tuna-like species in Caribbean Waters. CARICOM Fisheries Resource Assessment and Management Program (CFRAMP) Large Pelagic, Reef and Slope fishes Assessment Subproject Specification Workshop, St. Kitts, 18-26 January, 1994. LPRSF Assessment SSW/WP/32:14p.
- Singh-Renton, S. and J. Neilson, 1994. Potential yield of large tuna and billfish resources in CARICOM marine areas: a preliminary estimation. Presented at the CFRAMP Large Pelagics, Reef and Slope Fishes Assessment Subproject Specification Workshop. St. Kitts and Nevis, January 1994. LPRSF Assessment SSW/WP/19:37p.