UNITED ARAB EMIRATES

ENVIRONMENT AGENCY, ABU DHABI

I<small>MPLEMENTATION OF A</small> N<small>ATIONAL</small> F<small>ISHERIES</small> I<small>NFORMATION</small> S<small>YSTEM</small> (UAE-NFIS)

Project Plan and Structure

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1. Introduction

1.1 Context[1] of the contract

Fisheries provide a source of income, employment and recreation to inhabitants while contributing to the cultural heritage of the Emirate of Abu Dhabi. Fishing is primarily conducted from open fibreglass dories and wooden dhows, dome shaped traps are the most commonly used gear type although a variety of other methods exist. Catches are typically diverse and characteristic of multispecies tropical fisheries, target species primarily being composed of representatives of the families: Carangidae, Lethrinidae, Haemulidae, Epinephelidae and Scombridae.

Catch and effort data form the foundation of fisheries management. The outputs of effective fisheries information systems enable resource status to be monitored and evaluation of fisheries performance to be made, aspects crucial for informed management planning and decision making. In this context, the Terrestrial and Marine Biodiversity Sector of the Environment Agency – Abu Dhabi (EAD) is implementing the 'Fish Landings and Population Dynamics Project' the principal objectives of which include the collection of catch, effort and economic data and the production of fisheries statistics for the Emirate of Abu Dhabi. The project responds directly to the EAD's goal of developing a management regime for the fisheries of Abu Dhabi.

Since the inception of the Fish Landings and Population Dynamics Project in 2001, a stratified catch and effort data recording system for the Emirate of Abu Dhabi was set in place. Starting in 2005 a fishery data collection system was launched for the recording of species landed and of gear types used. A tailor-made fisheries database application was developed capable of storing the primary data, performing catch/effort estimates and producing fisheries statistical reports.

Experience gained during the aforementioned system implementation period has revealed that although the current system was well conceived there are nevertheless several application areas that need improvement, notably:

- Estimation of fishing effort by boat-gear category: Until now effort has been extrapolated on the basis of boat movements registered by the coast guard. This method cannot provide effort estimates by boat-gear since the latter is not reflected in the recordings.
- Estimation of fishing effort is not synchronized with the monthly collection of landings since it involves laborious screening of coast guard records in order to calculate total boat days for active boats. Such being the case the current

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[1] Most of the information in this Section was compiled from the Annual Fisheries Statistics Report for the Abu Dhabi Emirate, 2015

system cannot provide instantaneous catch/effort estimates that are essential for regular and effective fisheries statistical monitoring.

- The data collection procedures are well conceived and the enumerators have no difficulty in implementing the data collection protocols in use. The latter however are not based on strict statistical criteria with the result that the reliability of the resulting estimates is generally not known and not indicated in the reports (a prerequisite set-up by FAO and other fisheries agencies).
- At present the utility of the statistical outputs is limited to the production of annual reports. The database can indeed be interrogated at any moment but in the absence of ready-made statistical procedures users would have to formulate themselves database queries; such a practice requires a certain extent of database query knowledge that is generally not mastered by the average statistics user.
- There is a number of standard analytical procedures that ought to be integrated into the current database such as standardization of fishing effort and CPUE, multi-variate analysis of catch/effort variables, etc.

In view of the above problem points the Environment Agency of Abu Dhabi has decided to upgrade its current system in order to respond better to current and future needs. Such an upgrade would be carried out by means of the following twofold action:

(a) Revision of the data collection procedures (specifically those concerning fishing effort) and introduction of statistically sound data collection protocols for sampling landings and fishing effort.

(b) Adaptation of the internet system ArtFishWeb (introduced by FAO in 2011) to Abu Dhabi needs in a manner permitting its eventual expansion to the entire UAE.

This contract concerns the implementation of a fully operational internet system for the statistical monitoring of fisheries in the Emirate of Abu Dhabi (UAE). The system will be delivered in its entity (field operations and manuals, computer modules, database, training, documentation) within twelve (12) months after the first mission of the consultant. Details of the appointment are contained in the attached Terms of Reference in Annex A.

1.2 Objectives

The general objective of the assignment is to provide expert statistical and database advice, mentorship and training to the staff of the Environment Agency, Abu Dhabi, in order for them to effectively implement a statistically consistent and comprehensive National Fisheries Information Systems (UAE-NFIS), which would eventually be expanded for the entire UAE. Specifically the objectives of the contract are:

Strengthening the technical capacity of the Environment Agency - Abu Dhabi (EAD) by means of training in applied fisheries statistics and in operating internet-supported databases;

Setting-up a robust and sustaining statistical work frame for field and office operations for the effective statistical monitoring of fisheries in the Emirate of Abu Dhabi (UAE);

Implementing a web-based and integrated Fisheries Information System (NFIS) to be used for the fulfillment of statistical commitments to national user groups as well as to regional and international fisheries bodies.

1.3 Expected Results

Statistical outputs (shown as STnn in the Plan)

1. A sample-based fisheries statistical monitoring programme which will be tailored to fit with existing human and financial resources;
2. A fully trained group of national experts trained in all aspects of basic statistics, field operations and computer functions;
3. A fully operational Catch/Effort database that will be 100% internet-supported;
4. The Catch/Effort database will subsequently be upgraded to a National Fisheries Information System (UAE-NFIS) by incorporating information media automatically linked to numerical data;
5. Statisticians and researchers will be trained in the use of the database, selective extraction of statistical data and preparation of statistical publications, including analytical applications;

A guarantee period of six (6) months will be granted to the Client upon termination of the contract.

Training Specifications (shown as TRnn in the Plan)

1. Three manuals for computer operations (for the administrator, data operators and privileged users respectively;
2. Automatic HELP screen for all system functions;
3. Computer simulators for easier learning of basic statistical concepts in sampling;
4. Statistical textbooks adapted from FAO standard literature (FI/TP/388-425-454).
5. Training to be conducted at three levels: Field operations (sampling catch and effort), computer operations, statistical analysis. Each level will address different audiences.

The NFIS: General Features (shown as GFnn in the Plan)

The National Fisheries Information System will be used by partners to independently store, analyze and report catch and effort data, and other basic statistical monitoring variables such as prices, values, CPUE's, average fish weight, etc. The internet front-end database application will become an integral part of the Database Systems of EAD and hosted on its servers. The system shall:

1. Have an appropriate archiving mechanism;
2. Have an Arabic/English interface;
3. Be capable of recording and maintaining statistical standards (species, boat-gear types, stratification schemes, etc.);
4. Record and maintain sample data using data forms;
5. Perform statistical estimation procedures with controlled accuracy;
6. Run predefined queries and produce predefined reports;
7. Run ad hoc queries and produce ad hoc reports;
8. Exporting data and information using popular commercial packages (i.e. Excel);
9. Incorporate standard methodological tools as recommended by FAO and RECOFI.
10. Contain data security and data integrity functions;
11. Be capable of eventually becoming a component of a larger-scope application together with other statistical sectors.
12. Have advanced accessibility features and accommodate several levels of users such as Data Entry Operators, Data Supervisors, Application Administrators, Privileged Users, etc.

NFIS Database Technology (shown as DBnn in the Plan)

1. The NFIS shall be web enabled, so that it is functional to run from all standard Internet browsers.
2. It shall be optimized for web retrieval / updates. Its performance will remain the same over its entire life, thanks to the special database architecture employed in its development.
3. Users will operate completely autonomously, even if the same user re-opens the system from the same computer (or laptop or tablet or smartphone).
4. Uniform color, character and format shall be maintained in all the forms, following EAD portal standards. The reports shall bear standard titles and formats.
5. It shall be user-friendly with smooth movement among forms to complete the desired task and smart tips / error messages to help users.
6. It shall follow Windows application standards like cut, copy & paste to minimize typing in all text fields, enter / tab key to move to next field, Windows sorting methods and standard controls.

<u>Technical Reports (shown as RPnn in the Plan)</u>

1. Project plan and structure document;
2. Database Design and Data Dictionary Documents;
3. Technical specifications document;
4. Deployment plan;
5. Users' manuals at all levels (administrator, data operators, privileged users, etc.);
6. PhP source code with detailed documentation.

2. Mission 1: Objectives and expected results

The first mission had as objective the preparation of a one-year implementation plan and an initial statistical set-up with improved structure and operational modalities, including the adaptation of the FAO internet system ArtFishWeb to EAD needs.

The mission took place in Abu Dhabi during the period 5-20 November 2017. Its results (as per contract TOR; see annex A) were the following:

Table 1. Expected results of Mission 1

1	Meetings with stakeholders.
2	Consultations on system standards and referential data (species, boat-gear types, sites and ports, stratification scheme).
3	Consultations on the UAE-NFIS domain platform.
4	Drafting of data collection forms for catch/effort.
5	Set-up of UAE-NFIS referential data.
6	Set-up of sampling frame.
7	Preparation of data collection protocols (frequency and size of sampling).
8	Training/Workshop: - Basic training on sampling and discussions on alternative data collection scenarios. - Training on using data collection forms in line with data collection protocols.
9	Presentation/approval of a general workplan and of work to be carried out between the 1st and 2nd missions.
10	Submission of Mission Report 1

The mission results are discussed in more detail in Mission Report 1 submitted on 20 November 2017.

3. Project Plan and Structure

The project activities will be carried out in seven phases including four missions of the consultant. The total duration of the project is estimated to 1 year.

Table 1 illustrates the implementation phases and indicates those (shaded grey) that are to be carried out by EAD personnel in-between the consultant's missions.

Table 1 - Plan of project activities and results. Deliverables are coded as per Section 1.3 above.

PHASE	DAYS home	DAYS UAE	ACTIVITIES	DELIVERABLES (coded as per Section 1.3)
1	2		**MISSION 1** Mission preparation. Initial adaptation of NFIS software.	
		15	Meeting with stakeholders.	
			Consultations on system standards and referential data (species, boat-gear types, sites and ports, stratification scheme).	
			Consultations on the UAE-NFIS domain platform.	
			Drafting of data collection forms for catch/effort.	
			Set-up of UAE-NFIS referential data.	
			Set-up of sampling frame.	
			Preparation of data collection protocols (frequency and size of sampling).	
			Workshop: - Basic training on sampling and discussions on alternative data collection scenarios. - Training on using data collection forms	**TR04-TR05.** **ST01-ST02.**

			in line with data collection protocols.	
			Presentation/approval of a general workplan and of work to be carried out between the 1st and 2nd missions (specifically concerning boat-gear counts in pilot ports).	**RP01**
	2		Submission of Mission Report 1	
2				
			Pilot phase to be carried out by national staff	
			(2-3 months)	
3	2		**MISSION 2** Mission preparation.	**RP02, RP03**
		15	Advanced training on UAE-NFIS operations for the administrator(s).	**RP05 (admin manual)** **TR01.** **TR02.** **TR04-TR05.**
			Evaluation of pilot phase and finalization of NFIS tests.	
			Workshop: Advanced training of Data Operators on UAE-NFIS operations.	Advanced training on UAE-NFIS operations. **TR01.** **RP05 (Privileged Users Manual)** **RP05 (Operators' Manual)** **TR04-TR05.** **RP04**
	2		Submission of Mission Report 2	

4				
			Initiation of UAE- NFIS production operations.	
			(2-3 months)	
5	2		**MISSION 3** Mission preparation. - Preparation of advanced statistical textbooks. - Preparation of guidelines for the use of statistical reports (over 100 different reports are part of NFIS reporting component).	ST04.
		15	Evaluation of work already done and eventual corrective actions.	Evaluation Report.
			Workshop: - Advanced training in statistics. - Training in statistical reporting and quick preparation of statistical publications. - Initiation of consultations regarding full customization of UAE-NFIS by the IT Unit. Technical feasibility note.	**TR04-TR05.** **TR03.** **ST05.**
	2		Submission of Mission Report 3	
6				
			Consolidation of UAE- NFIS operations by national staff. Information media and links prepared by national staff.	ST04.
			(2-3 months)	

7	2		**MISSION 4** Mission preparation. Preparation of presentations illustrating the application of NFIS in the Emirate of Abu Dhabi (UAE).	
		15	Evaluation of work already done and eventual corrective actions. Finalization of contract deliverables. Finalization of consultations regarding full customization of UAE-NFIS by the IT Unit.	A fully operational UAE-NFIS. **DB01-DB06.** **GF01-GF12.** **RP06** Feasibility note.
			Seminar: Presentation of NFIS to stakeholders.	
	2		Submission of Project Final Report.	
TOTAL	**10**	**60**	**10 + 60 = 70 days**	

Annex A

Terms of Reference

TERMS OF REFERENCE

1 Summary

This Proposal concerns the implementation of a fully operational internet system for the statistical monitoring of fisheries in the UAE. The system will be delivered in its entity (field operations and manuals, computer modules, database, training, documentation) within a twelve (12) months period, and starting with the first mission of the consultant. The project cycle consists of four phases, each of which the consultant works 15 days in the UAE (mission) interspersed in a 2-3 months period when the national staff will be collecting and entering data. See Chapter 8 for the detailed Work Plan. The total input of the consultant will span 70 working days of which 60 in four missions of 15 days each.

The objectives of this Proposal are:

- Strengthening the technical capacity of the Environment Agency - Abu Dhabi (EAD) by means of training in applied fisheries statistics and in operating internet-supported databases;
- Setting-up a robust and sustaining statistical work frame for field and office operations for the effective statistical monitoring of fisheries in the Emirate of Abu Dhabi (UAE);
- Implementing a web-based and integrated Fisheries Information System (FIS) to be used for the fulfillment of statistical commitments to national user groups as well as to regional and international fisheries bodies.

2 Profile of the Consultant

The consultant is the holder of an MSc in Mathematics and Statistics and of a Doctorate in Numerical Analysis and Computer Sciences. His PhD thesis on automated combinatorial techniques awarded him in 1971 the 2nd Prize of the PHILIPS European completion for young scientists.

In 1971 he joined FAO and became Senior Fisheries Officer in 1980. Since then he worked in more than 50 countries worldwide in the sector of fisheries statistical development. Several of the methods he developed for stock assessment and sample-based statistical programmes became international standards. His functions

and responsibilities have been manifold, covering a wide area of applications such as project formulation, backstopping and evaluation, technical support, training, etc. A major product that has been widely used in more than 30 countries was the ArtFish software that initially operated under Windows (local mode).

The consultant retired from FAO in 2005 but continued to work as freelance consultant, always in the sector of fisheries statistical development. His employers include FAO, the EU, the World Bank and National Governments.

In 2011 the Consultant foresaw the need for an ArtFish supported by internet, thus catering for decentralized operations. The first ArtFishWeb prototype was developed for Qatar and became fully operation in 2013. In 2014 ArtFishWeb was adapted for Lebanon and in 2015 for Egypt. At present ArtFishWeb is being adapted for Algeria, Zanzibar and Tanzania Mainland.

3 Statistical outputs

- A sample-based fisheries statistical monitoring programme which will be tailored to fit with existing human and financial resources;
- A fully trained group of national experts trained in all aspects of basic statistics, field operations and computer functions;
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- Statisticians and researchers will be trained in the use of the database, selective extraction of statistical data and preparation of statistical publications, including analytical applications;
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4 Training specifications

- Three manuals for computer operations (for the administrator, data operators and privileged users respectively;
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5 The NFIS: General Features

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- It shall be user-friendly with smooth movement among forms to complete the desired task and smart tips / error messages to help users.
- It shall follow Windows application standards like cut, copy & paste to minimize typing in all text fields, enter / tab key to move to next field, Windows sorting methods and standard controls.

7 Technical reports (in addition to mission reports and final report)

- Project plan and structure document;
- Database Design and Data Dictionary Documents;
- Technical specifications document;
- Deployment plan;
- Users' manuals at all levels (administrator, data operators, privileged users, etc.);
- PhP source code with detailed documentation.

8 Project Work Plan

PHASE	DAYS home	DAYS UAE	ACTIVITIES	RESULTS
1			Mission preparation. Initial adaptation of NFIS software.	
		15	Meeting with stakeholders.	
			Consultations on system standards and referential data (species, boat-gear types, sites and ports, stratification scheme).	
			Consultations on the NFIS domain platform.	
			Drafting of data collection forms for catch/effort.	
			Set-up of NFIS referential data.	
			Set-up of sampling frame.	
			Preparation of data collection protocols (frequency and size of sampling).	
			Workshop: - Basic training on sampling and discussions on alternative data collection scenarios. - Training on using data collection forms in line with data collection protocols.	
			Presentation/approval of a general workplan and of work to be carried out between the 1st and 2nd missions (specifically concerning boat-gear counts in pilot ports).	Project Plan and Structure Document.
	2		Submission of Mission Report 1	

			Work to be carried out by national staff	
			(2-3 months)	
2			Mission preparation. Preparation of computer manuals.	Database Design and Data Dictionary Documents; Technical specifications document; Computer manuals.
		15	Training on NFIS operations for the administrator.	
			Finalization of NFIS tests.	PhP source code.
			Workshop: Training of Data Operators.	Practical training on NFIS operations. Deployment Plan for pilot areas.
	2		Submission of Mission Report 2	
			Pilot NFIS operations by national staff	
			(2-3 months)	
3			Mission preparation. - Preparation of advanced statistical textbooks. - Preparation of guidelines for the use of statistical reports (over 150 different reports are part of NFIS reporting	

			component).	
		15	Evaluation of work already done and eventual corrective actions.	System operates well in most areas. Initiation of system expansion at national level.
			Workshop: - Advanced training in statistics. - Training in statistical reporting and quick preparation of statistical publications.	Practical training on NFIS operations. Deployment Plan for expanded operations.
	2		Submission of Mission Report 3	
			Expanded NFIS operations by national staff. Information media and links prepared by national staff.	
			(2-3 months)	
4	2		Mission preparation. Preparation of presentations illustrating the application of NFIS in the Emirate of Abu Dhabi (UAE).	
		15	Evaluation of work already done and eventual corrective actions. Upgrading of the database to become a fully information system (NFIS).	System operates in all areas. Initiation of final system expansion for full national coverage. A fully operational NFIS.
			Seminar: Presentation of NFIS to stakeholders.	
	2		Submission of Project Final Report.	
TOTAL	**10**	**60**	**10 + 60 = 70 days**	