



Cook Islands
Census of Agriculture and Fisheries
2000

This report documents the Cook Islands 2000 Census of Agriculture and Fisheries. It contains an analysis of the main findings, 138 detailed priority tables and assorted attachments relevant to the census. More detailed information on the census data and results can be obtained from either of the agencies listed below.

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Published September 2001



FOREWORD

ACKNOWLEDGEMENTS

COOK ISLANDS GOVERNMENT:

1. Ministry of Agriculture – manpower, financial support
2. Statistics Office – manpower, data processing
3. Ministry of Island Administration – manpower, logistics
4. Ministry of Marine Resources – technical assistance
5. National Agriculture Census Committee – technical assistance and coordination

FOOD AND AGRICULTURE ORGANISATION (FAO):

1. Financial support
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4. Kopu Vogel – Assistant Data Editor
5. All Census Supervisors and their Enumerators (as listed in Annex 3)

MAP OF COOK ISLANDS

The Cook Islands consist of 15 islands scattered over 2 million km² of South Pacific Ocean located between 156° to 167° West and 8° to 23° South. The islands are split geographically in to the Northern Islands and the Southern Islands. Total land area is 237km².

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SOUTHERN ISLANDS

(Insert Island maps on left)

Island Name: **RAROTONGA**
Size: 67.1 km²
Height (Above MSL): 652m
Coordinates: 159°46'33" W, 21°12'06" S
Population (1996): 11,225

Island Name: **AITUTAKI**
Size: 18.3 km²
Height (Above MSL): 124m
Coordinates: 159°48'10" W, 18°51'45" S
Population (1996): 2,389

Island Name: **MANGAIA**
Size: 51.8 km²
Height (Above MSL): 169m
Coordinates: 157°57'47" W, 21°55'25" S
Population (1996): 1,108

Island Name: **ATIU**
Size: 26.9 km²
Height (Above MSL): 72m
Coordinates: 158°08'00" W, 19°58'45" S
Population (1996): 956

Island Name: **MAUKE**
Size: 18.4 km²
Height (Above MSL): 29m
Coordinates: 157°21'18" W, 20°08'30" S
Population (1996): 652

Island Name: **MITIARO**
Size: 22.3 km²
Height (Above MSL): 15m
Coordinates: 157°43'13" W, 19°51'33" S
Population (1996): 319

NORTHERN ISLANDS

Island Name: **PALMERSTON**
Size: 2.1 km²
Height (Above MSL): 5m
Coordinates: 163°11'31" W, 18°03'17" S
Population (1996): 49

Island Name: **PUKAPUKA**
Size: 1.3 km²
Height (Above MSL): 5m
Coordinates: 165°49'57" W, 10°51'05" S
Population (1996): 779

Island Name: **NASSAU**
Size: 1.3 km²
Height (Above MSL):
Coordinates: 165°25'13" W, 11°33'21" S
Population (1996): 99

Island Name: **MANIHIKI**
Size: 5.4 km²
Height (Above MSL): 5m
Coordinates: 161°02'10" W, 10°25'28" S
Population (1996): 668

Island Name: **RAKAHANGA**
Size: 4.1 km²
Height (Above MSL): 5m
Coordinates: 161°06'15" W, 10°01'53" S
Population (1996): 249

Island Name: **PENRHYN**
Size: 9.8 km²
Height (Above MSL): 5m
Coordinates: 158°03'33" W, 8°58'45" S
Population (1996): 606

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BACKGROUND

The Cook Islands consist of 15 islands scattered over 2 million km² of South Pacific Ocean, between 156°-167° West and 8°-23° South. The islands are split geographically in to the Northern Islands and the Southern Islands. Total land area is 237km².

Island	Area (Acres)	Area (km ²)	Rainfall (mm)	Mean Temp (Min)	Mean Temp (Max)
Rarotonga	16,569	67.1	2,040	20.8	27.0
Aitutaki	4,519	18.3	1,894	22.9	28.3
Atiu	6,643	26.9	1,992		
Mangaia	12,791	51.8	2,044		
Mauke	4,544	18.4	1,575	22.1	27.8
Mitiaro	5,507	22.3	1,842		
Manuae	1,531	6.2			
Takutea	321	1.3			
Southern Islands	52,425	212.3			
Manihiki	1,333	5.4	2,337		
Pukapuka	321	1.3	2,816	24.5	31.2
Nassau	321	1.3			
Palmerston	519	2.1	1,988	23.4	28.8
Rakahanga	1,012	4.1	2,360	24.2	31.2
Penrhyn	2,420	9.8	1,866	25.6	29.7
Suwarrow	101	0.4			
Northern Islands	6,027	24.4			
Cook Islands	58,452	236.7			

Source: Survey, Land & Information Services, Ministry of Works

The two island groups making up the country portray marked differences in their agricultural activities. The Northern Islands remains relatively isolated from the Southern Islands. Involvement of the people in the agricultural sector seems to be diminishing due to pearl farming activities, which is becoming a profitable venture, particularly in the islands of Manihiki and Penrhyn. Seaweed farming has recently been introduced in Pukapuka with high expectations of supplying export markets.

The Southern Group, on the other hand, continues to indulge in a much more diversified agricultural industry. This group has the benefit of cooler climate and more fertile soil enabling a wider variety of agricultural production. Regular air and sea transportation enhances export opportunities particularly to New Zealand. The main crops are banana in Aitutaki; taro in Atiu and Mangaia; and pawpaw, citrus, nono, taro and vegetables in Rarotonga. Cassava and taro are prominent in Atiu, Mauke and Mitiaro.

Agriculture is still the main activity in the Southern Islands with the exception of Rarotonga where trade, tourism and the service-related sectors are the major sources of income.

For the country as a whole, agriculture and fisheries are the principal productive sectors of the economy, contributing an estimated 15.2% (at average 1990 prices) of the country's Gross Domestic Product (GDP) in 2000.

OBJECTIVES

The 2000 Census of Agriculture and Fisheries (CAF) was the second nationwide census conducted in the Cook Islands relating to agriculture and fisheries sectors. The first one was conducted in 1988. There was a previous attempt to conduct the first agricultural census in 1975 with the intention to cover all islands but this did not eventuate and the coverage was limited to the capital island of Rarotonga.

The 2000 CAF was undertaken primarily to provide current and comprehensive statistics on agricultural that updated the 1988 undertaking and to provide benchmark information on fishing and pearl farming activities of the Cook Islands. Such information being the basis for development planning and project formulation for the nation.

The other specific objectives of the census were:

- To provide a frame for other agricultural and fisheries surveys;
- To obtain benchmark data for improving current crop production estimates.

LEGAL AUTHORITY

Since the 2000 CAF was jointly undertaken by the Ministry of Agriculture (MoA) and the Statistics Office, it was conducted under the Statistics Act 1966 which empowers the Government Statistician to collect statistical information relating to all activities in the Cook Islands.

CONFIDENTIALITY OF DATA

Section 17 of the Statistics Act provides that “the information furnished under the provisions of this Act shall be used for statistical purposes only.” Information relating to the identity of an individual will not be disclosed.

INCEPTION OF THE PROJECT

The twelve-year gap of no updated and comprehensive data on the agricultural sectors of the Cook Islands prompted the Government to request assistance from the Food and Agricultural Organization of the United Nations (FAO) to assist and advise on the conduct of another census of agriculture.

Initial assistance was provided through FAO’s Technical Co-operation Programme (TCP) in the form of a sub-regional project designed to provide technical assistance in the project planning, training and implementation as well as the provision of some equipment.

As part of this TCP project, an FAO Agricultural Census Adviser visited the Cook Islands in January 2000 to assess the data requirements and to draw up a detailed proposal for the conduct of an agricultural census. Government submitted this proposal to FAO for funding.

The project was approved in July 2000 as project TCP/CKI/0066 – Agricultural Census. The main components of the project were the provision of equipment, training and the services and expertise of the TCDC Expert in Agricultural Censuses and the National Consultant.

During the Data User-Producer Meeting fisheries was identified to be an important component to be included in the census project. This led to the 2000 Agricultural Census being renamed to the 2000 Census of Agriculture and Fisheries.

SCOPE AND COVERAGE

The 2000 CAF covered all households and holdings in the Cook Islands but excluded institutions and agricultural lands operated by the community or government. The scope of the census included items of information regarding the following:

Household

- Level of agricultural activity
- Household and holding location
- Crops grown by minor agricultural households
- Livestock and poultry as of the time of enumeration
- Consumption of coconuts
- Household composition
- Agricultural income
- Sources of agricultural loans
- Equipment used
- Use of fertilizers and agricultural chemicals
- Use of high-yielding varieties
- Other agricultural activities
- Fisheries activities

Holding

- Number, area, location, land tenure, land use and number use/fallow of individual parcel composing the holding
- Scattered plants/trees on the holding
- Labour inputs

Parcel

- Number of plots
- Proportion of area of individual plots, crops planted/grown, method of sowing, proportion of mixed crops, number of plants/trees for scattered sowing and proportion of crops to be sold
- Crops planted and harvested during the 12 months prior to enumeration

ADMINISTRATION

Before the actual start of the preparatory phase of the 2000 CAF, a National Agricultural Census Committee was formed and met to identify the resource requirement and budget. The key players committed to the success of the census included the following:

- Ministry of Agriculture
- Statistics Office
- Ministry of Island Administration
- FAO Sub-Regional Office (SAPA).

After the project had been approved by FAO for funding, the 2000 CAF was continuously collaborated by the MoA and Statistics Office. The Ministry of Marine Resources later joined the group by providing some inputs to the contents of the fisheries section of the household form questionnaire as well as the development of the separate questionnaire on pearl farming.

A National Project Coordinator was appointed from within the MoA to coordinate the activities of the census project. While a National Consultant was to have been hired at the start of the census project it was not until the latter part of the enumeration phase that the National Consultant was hired.

The MoA was the main station of the census project during its planning, preparatory, training, enumeration and manual processing. In the machine data processing stage, the physical location of the project was transferred to the Statistics Office, which had the capability and systems to carry out data entry, consistency checking, editing and tabulations. This arrangement worked extremely well and the project had the benefit of the support of both agencies.

A Census Planning Unit (CPU) was also established, comprising the Census Project Coordinator, MoA staff, data processing staff and the TCDC Expert. During the preparatory and enumeration phase of the census project, the National Consultant had not yet joined the CPU. It was only during the latter stage of the collection of the census questionnaires when the National Consultant was hired and became part of the CPU. The CPU was responsible for the following phases:

Phase 1: Preparatory

- Designing and finalizing the census questionnaires to be used during enumeration;
- Developing and writing the Instruction Manual for field staff;
- Testing the census questionnaires and manuals;
- Procuring equipment and supplies for the census;
- Recruiting and training field staff;
- Dispatching all materials and supplies required for field enumeration; and
- Publicising the census activities.

Phase 2: Enumeration

- Supervising the field enumeration and monitoring its progress;
- Responding to queries from the field staff as well as from respondents;

- Providing solutions to problems that may not be solved by the census supervisors or enumerators;
- Making arrangements for the compensation of field staff;
- Informing authorities on the progress of the project; and
- Monitoring the collection, submission and completeness of the coverage of census questionnaires for each enumeration area.

Phase 3: Data Processing and Tabulation

- Training the manual editors/coders and data entry clerks;
- Editing, coding and verification of completed questionnaires;
- Entering raw data into the microcomputer database system;
- Manual checking, machine editing, and validating the data entered onto the database; and
- Generating statistical tables.

Phase 4: Analysis and Publication

- Reviewing and analysing statistical tables;
- Preparing the census report; and
- Publicising and disseminating the census results.

DESIGN OF QUESTIONNAIRES

The FAO TCDC Expert in Agricultural Censuses designed the questionnaires for the census in collaboration with the staff from the MoA, Statistics Office and the Ministry of Marine Resources. All aspects of the agricultural system being practiced as well as the fisheries activities in the Cook Islands were taken into account in the initial and subsequent stages of the questionnaire design.

The questionnaires went through several revisions until the final version was arrived at. Considerable emphasis was put on a design appropriate to the agricultural systems prevailing in the Cook Islands, most notably mixed cropping, small crop areas and scattered tree crops. They were designed in a format that would provide ease in the field enumeration and data processing stages. Concepts and definitions used were those commonly understood by respondents and easily explained by enumerators. The questions, as were the instructions for completing the questionnaires, were worded in a simple manner and arranged in a logical sequence.

TYPES OF QUESTIONNAIRES

Five types of questionnaires were used to capture the agriculture and fishing activities of the household; pearl farming activities and information on the disposal activities of commercial livestock and poultry raisers. They were also printed on different coloured paper to assist with ease of identification in the field. The description of each questionnaire is as follows:

Household Form

This was completed for all households covered in the enumeration to determine the level of involvement of the household in agricultural activity and fishing activities (white form).

Holding Form

This form was completed only for agriculturally active households with a holding area of at least one-eighth (1/8) of an acre. The number of holding forms completed corresponded to the number of holdings operated by the households (green form).

Parcel Form

This was completed only for those households that completed a holding form. The number of parcel forms completed corresponded to the number of parcels, whether in use or fallow, as reported in the holding form (pink form).

Livestock Form

This was completed for those households engaged in commercial pig, goat or poultry raising. It was assumed that households reporting more than 10 pigs, 10 goats or 50 chickens at the time of enumeration fell into this category (yellow form).

Pearl Farming Form

This was completed by those households engaged in pearl farming. This was mostly administered in Manihiki, Penrhyn and Rakahanga (blue form).

The questionnaires made wide use of pre-coding to assist at the enumeration, data processing and tabulation phases. They were linked through unique identification assigned to each household, comprising a Census District, Enumeration Area and Household Number to ensure internal consistency of the data. In addition to these, the Holding and the Parcel Forms were linked through the Holding Number to ensure that the number and area of holdings operated by the household and the number and area of the parcels of the holding were accurately entered in the two forms.

The other feature of the questionnaire was the handling of plots, its area and method of sowing for each crop reported in the parcel form. The census was designed using the interview approach, being the least burdensome in terms of resource inputs. However, this approach suffers from inaccuracies of reporting by the respondents since they would have little idea of individual plot areas though they would have a better idea of holding and parcel areas. Hence, the holding and parcel forms were designed in such a way that the total area of the holding was first established, usually by summing the individual parcel areas. Once the individual parcel areas had been established, the individual plot areas on the parcel form were recorded in terms of a proportion against the parcel area.

Likewise in handling mixed crops, the proportion of the land under individual crops sown in mixture pattern was recorded to enable 'single crop equivalent areas' to be calculated. Fallow land, land waiting to be planted and scattered plants and trees were also separately identified.

PREPARATION OF THE INSTRUCTION MANUAL

The Instruction Manual was written for the purpose of ensuring uniform interpretation of the concepts and definitions used and to ensure standard procedures in field enumeration. It was used extensively at the training stage and also served as a reference guide for census supervisors, enumerators, and editors/coders during field enumeration and data processing.

The Instruction Manual contained the objectives of the census, scope and coverage, methodology of enumeration, detailed instructions for completing questionnaires and control forms, explanation on the various concepts and definitions used, coding schemes used and the duty list for census supervisors and enumerators.

PUBLICITY

A comprehensive publicity programme was organized to create the climate necessary for the census. The CPU was interviewed several times by the media. News about the

census was published in the daily and weekly newspapers. Advertisements on television and a two-week period of radio announcements and interviews were done to reach all households within the country.

The Cook Islands TV covered the first day of the training of supervisors on 2000 CAF that was held from 30 October – 1 November 2000. This provided a good opportunity for the people of the Cook Islands to be acquainted with the 2000 CAF. Owing to the good publicity, the respondents were generally very cooperative throughout the enumeration phase.

PRETEST

The CPU did a simple pretest of questionnaires on 14 October 2000, two weeks before the start of the census training. Due to time constraints and lack of manpower, no pilot census was carried out. The results of the pretest were used in finalizing the questionnaires and the Instruction Manual.

CENSUS FRAME

The frame used in the 2000 CAF was the listing of households by Enumeration Area (EA) compiled during the 1996 Census of Population and Dwellings (CPD) and the 1998 Household Income and Expenditures Survey (HIES). During the actual enumeration, these listings were updated by adding new households, deleting those households no longer existing and editing the names of the current heads of households.

For census purposes, each of the islands were divided into Census Districts (CDs), which in turn were further subdivided into a number of EAs that contains a manageable number of households. The following shows the number of CDs and EAs by island:

Island	Census Districts	Enumeration Areas
Rarotonga	12	78
Aitutaki	4	19
Atiu	6	7
Mangaia	5	7
Mauke	3	4
Mitiaro	2	2
Manuae	-	-
Takutea	-	-
Southern Islands	32	117
Manihiki	2	4
Pukapuka	3	4
Nassau	1	1
Palmerston	1	1
Rakahanga	2	2
Penrhyn	2	3
Suvarrow	-	-
Northern Islands	11	15
Cook Islands	43	132

BUDGET

The major financial inputs to the project came from the Government and the FAO. The Government's contribution amounted to approximately NZ\$80,000 with three quarters of this being remuneration of field staff and payment for data processing. To this amount

must be added the cost of salaries and other expenses of Government staff that worked on the census.

The FAO's contribution was around NZ\$260,000. The major components of their contribution were project personnel (TCDC Expert and the National Consultant), training and equipment (microcomputer system, printers, flat-bed A4 scanner, CD writer and photocopier).

REFERENCE PERIODS

The following are the reference periods for activities carried out and information collected during the 2000 CAF:

Reference Period	Activity or Data
1 month (13/11/01 – 13/12/01):	Enumeration
As at day of enumeration:	Number of Livestock Household Composition
1 month prior to enumeration:	Labour Inputs
12 months prior to enumeration:	Agricultural Activity Farm Details Crops Grown and Harvested Agricultural Income Use of Equipment Fishing Activities Pearl Farming Livestock Disposal
5 years prior to enumeration:	Loans for farming purposes

METHODOLOGY OF ENUMERATION

RECRUITMENT OF CENSUS STAFF

Thirty-five (35) census supervisors and one hundred thirty-two (132) enumerators were expected to be involved in the census undertaking although only 30 supervisors and 111 enumerators were available for recruitment. Most of the enumerators in Rarotonga were recruited from government departments and were required to conduct the census after regular office hours. In the Northern Islands and the Other Southern Islands, the designated census supervisors were responsible for the recruitment and training of enumerators on their respective islands.

The following shows the distribution of supervisors and enumerators by island:

Island	Supervisors/ Trainers	Enumerators
Rarotonga	17	58
Aitutaki	3	19
Atiu	2	7
Mangaia	2	5
Mauke	1	5
Mitiaro	1	2
Manuae	-	-
Takutea	-	-
Southern Islands	26	96
Manihiki	1	4
Pukapuka	1	3
Nassau	0	1
Palmerston	0	1
Rakahanga	1	2
Penrhyn	1	4
Suwarrow	-	-
Northern Islands	4	15
Cook Islands	30	111

The training of trainers and supervisors was held from October 30 to November 1. Two training sessions were held: one in the morning starting from 8:00 am until 4:00 pm and the other from 5:00 pm until 8:30 pm. The training was attended by participants from the islands of Aitutaki, Atiu, Mangaia, Mitiaro, Mauke, Pukapuka and Nassau. They were also joined by Rarotonga-resident supervisors who were responsible for the conduct of the census on the remaining islands of Manihiki, Rakahanga and Penrhyn. Some supervisors responsible for Rarotonga CDs also participated in this training. The evening sessions were more tutorial-oriented compared to the morning sessions, as there were only five trainees in attendance.

The second stage of training was specific to enumerators. It started differently in the three major regions of the Cook Islands. Other Southern Islands (Aitutaki, Mangaia, Atiu, Mauke and Mitiaro) and Pukapuka conducted their training from November 10-12. In Rarotonga, the training was divided into three groups, each adjusting the time and date (between November 11 to 17) according to the availability of the recruited enumerators. On the other hand, the other Northern Islands, namely, Manihiki, Rakahanga and Penrhyn

started their recruitment and training of enumerators as soon as the trainers/supervisors reached the respective islands. Although these trainers/supervisors were recruited in Rarotonga, they were nevertheless familiar with the customs, culture and conditions of these islands since their families originated from these islands.

At both training levels, special emphasis was given to the objectives of the census, concepts and definitions used, instructions on the proper completion of the questionnaires and forms, techniques in enumeration and the duties and responsibilities of both the supervisors and enumerators as contained in the Instruction Manual.

FIELD ENUMERATION

Visiting Households

The enumeration period started from November 13 until December 30, 2000. In some areas, however, the enumeration commenced later than the scheduled date due to lack of manpower at this particular time of the year.

Enumerators were assigned to one or more EAs. Maps and Census Household Listings were provided for each EA to assist in the physical location of households and to ensure completeness of coverage.

Visits to households were done mostly in the late afternoons during weekdays and/or on weekends, as it was during these times that many of the respondents were available for interview.

Fieldwork Monitoring

Close supervision was exercised in the field by the census supervisors who helped minimize the possible errors during enumeration. Field editing of the work of the enumerators permitted the early detection of some errors where immediate action to correct them was taken.

One important form completed by the enumerators, aside from the regular census questionnaires, was the Census Household Listing and Field Sheet for each EA. This was done to update the Listing of Households, enter the level of agricultural activity of the household and record the number of questionnaires used.

The enumerators then returned the completed questionnaires to their supervisors, who in turn checked the questionnaires for consistency and acceptability of the figures and correctness of the codes used. After ensuring that the questionnaires had been properly completed and all corrections and/or verifications done, the supervisors submitted all questionnaires to the CPU.

The fieldwork in the Outer Islands was generally well conducted and completed on schedule. The fieldwork in most areas on Rarotonga, however, got delayed and was not completed until May 2001.

Enumeration Problems

A large undertaking such as the 2000 CAF inevitably experiences some difficulties and problems. However, every effort was made to anticipate likely problems and as a result, no insurmountable problems were encountered.

The following briefly outlines the main problems encountered during the enumeration phase of the census:

- Limited means of transportation to effectively conduct training of staff particularly in the Northern Islands;
- Inadequacy of communication facilities to enhance efficient national supervision as well as monitoring of activities, particularly on Rakahanga, Palmerston and Nassau;
- Limited time devoted to staff training to fully understand the concepts and definitions and underlying enumeration procedures;
- Reluctance of respondents to supply information for fear of it being used for purposes other than statistical;
- Respondents' recollection of agricultural activities conducted during the 12 months prior to enumeration and their estimation of areas, number of trees/plants and the proportion of land under mixed cropping; and
- Delayed submission of questionnaires particularly in Rarotonga due to lack of enumerators or due to unavailability of the enumerators to interview households.

POST ENUMERATION CHECK

Due to the prolonged collection of questionnaires and lack of manpower in the MoA to handle the post enumeration survey, this activity was not conducted. Hence, the instruments for the objective measurement were not procured.

However, some simple ways of checking the accuracy of the results were done for some areas like using some existing data in the island and interviewing persons knowledgeable about the agricultural situation in the Northern and Southern parts of Cook Islands. In Rarotonga, the CPU staff re-interviewed some households whose questionnaires were not properly filled-up or most questionnaires were given back to the enumerators to redo the enumeration of households in their assigned areas.

OFFICE EDITING AND CODING

Upon receipt of the questionnaires and forms, initial checks were made for completeness and general acceptability of the questionnaires, household listings and maps.

Office editing of the questionnaires was done using the Instruction Manual for enumerators and a general Editing Manual to check for the completeness, accuracy and consistency of the data. Inconsistencies, omissions or doubtful entries in the questionnaires, which could not be corrected in the office, were referred back to the census supervisors for correction and/or verification.

A coding scheme was formulated assigning alpha and numeric codes to as many questionnaire variates as possible in order to make data entry easier and quicker. During actual field enumeration, enumerators used the majority of these codes to help reduce office-coding time.

To control the quality of the data, editing and coding verification was undertaken in final preparation of the data being entered into the microcomputer.

TABULATION PROGRAMME

A tabulation plan was drawn up at the early stages of the census operation. This plan contained the list of priority tables to be included in this report. A total of 115 tables were formulated, however, it should be noted that the number of tables and cross-tables that could be produced from this set of data is almost limitless and the list of priority tables contained in this report only represents the main findings of the census.

The tabulation programme took into account the relative importance of the items of information that would best serve the national and international needs of the data users. The tabulation plan was subsequently revised and reformatted prior to the production of the final sets of tables for this report, which increased to 138 tables.

MACHINE PROCESSING

The Statistics Office (SO) was responsible for the processing of the edited raw data using personal computers (PCs), as they already possessed the capability and capacity to do so. The structure of the census was set up in such a way as to provide maximum flexibility in the data set. Microsoft Access 97 was the preferred database management software of the SO and was thus used for the 2000 CAF. The census processing system was setup in the following manner:

Data Tables

Formats for tables to store information were predefined based on specifications detailed in the tabulation plan and setup in advance of data collection. There were two types of storage tables, those for storing the actual data by subject matter (20 separate tables in total) and those for storing variate code information (a further 11 tables). As there were 5 different types of census questionnaires it was important that the relationships between them and the code tables were well defined and applied.

Data Entry

The data were entered into the PC census processing system on a batch basis whereby a batch comprised of a single EA. The data entry interface simulated the five different questionnaires and each had additional sub data entry forms to control data storage. A number of predetermined data integrity checks; validation checks; and logical checks were built in and performed on the data at the entry stage to minimize punching errors and to detect obvious inconsistencies in the data. Wherever possible, errors detected at this stage were corrected based on surrounding data otherwise they were flagged and returned to the editors for remedial action.

Upon completion of data entry for a batch, a hard copy of the data was produced and manually checked against the data in the questionnaires. Detected errors at this stage were corrected and entered onto the PC before final machine editing of the data.

Consistency Checks

A wide range of cross-reference checks and logical checks were built using the "Query" facility within MS Access 97 for the purpose of cleaning the data to rid it of inconsistencies between questionnaires as well as between related variates within a questionnaire. An example, for instance, was the check to ensure that area of parcels were consistent between questionnaires as this information was reported separately in the household, holding and parcel forms. There were some 215 separate checks performed on the raw data (80 on the household form, 34 on the holding, 40 on the parcel, 30 on the livestock and 32 on the pearl farm form).

Machine Editing

When all the data for all EAs had been entered and manually crosschecked against their hard copies, the data was further scrutinized by conducting consistency checks. Data that failed these checks were numerous and reference back to the raw data was necessary. In some cases data was edited based on logical relationships between variates, for example, reports of mixed crop proportions that did not add up to 100% within the plot were edited accordingly.

Tabulation Queries

Over 260 separate data queries were written in MS Access 97 to generate the 138 priority tables contained in this report. Results of running these queries were then copied and pasted into the MS Excel 97 spreadsheets that contained the pre-formatted tables. Any column or row totals that were required were done using the appropriate formulae in the spreadsheets.

In addition to the data queries, some standard modules were built to contain general declarations and procedures not associated with any other object and frequently used procedures that could be run from anywhere within the database. These modules helped to make easier many of the data groupings required for the tables.

INTRODUCTION

For the purpose of this report, this section aims to interpret and illustrate the main results of the 2000 CAF. It does not constitute an in-depth nor complete analysis of the data.

As with any data collection exercise of this nature, some weaknesses exist in the data set. A careful study of the following interpretive paragraphs is therefore strongly advised prior to the use of the detailed tables to avoid undue misinterpretation of the results.

The geographical breakdown adopted for the tables, gives details by CD for the main island of Rarotonga. For the other parts of the country details are given on an island-by-island basis. Users requiring more detailed information than is presented in this report should contact the Planning Division of the MoA, Rarotonga.

The tables are presented in five distinct Table Sets relating to details for households, holdings, parcels, livestock and pearl farming.

TABLE SET 1: HOUSEHOLD DETAILS

Table Set 1 contains 42 tables relating to all the households enumerated during the census. A considerable array of information was collected about households, ranging from the extent of their agricultural activity, keeping livestock, consumption of coconuts and fishing activities. For agriculturally active households additional information on household composition, agricultural income and loans, equipment used and other agricultural activities was collected.

Agricultural Activity

Table 1.1 shows the number of households by location of household and level of agricultural activity. There were a total of 3,646 households in the Cook Islands, 1,697 households or about 47% were considered as agriculturally active households. The remaining 53% were classified as minor agricultural households (29%) and non-agricultural (24%).

(Insert Graph:HH by level of ag activity)

Of the agriculturally active households, a little over three-quarters (76%) were dependent on agriculture subsistence only, while 15% were classified as subsistence with some cash cropping with the sale of agricultural produce by these households being of secondary importance. The remaining 9% were classified as commercial producers as the sale or export of their produce was the primary intention of their agricultural activity.

On a regional basis, 74% of households on Other Southern Islands were classified as agriculturally active compared to 43% on Northern Islands and 35% on Rarotonga. This difference in agricultural activity between the regions is explained by the much greater diversification of the economy on Rarotonga particularly in the trade, tourism and service sectors and on the Northern Islands, a dramatic shift to cultured black pearl farming, particularly on Manihiki and Penrhyn and in recent years, Rakahanga.

Table 1.2 presents the number of holdings by level of agricultural activity of the household. Of the total 1,721 holdings in the Cook Islands, 75% were operated by

households engaged in subsistence only activities, 15% in subsistence with cash cropping and less than 10% for commercial agricultural purposes.

(Insert Graph: Ag Active HHs)

Agriculturally active households in the Cook Islands operated an average of one holding per household. Further information on holdings can be found in Table Set 2.

Table 1.3 presents the number of parcels of land enumerated by level of agricultural activity. A total of 3,467 parcels were recorded of which 66% were for the 'subsistence only' category of households, 21% for the 'subsistence with cash cropping' category and the remaining 13% for commercial agricultural purposes. Further information on parcels can be found in Table Set 3.

Table 1.4 presents the number of holdings and number of parcels according to the 'In Use' and 'Fallow' classification. The number of parcels 'in use' in the Cook Islands at the time of the census comprised almost 95% of the total parcels with the remaining 5% recorded as fallow parcels.

On an island basis, on Rarotonga and the Other Southern Islands, the number of parcels in use accounted for 94% and 95% respectively while on Northern Islands all parcels were in use.

(Insert Graph: No. parcels by usage)

The average number of parcels per holding in the Cook Islands was 2. Rarotonga and the Other Southern Islands equaled the national average while the Northern Islands average reflected a single-parcel per holding setup.

Livestock

Tables 1.5 – 1.7 give details of the number of households keeping livestock and the number of livestock raised classified by location of the household and type of livestock. The number of households raising livestock in the Cook Islands represented about 54% of the total number of households. The proportion was markedly higher in the Other Southern Islands and Northern Islands at 78% each, with Rarotonga reporting around 40%.

(Insert Graph: HHs and their livestock)

As expected, the most popular type of livestock raised was pig with 92% of all households recorded as keeping pigs. Around 31% of households were reported as raising goats, 30% chickens, 4% cattle and less than 2% horses.

In terms of numbers of animals, the number of chickens in the Cook Islands at the time of the census is estimated at some 24,300 followed by pigs (15,900), goats (3,600), cattle (300) and horses (70). In comparison, the 1996 CPD showed for the same types of livestock: 35,400 chickens, 19,300 pigs, 3,700 goats, 157 horses and 375 cattle.

(Insert Graph: Livestock compare with 1988 and 1996CPD)

Tables 1.8 - 1.9 present in detail the number of households keeping cattle and the number of cattle, both classified by size of cattle holding. Of the total number of

households raising cattle in the Cook Islands, 60% were located in Rarotonga, which also accounted for 47% of the total number of cattle raised.

Information on breeding animals was also recorded in the census for the major livestock categories. There were 156 cows representing 52% of the cattle population.

Tables 1.10 – 1.11 show that some 70 horses were recorded in the Cook Islands at the time of the census of which 48 or 67% were on Rarotonga. No horses were recorded for the Northern Islands. Of the 71 horses recorded, 35 or 49% were classified as mares.

Tables 1.12 – 1.13 give details on the number of households keeping goats and the number of goats, both classified by size of goat holding. Just over 58% of the total number of households keeping goats were located in the Other Southern Islands with the remainder recorded on Rarotonga. No goats were recorded in the Northern Islands.

Some 3,600 goats were recorded in the Cook Islands at the time of the census with an average herd size of 6 goats.

In terms of breeding stock, the number of does recorded was 1,300 or 35% of the goat population.

Tables 1.14 – 1.15 give details of the number of households keeping pigs and the number of pigs, both classified by size of pig holding. At the time of the census 1,800 households spread over all islands reported to be raising pigs. Forty six percent were located on Rarotonga, 39% on Other Southern Islands and the remaining 15% on Northern Islands.

In terms of numbers of animals, some 15,900 pigs were recorded in the Cook Islands and the average number of animals per household keeping pigs was close to 9. Although the majority of pigs (56%) were kept on holding sizes between 5 and 29, 34% were found in holding of 30 pigs or more. The number of sows recorded was around 3,800 or 24% of the pig population.

Tables 1.16 – 1.17 show details of the number of households keeping chicken and the number of chickens raised, classified by size of chicken holding. About 44% of the households raising chicken were located in the Other Southern Islands. Only 24% of households on Rarotonga were recorded as raising chicken.

The total number of chickens recorded at the time of the census was around 24,300. This figure, however, can only be regarded as a rough approximation since most households did not know the number of chickens they owned and could only offer a rough guess. Most households reported owning between 30 and 100 chickens (42%).

Coconut Consumption

Table 1.18 shows the number of households using coconuts for human consumption (eating, cooking, drinking, etc) and the total number and average weekly consumption of coconuts for this use. Note that this consumption does not include coconut products like bottled coconut sauce that is increasingly available for purchase from the local markets. Less than half of the households in the Northern Islands and Rarotonga were reported to be using coconuts for human consumption (47% and 43% respectively). However, on Other Southern Islands the extent was 77%.

The average weekly consumption of coconuts for human consumption in the Cook Islands was 13 coconuts per household. However, big regional differences in consumption levels were evident with households on Rarotonga only consuming an average of 6 coconuts per week whilst in the Northern Islands the average was 23 (it should be noted that the average consumption data shown in Table 1.18 relates to the number of households actually using coconut for this purpose and not the total number of households in the country).

(Insert Graph: Weekly human consumption of coconuts)

The total number of coconuts consumed weekly by households was estimated at 24,600 nuts, which is equivalent to approximately 5 tons of copra (based on 4,500 nuts per ton copra).

Table 1.19 shows the number of households using coconuts for feeding animals and the total weekly and average weekly consumption of coconuts for this purpose. The Northern and Southern Islands registered 40% and 64% respectively of the total number of households using coconuts for feeding animals. On Rarotonga the percentage was 29.

The average weekly consumption of coconuts for feeding animals in the Cook Islands was 90 coconuts per household. However, big regional differences in consumption levels were again evident with households on Rarotonga using an average of 50 coconuts per week whilst in the Other Southern Islands the average was 125 (it should be noted that the average consumption data shown in Table 1.19 relates to the number of households actually using coconuts for this purpose and not the total number of households).

The total number of coconuts used for feeding animals was 130,000, which is equivalent to approximately 29 tons of copra (based on 4,500 nuts per ton copra).

(Insert Graph: Weekly consumption of coconuts)

Household Composition

Table 1.20 shows the number of persons in agriculturally active households by sex and broad age group. There were more males than females in all three age groups and the average number of persons per household was 4.2 (the average household size recorded for all households in the 1996 Census of Population and Dwellings was 4.4).

For both sexes, the total number of persons 15 years and over was twice as many (66%) as those below 15 years of age. The proportion was even higher in Rarotonga with 71% of persons being older than 15 years of age.

The number of persons in agriculturally active households who lived in Rarotonga and the Other Southern Islands accounted for 44% each of the total and only 12% lived in the Northern Islands.

Income from Agriculture

Table 1.21 gives details of the number of agriculturally active households by proportion of their total income derived from agricultural activities. Some 66% of the agriculturally active households reported that none of their income was derived from their agricultural activities with the remaining 34% deriving some or all of their household income from their

agricultural activities. Only 33 households or 2% of the total number reported that all of their household income was derived from agricultural activities.

These figures reaffirm the subsistence nature of the agricultural industry in the Cook Islands. Rarotonga registered the highest proportion of agriculturally active households which derived some or all of their income from agricultural activities (36%). Northern Islands and Other Southern Islands followed this with 35% and 29% respectively.

(Insert Graph: Proportion of income from ag)

Agricultural Loans

Table 1.22 shows the number of agriculturally active households classified by the source of agricultural loans. Only 4% of the agriculturally active households in the Cook Islands reported having taken out loans related to their agricultural activities during the 5 years preceding the census. The majority of these loans were secured from the Cook Islands Development Bank.

Agricultural Equipment

Tables 1.23A – 1.24B shows details of the number of households owning equipment and the number of items of equipment owned by type of equipment. In terms of the number of households owning manual equipment in the Cook Islands, bush knives were the most commonly reported type (92% of agriculturally active households) followed closely by those owning shovels and digging spades.

In terms of numbers of items of manual equipment owned, on average households owned 1 item of each equipment with the exception of bush knives and shovels, which averaged 2 per household.

Amongst the households owning mechanical equipment, weed eaters (48% of agriculturally active households) were the most common type owned followed by vehicles (44%, although it should be recognized that in many instances these would also have been used for purposes other than for agricultural). Significant numbers of households were recorded as owning mist blowers or sprayers and chainsaws.

As would be expected, the numbers of items of mechanical equipment owned related closely to the numbers of households owning this equipment. However, in the case of vehicles, 1,060 vehicles were recorded as being owned by 746 households implying an average in excess of the 1:1 ratio. This may be explained by the common usage of 'utility' type vehicles for agricultural purposes and the ownership of another vehicle for non-agricultural use confirming the earlier observation on vehicle reporting in the census.

Items recorded under 'other' types of equipment include: **Other Manual Equipment** – hoe, iron rake, reap hook, garden and irrigation hose, and wheelbarrow; and **Other Mechanical Equipment** – mower, trailer and bulldozer/JCB.

Tables 1.25 – 1.26B give details of the households hiring and borrowing the different types of equipment. No manual equipment were reported to be hired while it was observed that households in general were hiring mechanical equipment with the highest number reported as hiring tractors along with slashers and ploughs.

With the exception of copra dryers, all types of equipment were reported as being borrowed with the highest numbers being reported as weed eaters, mist blowers or sprayers, chainsaws, digging spades, vehicles and tractors.

(Insert Graph: HH and mechanical equipment)

Improving Yields

Tables 1.27 – 1.28 look at activities in terms of the use of fertilizers and high-yielding varieties of crops that enhance and improve crop yields. Slightly more households were reported to be using organic fertilizers (23%) as opposed to inorganic fertilizers (18%) while 28% of households used some form of chemicals on their crops. The use of organic fertilizers was highest in Other Southern Islands although this region also recorded the highest use of chemicals. There were no reports of the use of inorganic fertilizers or chemicals in Northern Islands at the time of the census. This is in line with the restrictions imposed by these islands on the importation of these inputs.

In terms of improved high-yielding varieties, cassava and pawpaw were most common with little difference in the number of households using improved varieties. Just over 5% of households used improved varieties of unspecified vegetables (the census did not seek to specify crops other than taro, cassava and pawpaw).

Agriculturally Active and Commercial Livestock

Table 1.29 shows the number of agriculturally active households that were also engaged in beekeeping and raising of livestock for commercial purposes. No such households existed in Northern Islands while less than 1% in remaining areas were engaged in commercial livestock raising and less than 2% in beekeeping.

Fishing Activities

Tables 1.30 – 1.31 give details of households engaged in fishing activities and the main purpose of their fishing involvement. Of the total 3,646 households enumerated, 1,703 or 47% were engaged in fishing activities although on a region basis, more than 75% of households in Other Southern Islands and Northern Islands did some form of fishing. Only 29% of Rarotonga households were carrying out fishing activities. Those households engaged in fishing activities as well as being agriculturally active amounted to 67% with the majority of them in Other Southern Islands.

Information on pearl farming was also collected and 178 households reported to be engaged in pearl farming (see Table Set 5 for more detail – note that in this table set the total of operators is 182 as some households operate more than 1 pearl farm). Thirty-five of them were also agriculturally active.

(Insert Graph: No HH fishing)

For 99% of households engaged in fishing, the main purpose for this was for home consumption while 12% of them occasionally sold some of their catch. The remaining 1% of households indicated that their fishing activity was primarily commercial in nature. All households in Northern Islands were non-commercial.

Tables 1.32 – 1.33 show the types of fishing Cook Islanders practice. The traditional forms of fishing being hook-and-line, netting, spear fishing and gleaning reefs and lagoons

still prevail strongly in all islands where 49%, 47%, 33% and 28% of households respectively carried out these methods. In Northern Islands trolling for large ocean fish such as tuna and marlin also featured high as 56% of households trolled – second only to netting.

The greater part of fishing activity by households in the Cook Islands took place on the reef (67%) followed closely by lagoon fishing (58%) and over the reef (56%). The favoured method of fishing in Rarotonga and Other Southern Islands was hook-and-line fishing on the reef whereas households in Northern Islands preferred trolling in open ocean (see Table 1.35 for more detail) despite the relatively high supplies of fish stock within their lagoons.

Table 1.34 indicates the average number of fishing trips made by households and the average duration of these trips. The figures are presented in terms of weekly activity as well as monthly activity in accordance with information received from respondents who provided either weekly or monthly information, but not both, depending on which was more appropriate.

The average time spent fishing for all households was just under 3 hours. For those households reporting in terms of weekly fishing trips, this time was spent on 2 fishing trips per week while those households reporting in terms of monthly trips made 3.

Tables 1.35 – 1.36 look at the different methods of fishing done by households and the location at which these types of fishing are performed. Netting and hook-and-line fishing were the only methods of fishing practiced in all fishing locations while over the reef was the only location where all forms of fishing took place. When converting weekly trips into monthly comparable trips, the most common number of trips made in a month was 6 trips although the number of trips varied between regions from 3 to 11.

Table 1.37 gives the number and types of boats used in fishing activities. Forty percent of households engaged in fishing used a boat, 28% of them used non-motorized boats with an average length of 3.5m and 83% used motorized boats. The average length of motorized boats was a little over 4.5m with an average outboard engine size of 30HP. The Other Southern Islands and Northern Islands constituted 90% of motorized boats being used at the time of the census.

Disposal of Fish Catch

Tables 1.38 – 1.39 show how households disposed of their catch through selling, or consuming within the household. The bulk of households, some 87%, consumed all of their own catch and 13% reported selling portions of their catch. Less than 1% of households engaged in fishing sold all of their catch.

TABLE SET 2: AGRICULTURAL HOLDINGS DETAILS

Table Set 2 contains 18 tables relating to agriculturally active households. Specific information was collected about these households regarding their use of land and parcels and the arrangement of labour inputs into their agricultural activities.

Characteristics of Holdings

Tables 2.1 – 2.2 present in detail the number and area of holdings according to the area size of the holding. In the Cook Islands there were some 1,700 separate holdings over some 2,500 acres, the most common holding size being half to one acre (28%). On Other Southern Islands, holdings tend to be slightly larger than elsewhere in the country with the most common size between 1 and 2 acre.

While 1,242 holdings in the Cook Islands, or 92% of the total, have individual areas between 0.25 and 5 acres, these accounted for only 72% of the total estimated holding area. The number of holdings with areas of 5 acres and over represented less than 5% of the total number of holdings and 27% of the total holding area.

In terms of location of holdings, 48% were located in Rarotonga, 43% in Other Southern Islands and 10% in Northern Islands. The average holding area in the Cook Islands was 1.5 acres with Rarotonga, Other Southern Islands and Northern Islands reporting individual averages of 1.4 acres, 1.8 acres and 0.6 acres, respectively.

(Insert Graph: Area of holdings)

Tables 2.3A – 2.3B show the area of holdings by location of household and location of the holding. The figures show that in Rarotonga about 81% of the holding areas were located in the same Census District as the household (holding operator). In Other Southern Islands and Northern Islands, all of the holding areas were located on the same island where the operator resided.

Characteristics of Parcels

Tables 2.4 – 2.5 present details of the number and area of parcels according to the area size of the parcel. In the Cook Islands, parcels are generally small with the most common parcel size being between 0.25 and 0.5 acres representing 34% of the total 3,500 parcels. In terms of area, the biggest proportion of land area is made up of parcels in the size category of 1.00 - 1.99 acres.

Tables 2.6 – 2.7 present details of the number and area of parcels according to land tenure for both in use and fallow classification. The most common type of land tenure in Rarotonga is freehold-occupation right, which represented 40% of the total number of parcels. In Other Southern Islands customary tenure is the most common type, accounting for 53% of household while in Northern Islands the same category represented 99%.

(Insert Graph: Acres of parcels by land tenure)

Tables 2.8 – 2.9 show the number and area of parcels according to their main land use. In the Cook Islands, the area of parcels in use accounted for 90% of the total parcel area, 6% were fallow parcels and less than 4% of parcel area was used for livestock and non-agricultural purposes. In terms of numbers of parcels, parcels in-use accounted for 92%

of the total, 5% were fallow parcels and the remaining 3% were for livestock and non-agricultural purposes. The majority of the fallow parcels were located in Rarotonga.

Tables 2.10 – 2.11 give details of land rotation in the Cook Islands as reflected by the area of parcels in-use and fallow according to the number of continuous years in use/fallow. When interpreting these results it must be noted that the presence of tree crops will have an effect on the number of years of continuous use for land 'in use'.

Based on the results of the census, land is generally used on a continuous basis for long periods. This implies intensive land usage and a general shortage of arable land. Of the total area of parcels in use throughout the Cook Islands, 64% had been in continuous use for less than 15 years whilst the remaining 52% had been in continuous use for 15 years or more.

The picture of intensive land usage is supported by the data pertaining to the number of years land is left continuously fallow.

A little over one third of the fallow land was recorded as being continuously fallow for more than 15 years with the shortest time period (less than 5 years) recording the largest fallow land area.

On a regional basis, on both Rarotonga and Other Southern Islands, over half the total fallow land area was classified as not in use for less than 5 years whilst in Northern Islands, where fallow land represents less than 1% of total fallow land, 83% were classified as not in use for the same period.

Agricultural Labour Inputs

Tables 2.12 – 2.13 shows the number of household members and non-household members aged 15 years and over, engaged in the household's agricultural operation giving detail relating to the operator, paid workers and non-paid workers. Not surprisingly, there were more household members than non-household members working on holdings in an unpaid capacity (95%, excluding operators).

(Insert Graph: Unpaid workers on the holding)

Regardless of age and household membership status, the number of males who worked on holdings out-numbered the females by more than 3 to 1 (2,040 males, 611 females) although more females than males worked on the holdings in an unpaid capacity. For both sexes, 46% were over 40 years old and 37% between 15 and 39 years of age. No ages were reported for the remaining 17%. Male farm operators far out-numbered female operators.

Of the total household members working on holdings, 65% were operators, 32% worked on the holding without any pay and only 3% were hired with pay. For non-household members working on the holdings, around 40% were paid workers and 39% were unpaid workers receiving other forms of benefits.

Table 2.14 presents the average number of hours worked per week by persons aged 15 years and over, engaged in the household's agricultural operation giving detail relating to the operator, paid workers and non-paid workers. The average hours worked was recorded at around 8 per week (or 32 per month) for all workers. Male workers spent

longer hours (around 8 hours per week) on the holding than their female counterpart (around 6 hours per week).

In terms of the type of workers, paid workers worked the longest average weekly hours (17 hours per week or 68 per month) compared to the time spent by the operators on the farm (8 hours per week) and that of the unpaid workers (7 hours per week).

Table 2.15 gives the average wages per month received by persons aged 15 years and over, engaged in the household's agricultural operation giving detail relating to the operator, paid workers and non-paid workers. The national average monthly wage received was NZ\$155 while the average for Rarotonga was NZ\$268. The following graph shows the relationship between the average number of hours worked and the average wage received in a week by the 4 age groups.

(Insert Graph: Remuneration of paid workers)

Table 2.16 provides the number of persons working on holdings during the month prior to enumeration by type of other benefits (housing, meals and other) received. Of the total number of paid workers on holdings, 49% did not receive any additional benefits. Around 17% of workers reported to be simultaneously receiving all three types of benefits.

Table 2.17 shows the number of persons working on holdings during the month prior to enumeration by type of other employment. Close to 47% of the agricultural labour force had no paid employment of any kind. Some 35% had a paid full-time job and 11% had only a paid part-time job.

Although there were 3 times as many male than females working on the holdings, there was little difference in paid employment status between the sexes, around 50% of both sexes reporting having no paid employment. Males with other employment represented 47% while females represented 33%.

The percentage of unpaid agricultural workers with some form of paid employment on Rarotonga (56%) was noticeably higher than in the rest of the group (18%) reflecting greater job opportunities on Rarotonga.

TABLE SET 3: PARCEL DETAILS

Table Set 3 contains 57 tables relating to agriculturally active households enumerated during the census. Detailed information on crops is presented here on the extent of agriculture activity, area and number of crops in parcels and scattered trees or plants. Additional information relating to the activities of minor agricultural households is also included here.

Characteristics of Crops

For the purpose of the census, information on crops was collected according to the six different methods of planting in the Cook Islands. These methods are:

- Crops currently growing in parcels other than scattered crops;
- Scattered crops growing in parcels;
- Scattered crops growing outside parcels;
- Crops currently grown by minor agricultural households;
- Crops in parcels planted and harvested during 12 months prior to the census; and
- Crops planted and harvested by minor agricultural households in past year.

Information is presented for each of these categories on the numbers of plots (separate plantings), the number of plants/trees and the area covered by the crops. On a geographical basis, information is given on an island-by-island basis for numbers of plants and areas and on a regional basis in the tables depicting particular crop attributes.

All crop areas are presented as 'single crop equivalent' (SCE) areas. These differ from 'actual' areas and the difference should be carefully noted. 'Actual' area relates to the area of land actually covered by a crop whereas SCE area relates to the area the crop would have covered if it had been planted on a single crop basis, i.e. account is taken of mixed crops. For example, if a plot of land of 1 acre has cassava and kumara inter-cropped on a 3:1 ratio, the 'actual' area both for cassava and kumara would be 1 acre whereas the 'single crop equivalent' area would be three-quarters of an acre for cassava and one-quarter of an acre for kumara.

The advantage of SCE areas is that this approach eliminates the problem of double counting normally associated with mixed-cropping and the crop areas calculated on this basis should equal the physical land under crops.

The census also considered the problem of temporary or short-term crops (such as seasonal vegetable crops) that may not have been growing at the time of the census. It also considered cases where more than one crop was rotated over a piece of land during the year. This information was collected for both minor agricultural households and agriculturally active households. The concept was to collect information on crops planted in the last 12 months and already harvested by the time of the census. This was a difficult concept for both enumerators and farmers to understand and some caution should be taken when interpreting this data.

Altogether some 107 different crops were separately identified in the census. However, many of these categories were too small to differentiate in this report. Details are available on these minor crops on request. A further 11 categories of non-crops, for example, Home, Fallow, Bush and non-agriculture, were identified. Detailed information on non-crops do not exist in some parts of the questionnaire and have been omitted from the tables wherever appropriate.

Although data has been presented for crops in terms of numbers and areas, both these measures are not felt to be appropriate to all crops in all instances. For instance, vegetable crops are usually referred to in terms of acres whilst tree crops are usually referred to in terms of numbers of trees. This reflects the method of planting of these crops in the Cook Islands.

It should also be noted that whilst the term 'number of separate plantings' is widely used in table headings and in the text, this term only correctly refers to crops planted in plots within parcels. In other cases this term refers to the number of recordings made of each crop.

Crops in Parcels

Tables 3.1 – 3.3 give details on the number of plots, SCE area and number of plants of the crops growing under the single crop and mixed cropping methods of planting in parcels, by type of crop and island. Scattered crops in the parcels are excluded from these figures but are presented in detail in Tables 3.9 – 3.11. In the Cook Islands, root crops such as cassava, taro (wet, raised or flooded), tarua and kumara recorded the highest number of plots in parcels with a combined share of 53% of the total number of plots recorded. Tree crops such as coconut, banana and nono followed, with the next most number of plots (22%).

The area covered by plots, in terms of SCE, totaled 2,390 acres. Root crops accounted for 45% of this area with tree crops covering 25%, vegetable crops 6% and the remaining 24% under non-crop.

(Insert Graph: Crops in parcels)

Island-wise, Rarotonga, Aitutaki and Mangaia ranked first, second and third respectively in terms of numbers of plots and represented 44%, 20% and 17% respectively of the 6,426 (including 985 non-crops) recorded plots of crops growing in parcels. The SCE area covered for these islands were 45%, 18% and 15% respectively.

The census did not seek to obtain from respondents an estimate of the number of plants growing in their plots. Instead, the number of plants was estimated based on the known density of crops (see Annex 2) provided by the Research Division of MoA. Similar proportions found in SCE area were therefore observed in the number of plants. Over 10.4 million plants were estimated to be growing at the time of the census where 82% were root crops, 16% vegetable crops and 2% tree crops.

Tables 3.4 – 3.5 show details on the number of plots for the different types of crops growing in parcels by sizes of planting (number of plants) and SCE area (acres) by region.

Bearing in mind that these tables only refer to crops planted in parcels using the single crop and mixed crop methods of planting, the data is dominated by the major root crops. Table 3.5 relating to size of planting in areas is the more relevant and portrays the tendency to grow crops in small plots (less than 1 acre) reflecting once again the subsistence nature of agriculture in the Cook Islands. In fact the majority of these plots have an SCE area of less than a quarter of an acre.

Tree crops growing over plots of less than a quarter of an acre accounted for 37% of the total SCE area and, if combined with the second size category of less than half an acre,

would account for 68% of all tree crops. These indications of growing in small plots are even greater for root crops (40% and 75%) and vegetable crops (61% and 83%).

Table 3.6 shows the SCE area of plots of the different types of crops growing on parcels by region. The area planted to crops in the Cook Islands under this method of planting was 1,820 acres.

SCE areas planted to orange, nono, pawpaw, banana and mango in Rarotonga under this method of planting accounted for 87%, 91%, 95%, 48% and 74% respectively of the Cook Islands total. Beans, cabbage, melon, tomato and lettuce were also widely grown on Rarotonga accounting for 78%, 72%, 65%, 72% and 77% respectively of the Cook Islands total.

On Other Southern Islands, popular tree and vegetable crops grown under this method of planting included coffee, banana, melon and pineapple. The SCE area of these crops accounted for 99%, 52%, 35% and 81% respectively of the Cook Islands total.

The combined SCE areas planted to root crops such as cassava, taro, tarua and kumara represented about 60% of the total SCE area of all crops in the Cook Islands planted under this method. Root crops were more prevalent in Other Southern Islands accounting for 59% of root crops nationwide.

Mixed-Cropping in Parcels

Table 3.7 relates to mixed-cropping and shows the SCE area of the different types of crops by region and type of crop mix. In the Cook Islands, about 93% of crops grown in this fashion were grown under a single crop mix according to the census methodology adopted, which excludes the concept of mixed-cropping involving scattered crops. This high proportion of single cropping was evident for almost all types of crops, except chestnut and breadfruit.

Vegetable crops were more common in using this method of planting with the highest proportion observed in the area planted to lettuce, recording 63% of the total area of lettuce planted in parcels (single crop and mixed crop methods). Cabbage and tomato were also notable, recording 29% and 25% respectively.

Sale of Produce

Table 3.8 gives detailed information on the SCE area of the different types of crops by proportion for sale and region. Note that the census sought information on the proportion of the crop currently growing that was intended for sale as opposed to what was already sold as shown in Table 3.24. It was observed that while orange was a major crop on Rarotonga, some 63% of the total crop SCE area was entirely for own consumption (none for sale). However, the figures for pawpaw-solo, also a major crop on Rarotonga, showed that the crop grown in 47% of the total crop SCE area was entirely for sale and those grown in only 25% of the total crop SCE area entirely for own consumption. The remaining 28% of the total crop SCE area was grown partly for sale and partly for own consumption with a lean towards 'for sale'.

For the Cook Islands as a whole, it should be noted that other crops grown primarily for sale include coffee, nono, cabbage, lettuce, capsicum, chilli and melon.

(Insert Graph: Proportion of crop area for sale)

Scattered Crops in Parcels

Tables 3.9 – 3.13 show details on the number of separate plantings, number of plants and SCE area of the different types of scattered crops growing in parcels by island. Tree crops dominate this method of planting.

In terms of the number of plantings and the number of trees, coconut was reported to be the most commonly grown in this category. This was followed by banana, mango and breadfruit. The following illustrates the nature of scattered crops by presenting the estimated average number of scattered trees per reported plantings: 20 coconut, 21 banana, 4 mango, 3 breadfruit, 3 avocado, 3 chestnut and 6 lemon.

Translating these numbers to SCE areas (see Annex 2 for individual crop densities used) coconut and banana accounted for 75% of the total 144 acres SCE area of crops planted by this method in the Cook Islands.

Table 3.14 gives the number of plants of the different types of scattered crops growing in parcels by proportion for sale and by island. Crops growing in this category, by their very nature, were almost entirely grown for own consumption (98%). All reports of scattered crops growing in parcels on all islands outside of Rarotonga were grown for own consumption.

Scattered Crops Outside Parcels

Tables 3.15 – 3.17 show details on the number of separate plantings, number of plants and SCE area of scattered crops growing outside parcels by island. The figures indicate that tree crops like coconut, mango, banana, breadfruit, avocado and chestnut were again commonly grown as scattered crops outside parcels. The following table gives the distribution of the number of separate plantings, numbers of trees and the distribution of SCE area of the major crops in this category:

Scattered Tree Crop Outside Parcels	Number of Separate Plantings	Number of Trees	SCE Area in Acres
Avocado	214	583	14.2
Banana	486	7,413	8.9
Breadfruit	437	1,155	28.2
Chestnut	123	449	11.0
Coconut	1,081	20,072	264.1
Lemon	311	1,066	6.3
Mango	774	4,134	100.8
Nono	64	1,171	5.9

Tables 3.18 – 3.19 show comparative data on the number of separate plantings and number of plants for the different types of scattered crops growing outside parcels by size of planting (number of plants) and region. The most common size of planting category was less than 10 plants although coconut, banana, pineapple and all reported root crops in this method of planting fell in a higher size of planting category.

On a regional basis, on Rarotonga, coconut, mango, breadfruit, banana and avocado were found to be growing widely as scattered trees outside parcels. For the Other Southern Islands, coconut was the dominant crop in this category followed by mango, banana and breadfruit. As for Northern Islands, the figures show banana as the most common scattered tree outside parcels, above coconut due to non-reporting of coconut commonly grown and used collectively by the community in this region.

Crops Grown by Minor Agricultural Households

Minor agricultural households were defined in the census as households cultivating an area of garden crops of less than one eighth of an acre or having less than 10 coconut, 10 banana or 10 other tree crops. Twenty-nine percent of all households fell into this category. On a region basis, 21% of households on Other Southern Islands were classes as minor agriculture, 30% of Rarotonga households and 41% of Northern Islands' households. The census thus confirms that this was a significant category of households.

Tables 3.20 – 3.23 present data on the number of separate plantings, number of plants and SCE area (acres) of the different types of crops currently grown by minor agricultural households on an island-by-island basis.

Table 3.22 is perhaps the most useful of the four tables from which to gain an overall picture of crops in this category on an island basis and shows the dominance of coconut, mango and breadfruit. Of the total SCE area of 157 acres recorded as currently under cultivation by these households, the three major tree crops mentioned accounted for 80%.

Table 3.23 summarises the number of separate plantings, the number of plants currently growing by the different crops and the SCE area (reported in acres and square metres) planted by minor agricultural households.

Crops in Parcels Planted and Harvested

Table 3.24 shows the area harvested for each of the different types of crops planted in parcels in the 12 months preceding the census by the proportion of the crop sold. Tree crops such as coconut, nono, banana, pawpaw and orange accounted for the major share of the area harvested at 48% with root crops closely behind with 43%.

Crops Planted and Harvested by Minor Agricultural Households

Very few crops were reported in this category and the combined SCE area was just under 43 acres where coconut and mango accounted for half of this area. No table has been produced for this category although the SCE area for each crop in this category has been included in Tables 3.26 and 3.27.

Non-Crop Land Use in Parcels

Table 3.25 gives information on the number of plots and SCE area of land in parcels being used for purposes other than for crops, by island. The majority of this land was classified as fallow land (51%) covering an SCE area of 288 acres and land waiting to be planted (17%) covering 95 acres. The remaining 32% of land in this category was under other non-crop production.

(Insert Graph: Area of non-crop land use in parcels)

Crops Summary

Tables 3.26 – 3.27 present a summary of the crop data in terms of single crop equivalent areas and numbers of plants. The tables show crops growing at the time of the census as well as crops planted and harvested in the 12 months preceding the census by method of planting. These tables aim to summarize the data presented earlier in the report to provide an overall picture of crop areas and numbers in the Cook Islands as well as the relative significance of the methods of planting on a crop-by-crop basis.

Table 3.26 shows that of the crops growing at the time of the census, taro accounted for the largest SCE area (953 acres) followed by cassava (700 acres) and coconut (520 acres). Including crops planted and harvested in the 12 months preceding the census, the proportion of land planted to root crops increases further.

(Insert Graph: Area of tree crops currently growing)

Table 3.27 is of particular relevance when interpreting the data relating to tree crops since it gives a summary by number of trees/plants. For instance, 2,223 breadfruit trees were recorded in the census of which 1% was recorded growing in parcels other than on a scattered basis, 25% were recorded growing in parcels on a scattered basis, 52% scattered outside parcels and 22% recorded by minor agricultural households.

TABLE SET 4: LIVESTOCK DETAILS

Table Set 4 contains 6 tables relating to households who reported that, at the time of the census, they owned more than 10 pigs or goats or more than 50 chickens. Detailed information on the disposal of livestock is presented here.

Households Raising Livestock

Tables 4.1 – 4.3 give details of the number of households raising livestock in commercial quantities by type of livestock, type of operation and location of the operation. Of the 439 households covered in this section, 60% were on Other Southern Islands, 33% on Rarotonga and the remaining 7% on Northern Islands. The majority of households were raising pigs (84%) of which 4% (16 households) of them were raising pigs mainly for commercial purposes.

(Insert Graph: HH raising livestock)

Disposal of Livestock

Table 4.4 reports the number of times households disposed of livestock, by the type of livestock and the location of the household. The two methods of disposal identified in the census were disposal by slaughter and disposal by live head of livestock. Care should be taken when using this data as it reports the event of disposal regardless of sub-category of livestock, particularly in the case of pigs. For instance, Table 4.1 showed that there were 367 households raising pigs while in this table it is reported that 400 households disposed of pig. This number is correct in the sense that it counts those households that disposed of more than one sub-category of pig, i.e., a household could report the disposal of weaners as well as fatteners in which case this table would report two “households” disposing pig.

In all types of livestock, disposal by slaughter was more common than live disposal with 60% of households opting to slaughter their pigs, 56% for goats, 63% for cattle and 70% for chickens.

Table 4.5 looks at the nature of disposal numbers of head of livestock by type of livestock and the method of disposal. There were 4,344 pigs disposed of with the majority (80%) being fatteners. Some 45% of disposed pigs were for traditional feasts or gifts, 35% for home consumption and the residual 20% were sold.

On Other Southern Islands there were high reports of the disposal of chicken, in particular, live layer hens (96% of all chickens disposed of). These hens would more than likely have reached their economic value.

(Insert Graph: Disposal of pigs)

On a region basis, 56% of all livestock was disposed of in Other Southern Islands, 39% in Rarotonga and the remaining 5% in Northern Islands. The Other Southern Islands also dominated the use of pigs for home consumption, feasts and gifts (58%) while Rarotonga had the market on pigs sold (57%).

Table 4.6 shows the revenue generated from the sale of livestock. In the Cook Islands almost NZ\$140,000 was made from the sale of livestock of which 66% went to Rarotonga households. Around three quarters of sales came from slaughtered livestock. Pigs

generated the most sales accounting for NZ\$112,700 or 81% of all sales. The average price per pig was NZ\$132 while fatteners fetched the highest average of NZ\$137 and boars the lowest at NZ\$63. There was also a marked difference between the price of slaughtered and live pigs: slaughtered weaners fetched NZ\$138 while live ones only made NZ\$99 while fatteners went for NZ\$157 and NZ\$81 respectively.

TABLE SET 5: PEARL FARMING DETAILS

Table Set 5 contains 15 tables relating to households who reported to be operating pearl farms at the time of the census. Information relating to the pearl farms contained in this section includes farm sizes, labour input and pearl farm related equipment, income and loans. Additional information was collected on the production projections of pearl farm operators over the short and medium term.

Farming Capacity

Table 5.1 shows details of the number of pearl farm operators, the number of pearl farms and the lines owned. The actual pearl farms are found on the three Northern Islands of Manihiki, Penrhyn and Rakahanga where their lagoons are suitable for producing cultured black pearls. Manihiki, being the pioneer of the back pearl industry, is home to the majority of operators (57%), followed by 36% in Penrhyn and 6% in Rakahanga. The remaining 1% of operators resided in Rarotonga although their pearl farms were in Manihiki.

(Insert Graph: Pearl farming)

In general pearl farm operators managed a single farm with an average number of 9 farm lines and 4 spat collector lines per farm. On an island basis the number of farm and spat lines differed from the total average with Manihiki having 12 and 5, Penrhyn with 6 and 1 and Rakahanga, being new to the industry, reporting 5 farm lines and 4 spat collector lines.

Table 5.2 presents on an island basis the number of pearl farms using farm lines and spat collector lines by the length of the lines. Around 78% of the total pearl farms in the Cook Islands had farm lines with length varying between 100 to 299 metres with the most common being 200 to 299 metres long. Spat collector lines were not as widespread as farm lines as some 35% of farms did not use any. About 61% of farms had spat collector lines with the same length as reported for farm lines.

Table 5.3 shows the number of lines used on the pearl farms. The total number of farm lines in the Cook Islands was around 1,700 while the number of spat collector lines was about 750. The majority of lines were found in Manihiki: 75% of farm lines and 84% of spat collector lines.

The median length of the farm lines and spat collector lines reported in Manihiki was about 265 metres and 114 metres, respectively. On the other hand, Penrhyn pearl farm operators reported smaller median lengths of farm lines, about 109 metres, but longer spat collector lines, about 136 metres.

Table 5.4 presents the number of pearl shells owned by the pearl farms by the type of shell. On average, each pearl farm in the Cook Islands had 14,300 farm shells. Manihiki registered the highest average of farm shells (around 20,400) and Penrhyn had the lowest, which was about 4,500 shells per farm. The types of farm shells used by the pearl farmers in the Cook Islands were the seeded farm shells that were producing cultured black pearls, drilled un-seeded farm shells that were almost ready for seeding and other type of farm shells that included juvenile oysters.

Eighty percent of all pearl farms reported to have 1.2 million drilled un-seeded farm shells or an average of 8,000 shells of this type in each farm. A similar ratio of 81% of pearl

farms had close to a million seeded farm shells or an equivalent of 6,400 seeded shells per farm.

Among the three islands, Manihiki reported the highest average number of seeded shells per farm (9,876 shells) and average number of drilled un-seeded shells per farm (12,414 shells). Rakahanga based pearl farmers reported the highest average number of other types of farm shells (18,800 shells), which supports the earlier observation of being new to the industry.

(Insert Graph: No. of pearl shells)

Labour Input

Tables 5.5 – 5.8 give details regarding labour inputs on pearl farms in terms of manpower, time and remuneration. Around 450 persons aged 15 years and over worked in the pearl farms during the month prior to enumeration. Four in every five of these persons were members of the household while the rest were hired workers. On average, there were 2 household members working in each pearl farm.

Of the total household members working in the pearl farms, 63% came from Manihiki, 29% from Penrhyn and the rest from Rakahanga.

There were more males working in the pearl farms than females, giving a ratio of 4:1. The proportion of male household members was 78% while the proportion of female household members was about 89%. Male pearl farm operators far out-numbered female operators.

Of the total household members working in the pearl farms, 49% were operators, 42% worked in the farms without any pay and only 9% were hired with pay. For non-household members working in the pearl farms, more than half (64%) were paid workers and about one-third (35%) were unpaid workers receiving other forms of benefits.

Of the total pearl farm operators, around 58% were residing in Manihiki, 35% in Penrhyn and 6% from Rakahanga. A report of 1% came from Rarotonga.

The household members working in the pearl farm during the reference month, on average (median age), were quite young at the age of 22 years. However, examining the median age of each type of worker, the pearl farm operator was the oldest among the three types, at 57 years of age.

Paid and unpaid household members were younger having median ages of 28 and 26 years, respectively. Non-household members who worked with pay and those without pay were even younger than those of the household members where their median ages were 24 and 21 years, respectively.

All pearl farm workers spent an average of 14 hours per week in doing their pearl farm activities. The male workers spent longer hours (about 15 hours per week) than their female counterpart (about 12 hours per week).

In terms of the type of workers, the paid labourers in Penrhyn (35 hours per week) and Manihiki (34 hours per week) worked the longest average weekly hours compared to the time spent by the operators in the pearl farm and that of the unpaid workers.

(Insert Graph: Average weekly hours worked)

Manihiki reported the highest average hours worked per week (17 hours) by pearl farm workers followed by Rarotonga, which was 13 hours. Note however, that these workers in Rarotonga were reporting the time that they spent on their farms located in Manihiki.

(Insert Graph: Average hours worked – all workers)

Each paid worker in the pearl farm received an average monthly wage in the amount of NZ\$460. The workers residing in Penrhyn received higher wages (higher by NZ\$178) than those residing in Manihiki. Rakahanga-based paid workers received the least amount of wages, about NZ\$125 per month.

Table 5.9 presents other benefits received by paid workers in the pearl farm. Of the total paid workers in the pearl farm, 83% did not receive any additional benefits to their wages from their pearl farm employers. Around 11% received free subsidized meals solely or with other benefits.

Table 5.10 shows the number of persons working on pearl farms during the month prior to enumeration by type of other employment. Just over 67% of the pearl farming labour force had no paid employment of any kind. Some 18% had a paid full-time job and 5% had only a paid part-time job.

There were close to 4 times as many male than females working on the pearl farms accounting for the large difference in paid employment status between the sexes, around 70% of males reporting having no paid employment as opposed to 54% of females. Males with other employment represented 22% while females represented 32%.

Equipment

Table 5.11 presents the number of pearl farms using boats. Nine in every ten pearl farms were using boats to assist with their pearl farm activities, making almost 900 trips per week. Overall this averaged to 5 trips per week for each pearl farm operation in the country while on an island basis only Rakahanga deviated off this national average with 4 trips per week.

Table 5.12 gives details of the number of pearl farms owning equipment relevant to the operation and the number of such equipment. Each household engaged in pearl farming owned, on average, 2 scuba tanks, 1 hooka dive compressor, 1 regulator, 3 snorkeling gears, 1 generator, 1 electric drill, 1 vehicle, 1 boat and several other equipment (majority of reports in other equipment include floats). However, only 30% owned seeding houses or platforms and 15% had scuba compressors.

Production Projections

Table 5.13 shows the number of seeded shells expected to be in production in the short (3 years) and medium (5 years) terms. Ninety percent of pearl farm operators perceived to collectively have 3.3 million shells seeded by the year 2003 (3 years from now) and double that by the year 2005. Manihiki pearl farm operators had higher expectations than their counterpart in Penrhyn and Rakahanga. They perceived to have 2.4 million shells to be seeded three years from now and 4.6 million shells five years from now.

(Insert Graph: Production projections – number of shells)

Pearl Farm Income and Loans

Tables 5.14 – 5.15 give breakdowns of the proportion of the operator's total income usually derived from pearl farming and information on support from financial institutions. Of the total 182 households engaged in pearl farming, 31% reported that they did not yet receive any income at all from pearl farming while 16% stated that all of their household income was derived from their pearl farming activities.

At the time of the census, 60% of pearl farm operators reported that they did not avail any loan to finance the operation of the farms. Of those that did obtain loans, most of them (80%) got their loan from the Cook Islands Development Bank.

Images of prosperity

(Insert 4 pages of photos)

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1. Watermelon seedlings in nursery await transplanting 2. Pawpaw of the solo variety destined for export 3. Household members work on the holding planting banana 4. Angola-Fiji goats being breed by MoA for distribution to outer islands 5. Horse tethered in pasture 6. Breadfruit – a popular scattered tree 7. Pearl farm lines are suspended in nutrient-filled lagoon 8. Local-breed litter of piglets enjoy a meal of coconut 9. Lemon 10. New variety of Chinese cabbage 11. Mixed cropping of pineapple, capsicum and tomato.

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1. Capsicum 2. Free-range layers 3. Workers return seeded farm shell to the lagoon 4. Ripe nono fruit ready for harvesting 5. Tractor and disc prepare land for planting 6. Multi-cropping of vegetables is a common method of planting in the Cook Islands 7. Major root crop – dry land taro 8. A parcel of land waits to be planted 9. Local small scale fisherman use out-rigger canoes to fish over the reef 10. A well maintained plot of kumara

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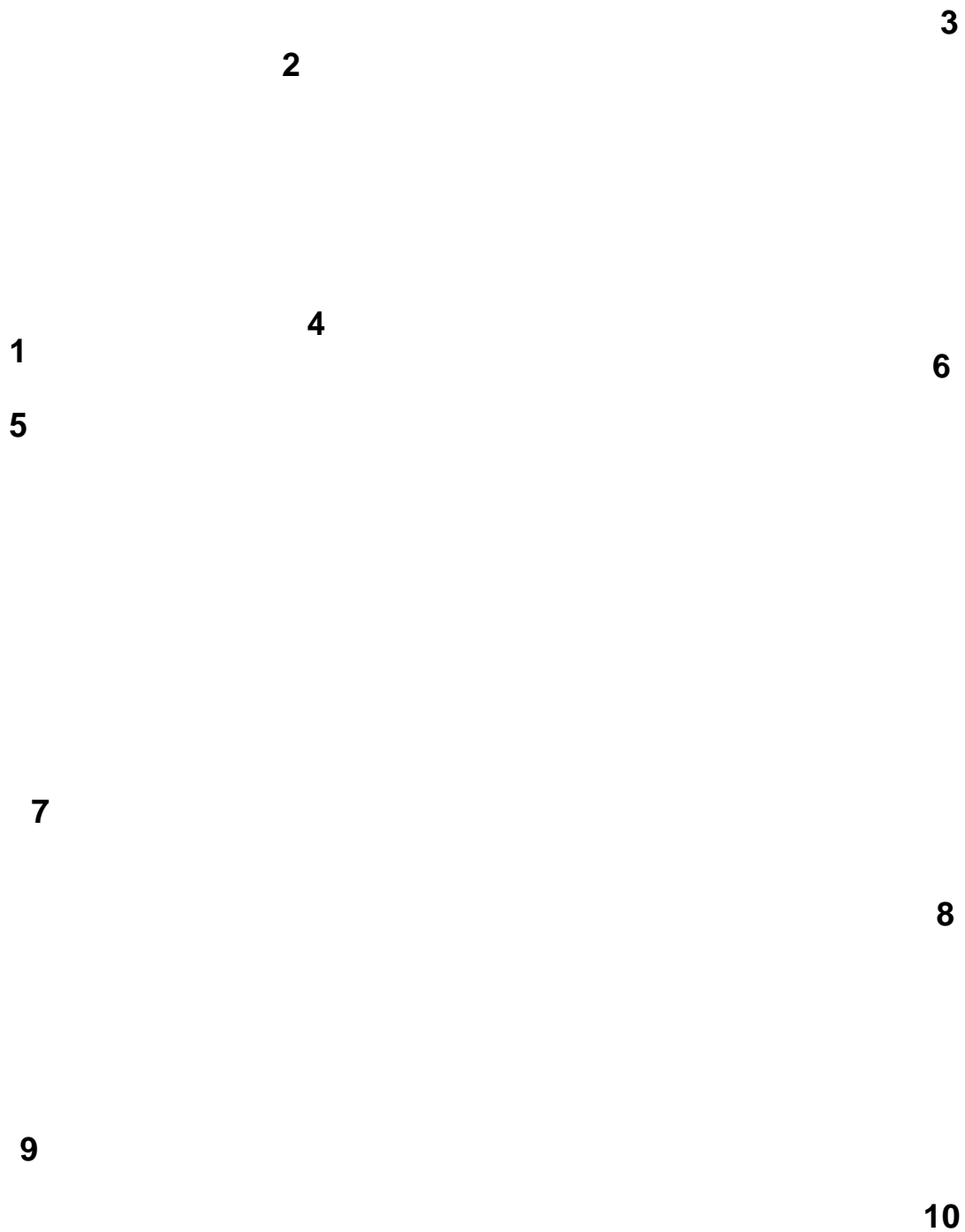
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1. Full bunch of ladyfinger banana ready to harvest 2. Heatwave tomato sun-ripening 3. Overhead irrigation system waters young cabbage 4. Hydroponic lettuce and other vegetables are becoming more prevalent 5. Out-board motorboats used for small scale fishing and pearl farming 6. Household members transport fresh produce to local market for sale 7. Slaughtered pigs await meat inspection before going to butchers 8. Paua (clam) collected & consumed on coral heads in lagoon 9. Chilli intended for export.



1. The old tiller machine competes with more modern farming equipment 2. Pumpkin 3. Mixed cropping of banana, cabbage, lettuce, tomato & scattered lemon trees 4. Silverbeet standing by for consumption 5. Manga (deep-sea mackerel) on display at fish market 6. Ready-to-harvest lettuce and Chinese cabbage 7. Capsicum plot thrives next to tomato 8. Cabbage plot midway through harvesting 9. A nono grower selling bottled nono juice at market 10. Cross-breed piglets inescapable from some future feast.

GENERAL REMINDERS

- The tables are presented in five distinct Table Sets relating to details for households, holdings, parcels, livestock and pearl farming.
- The geographical breakdown adopted for the tables, gives details by CD for the main island of Rarotonga. For the other parts of the country details are given on an island-by-island basis.
- All crop areas are presented as 'single crop equivalent' (SCE) areas. These differ from 'actual' areas and the difference should be carefully noted. 'Actual' area relates to the area of land actually covered by a crop whereas SCE area relates to the area the crop would have covered if it had been planted on a single crop basis, i.e. account is taken of mixed crops. For example, if a plot of land of 1 acre has cassava and kumara inter-cropped on a 3:1 ratio, the 'actual' area both for cassava and kumara would be 1 acre whereas the 'single crop equivalent' area would be three-quarters of an acre for cassava and one-quarter of an acre for kumara.
- It should also be noted that whilst the term 'number of separate plantings' is widely used in table headings and in the text, this term only correctly refers to crops planted in plots within parcels. In other cases this term refers to the number of recordings made of each crop.
- The number of tables and cross-tables that could be produced from this set of data is almost limitless and the list of priority tables contained in this report only represents the main findings of the census.
- Users requiring more detailed information than is presented in this report should contact the Planning Division of the MoA, Rarotonga.

(Insert 138 pages of tables)

DEFINITIONS OF TERMS & CONCEPTS

Household Related

Agriculturally Active Household: - This refers to a household whose level of agricultural activity was either subsistence only, subsistence with cash cropping or commercial producers.

Commercial Producer: - The level of agricultural activity where a household's main purpose for agricultural production is to have their produce sold locally or for export.

Household: - Based on the arrangements made by persons, individually or in groups, for providing themselves with food or other essentials for living, a household may be either:

- a one person household, that is, a person who makes provision for his or her own food or other essentials for living without combining with any other person to form part of a multi-person household; or
- a multi-person household, that is, a group of two or more persons living together who make common provision for food or other essentials for living. They may be related or unrelated persons or a combination of both. They may live in one house or in more than one house.

Minor Agricultural: - The level of agricultural activity where a household has only very few crops defined as less than 625 square yards (1/8 acre) of land under garden crops or less than 10 coconut trees or less than 10 trees bearing other tree crops.

Non-Agricultural: - The level of agricultural activity where a household does not engage in any crop production. Such households may own or look after land not in use and also own or look after livestock.

Operator: - The person exercising management control over the operation of the agricultural holding. Where the holding is being operated by a single household the head of the household is in most cases the operator. A holding can have more than one operator.

Subsistence Only: - The level of agricultural activity where a household produces crops but does not sell for any significant amount.

Subsistence With Cash Cropping: - The level of agricultural activity where a household's main purpose for agricultural production is to feed itself but some crops or surplus crops are sold.

Farm Related

Holding: - An economic unit of agricultural production under single management comprising all livestock kept and all land used wholly or partly for agricultural production purposes, without regard to title, legal form, or size. Single management may be exercised by an individual or household, jointly by two or more individuals or households, by a clan or by a tribe. The holding's land may consist of one or more parcels, located in one or more separate areas or in one or more enumeration areas, providing the parcels share the same production means utilized by the holding, such as labour, farm buildings or machinery. For the purpose of this census, an agricultural holding excludes a juridical person such as a corporation, cooperative or government agency.

Inorganic Fertilizers

Manufactured mineral substances applied to soil, or irrigation water, to supply plants with the necessary nutrients. Examples include N.P.K. mixes, urea, ammonia and super phosphate.

Organic Fertilizers

Materials of organic origin, either natural or processed, that can be used as sources of plant nutrients. The most commonly used are compost and chicken manure.

Parcel

Any piece of land entirely surrounded by other land, water, road, forest, etc. not forming part of this holding. A parcel may consist of one or more plots adjacent to each other.

Plot

A part or whole of a parcel on which a specific crop or crop mixture is cultivated. A plot can also be fallow land or land waiting to be planting.

Land Related

Crown Land

Any land which has not been alienated from the Crown for a subsisting estate in fee simple, other than Native land. Examples of such land types include the main road, schools, hospitals, government premises, beaches, and usually inaccessible lands such as the interior of Rarotonga.

Customary Land

Alias Native land, Native Freehold Land, is a land which, being vested in the Crown, is held by Natives or the descendants of Natives under the Native customs and usage in the Cook Islands. Customary land is not investigated by the land court but is being looked after and handled by the Natives.

European Land

Any land, which has been alienated from the Crown for a subsisting estate in fee simple other than Native land. In other words Crown land (i.e. not native or customary land) leased or put aside by the Crown for specific purposes such as some churches.

Fallow Land

Idle lands suitable for cultivation that are not yet prepared nor ready for planting.

Freehold Land

Land which has been investigated by the land court and held by individuals who possess the right to apply to the land court for lease or occupational right.

Land Tenure

Refers to the arrangements or rights under which the operator holds or uses the agricultural land.

Lands Under Virgin Bush

Lands that are not cultivated with grasses and bushes all around. These are good as grazing ground for cattle, horses and goats.

Leased Land

Freehold Land which is obtained through a land court contract by which one party (lessor), usually in consideration of rent, conveys land to another (lessee) for a specified time period.

Licensed Land

Freehold Land belonging to another household or person that the borrower has borrowed for use usually on a temporary basis. Terms of the agreement are between the two parties concerned; i.e. it need not go through the court.

Long Occupation Right: - Alias vested order: that is, if any person or persons has lived on Crown or Customary land without any right for 20 years or more, such person(s) can apply to the land court for a right to occupy the same land indefinitely.

Occupation Right: - The operator (or spouse) has an exclusive right to use a piece of land, such right being obtained through the land court system of the Cook Islands.

Physical Land or Farm Area: - The actual measure of the land or farm used for agricultural activities or agricultural lands left fallow or idle or under virgin bush. The land or farm area will be measured in acres or in some cases square metres. There are 4,840 square yards or 4,046 square metres in an acre.

Crop Related

Mixed Crop: - Refers to two or more crops, which are interplanted over a plot in a regular pattern such as rows. Sometimes there are a few scattered plantings of other crops but not considered to be part of the mixed crop.

Ornamental Plants: - Those plants used for beautification or decoration whether indoor or outdoor. Examples of these are bougainvillea, orchids, etc.

Other Crops: - For the purpose of the tables in the report, other crops are non-edible crops comprising primarily of ornamental plants.

Scattered Crop: - Refers to trees or plants, which have not been planted with any uniform method of spacing over a plot.

Single Crop: - Refers to “one crop” which has been planted over a plot in a regular pattern such as rows. If there are a few scattered trees or plants of different crops within the plot, the plot is still considered to be single cropped.

Tree Crops: - Trees bearing edible fruits or nuts. The economic life of the trees vary significantly, more than five years. Examples being pawpaw (2.5 years), citrus (15 years) and coconut, mango, litchi, spondias, avocado (over 30 years).

Livestock Related

Boars: - Adult male pigs. Their live weight is over 40 kg.

Fatteners: - Middle aged pigs. Their live weight ranging from 25-40 kg.

Sows: - Adult female pigs. Their live weight is over 40 kg.

Weaners: - Piglets separated from the sow, and at the stage where they are considered to be ideal for consumption. Their live weight is less than 24 kg.

Fishing Related

Collecting/Gleaning Seashells and Sea Products: - Method of fishing using limited equipment and specialized gear for gathering seafood like clams, sea urchins, sea cucumbers, turban snails, oyster meat, octopus, crabs, etc. It is usually done in the lagoon and on the reef during low tide.

Deep Bottom Fishing: - Method of fishing used in catching tuna and other pelagic fishes in large quantities.

Drop Lining: - Method of fishing usually done by dropping a baited hook to great depths to target deep-sea fish such as grouper, snapper and pelagic fish like tuna, wahoo and marlin. The gears included in this method are drop stone fishing, rod and reel, etc.

Gill and Other Net Fishing: - Gill nets are used to catch a number of different reef fish in a lagoon or along a reef edge. Other netting includes scoop nets, cast nets, etc.

Hook and Line Fishing: - One of the oldest methods for catching fish. It is considered an environmentally friendly method as it catches primarily target species, inflicts minimal injury to the fish, and causes minimal damage to the surrounding habitat.

Long Lining: - Method of ocean fishing used to catch tuna. Its gear consists of a mainline between 100 to 300 kg breaking strength with several branch lines between attached to the mainline via quick release clips. The gear is left to soak for two to four hours before hauling. This method is generally used around fish aggregating devices (FADs).

Spear Fishing: - Method of fishing using javelin-like wooden spear or spear gun for catching fish among coral reefs, along the shore or in the surf.

Trolling: - Method of fishing used for catching oceanic species of fish. It includes trolling lures.

Pearl Farming Related

Drilled Unseeded Shells: - These are black lip pearl oysters, which are not yet ready for nucleus insertion.

Farm Lines: - The submarine main lines used to hang cultured black pearl oysters.

Farm Shells: - The oyster shells used for pearl farming. These are different from wild shells found naturally attached to calcified structures in the lagoon.

Other Shells: - These include juvenile black pearl oysters growing on spat collectors or nursery trays.

Pearl Farming: - Activities involved with the culturing of pearl oysters for black pearl production.

Seeded Shells: - These are cultured black lip pearl oysters which have a nucleus inserted into their gonads to generate black pearls.

Spat Collector Lines: - The submarine lines used to hang spat collectors, the devices used for the collection of oyster larva.

CROP INFORMATION

The following table lists all the crops separately identified in the census. For reporting purposes the major crops were itemized while others, being too small to differentiate, were grouped according to their general classification. The fourth column of this table shows which category in Table Set 3 each crop falls under. The final column gives the crop density of each crop, i.e., the number of trees/plants of that particular crop that would cover one acre of land if standard spacing for these crops were to be used.

Crop Code	Crop Description	Table Category Code	Category in Table Set 3 that the Crop falls under	Crop Density
1	Apple-star	12	Other Tree Crops	50
2	Avocado	1	Avocado	41
3	Banana-Cavendish	2	Banana	833
4	Banana-ladyfinger	2	Banana	833
5	Banana-other	2	Banana	833
6	Breadfruit	3	Breadfruit	41
7	Carambola	12	Other Tree Crops	52
8	Chestnut	4	Chestnut	41
9	Citrus-grape	12	Other Tree Crops	170
10	Citrus-lemon	7	Lemon	170
11	Citrus-lime	12	Other Tree Crops	170
12	Citrus-mandarine	12	Other Tree Crops	170
13	Citrus-orange	10	Orange	170
14	Citrus-tangerine	12	Other Tree Crops	170
15	Coconut	5	Coconut	76
16	Cocoa	12	Other Tree Crops	170
17	Coffee	6	Coffee	405
18	Custard apple	12	Other Tree Crops	42
19	Granadilla	12	Other Tree Crops	50
20	Guava	12	Other Tree Crops	60
21	Jackfruit	12	Other Tree Crops	40
22	Kava	12	Other Tree Crops	200
23	Litchi	12	Other Tree Crops	50
24	Macadamia	12	Other Tree Crops	50
25	Mango	8	Mango	41
26	Nono	9	Nono	200
27	Passion fruit	12	Other Tree Crops	300
28	Pawpaw-solo	11	Pawpaw-solo	833
29	Pawpaw-wild	12	Other Tree Crops	833
30	Sapodilla	12	Other Tree Crops	60
31	Spondias	12	Other Tree Crops	52
32	Sour sop	12	Other Tree Crops	57
33	Bean-export	13	Bean	27000
34	Bean-snake	13	Bean	27000
35	Broccoli	21	Other Vegetable Crops	37037
36	Brussels sprout	21	Other Vegetable Crops	37037
37	Cabbage-Chinese	21	Other Vegetable Crops	10125
38	Cabbage-European	14	Cabbage-European	10125

39	Capsicum	15	Capsicum	10125
40	Carrot	21	Other Vegetable Crops	10000
41	Cassava	22	Cassava	8100
42	Cauliflower	21	Other Vegetable Crops	37037
43	Celery	21	Other Vegetable Crops	62500
44	Chilli	16	Chilli	833
45	Choko	21	Other Vegetable Crops	5000
46	Courgette/Marrow	21	Other Vegetable Crops	11111
47	Cucumber	21	Other Vegetable Crops	11111
48	Eggplant	21	Other Vegetable Crops	18518
49	Ginger	29	Other Root Crops	7000
50	Kape	29	Other Root Crops	73
51	Kumara	23	Kumara	8100
52	Lettuce	17	Lettuce	66666
53	Maize	21	Other Vegetable Crops	55555
54	Melon-musk	18	Melon	1095
55	Melon-rock	21	Other Vegetable Crops	1095
56	Melon-water	18	Melon	1095
57	Okra	21	Other Vegetable Crops	37037
58	Onion	29	Other Root Crops	5000
59	Parsley	21	Other Vegetable Crops	7059
60	Peanut	29	Other Root Crops	3000
61	Pineapple	19	Pineapple	10800
62	Potato	29	Other Root Crops	4050
63	Pumpkin	21	Other Vegetable Crops	10067
64	Puraka	24	Puraka	8100
65	Radish	29	Other Root Crops	18000
66	Rukau	21	Other Vegetable Crops	8100
67	Silver beet	21	Other Vegetable Crops	37037
68	Snow pea	21	Other Vegetable Crops	55555
69	Spinach	21	Other Vegetable Crops	55555
70	Spring onion	21	Other Vegetable Crops	7005
71	Sweet corn	21	Other Vegetable Crops	33333
72	Taro-dry land	25	Taro-dry land	8100
73	Taro-wet, flooded	26	Taro-wet, flooded	8100
74	Taro-wet, raised	27	Taro-wet, raised	8100
75	Tarua	28	Tarua	8100
76	Tawa	29	Other Root Crops	52
77	Tomato	20	Tomato	10125
78	Turmeric	29	Other Root Crops	3000
79	Vanilla	21	Other Vegetable Crops	405
80	Yam	29	Other Root Crops	400
81	Ornamental Plants	30	Other Crops	0
821	Apple	12	Other Tree Crops	60
822	Kaika	12	Other Tree Crops	32
823	Strawberry	21	Other Vegetable Crops	10000
824	Herbs	21	Other Vegetable Crops	5000
825	Boysenberry	12	Other Tree Crops	600
826	Pandanus	12	Other Tree Crops	100
827	Hibiscus	30	Other Crops	0
828	Matakoviriviri	12	Other Tree Crops	40
829	Grapes	12	Other Tree Crops	313
830	Tamarind	12	Other Tree Crops	40
831	Pistachio - plum	12	Other Tree Crops	40
832	Rambutan	12	Other Tree Crops	32
834	Kota'a	30	Other Crops	0
835	Sugar Cane	21	Other Vegetable Crops	20000
836	Remuna	12	Other Tree Crops	40
837	Cashew nut	12	Other Tree Crops	87

838	Tapotapo	12	Other Tree Crops	52
839	Rukau viti (bele)	21	Other Vegetable Crops	10000
840	Marbel (mapera)	12	Other Tree Crops	40
841	Sweetsop	12	Other Tree Crops	52
842	Basil	21	Other Vegetable Crops	5000
843	Dill	21	Other Vegetable Crops	7800
844	Chives	21	Other Vegetable Crops	5000
845	Coriander	21	Other Vegetable Crops	3500
846	Pomelo	12	Other Tree Crops	170
848	Menemene	12	Other Tree Crops	40
849	Fig	12	Other Tree Crops	200
850	Bay	12	Other Tree Crops	40
851	Jojobe	12	Other Tree Crops	40
853	Sandalwood	12	Other Tree Crops	52
991	Fallow	31	Fallow/Waiting to be Planted	0
992	Waiting to be Planted	31	Fallow/Waiting to be Planted	0
993	Home	32	Non-Crop	0
994	Bush	31	Fallow/Waiting to be Planted	0
995	Livestock and Poultry	32	Non-Crop	0
996	Marae	32	Non-Crop	0

CENSUS FIELD STAFF

Thirty (30) census supervisors and one hundred eleven (111) enumerators were involved in the census undertaking. Most of the enumerators in Rarotonga were recruited from government departments and were required to conduct the census after regular office hours. In the Northern Islands and the Other Southern Islands, the designated census supervisors were responsible for the recruitment and training of enumerators on their respective islands.

Island	Enumerators
RAROTONGA	
Kiikii-Ooa	Supervisor: Tama Joseph Enumerators: Teariki Jacob, Rua Araitia, Rae Tupa, Lucky Julian, Tepoave Araitia
Tupapa-Maraerenga	Supervisor: Tapaeru Matutu Enumerators: Maryanne Poaru, Ngatamaine Kamana, Tina Akama, Kevin Aroita
Takuvaine	Supervisor: Sabati Solomona Enumerators: Tauraki R. Raea, Anna Roi, Tania Avare, Makirere Poila
Tutakimoo-Teotue	Supervisor: Makirere Poila Enumerators: Junior Takai, Makirere Poila
Ruatonga-Panama	Supervisor: Sabati Solomona Enumerators: Mii Rongo, Maara Vaiimene, Howard Tane, Mii Collier
Nikao-Panama-Pokoinu	Supervisor: Brian Tairea, Rairi Rairi Enumerators: Tania Avare, Teiho Teiho, Kau Arakura, Ngametua Arakura, Engia Nanai, Tukua Tangaroa, William Akanoa, Karen Tairea, Jackie Puna, Tauturu Hosking, Teokotai Tuaivi
Ruaau-Arerenga	Supervisor: Taarouru Apera Enumerators: Aketuke Tereia, Vae Unuka, Mata Aumata, Tavake Manuel, Matakeu Richard
Akaoa-Betela	Supervisor: Pare Rongokea Enumerators: Vaine Teokoitu, Mairi Heather, Elizabeth Karena,
Murienua-Rutaki	Supervisors: Oirua Joseph, Joe Ngatae Enumerators: Vaine Henry, Ngamata Bryson, Ngara Katuke, Betty Remuera, Joe Ngatae, Tapu Richard, Jennine Daniel, MaaraTaene, Pati Katuke
Titikaveka	Supervisor: Tutai Matenga, Andrew Hosking Enumerators: Rouru Tangatapoto, Taiene Takitaki, Vai Henry, Theresa Tatuava, Taiene Takitaki, Ani Piri, Maiata Samuel, Eiau Tangapirii, Aumai Tangapiri
Ngatangia	Supervisors: Joseph Kaveao, Fabian Kairua Enumerators: Tekea Enoka, Rachel Aiturau, Tapita Aiturau Mere Goodwin, Sharon Masters, Kerry Lazaro
Matavera	Supervisors: Kopu Vogel, Apii Enuua Enumerators: William Tamarua, Nga Enuua, Ngatuaine Maui, Thomas Ngauru, Noo Tokari, Teato Enetana, Madalene Kare

AITUTAKI	Supervisors: Tiraa Arere, Ina Maramatoa, Tinorei Temanu Enumerators: Amiria Davey, Amiria Karore, Anna Jessie, Aerau Maa, Cyndee Puapii, Ina Solomona, Isamaela Kiria, Maki Toko, Mataiti Rave, Rata Vaireka, Rere Mataiti, Ruth Arere, Teina Tetevano, Teiputurā Turi, Tekura Bishop, Tēpaeru Ngatuakana, Tēpaeru Nicholas, Tukua Upokomanu, Tukumate Riki
MANGAIA	Supervisor: Ngarangi Tuakana, Ngaiaere Aratangi Enumerators: Atetu Atetu, Kimi Torotoro, Maki Areai, Mamatiare George, Mautaike Tetonga, Revareva Ngarima, Teremateiti Tuamingi
ATIU	Supervisors: Maara Tairi, Tokoa Ina Tou Enumerators: Beni Toki, Maara Tairi, Tangata Rakei, Tangata Vainepoto, Teakura Ponini, Teura Maka Kea Jnr., Tokoa Ina Tou
MAUKE	Supervisor: Noo Aitorau Enumerators: Joan Taripo, Kamoe Aiturau, Noema Rouru, Teariki Enea, Uru Tairea
MITIARO	Supervisor: Pua Tetava Enumerators: Ngatokorua Ngatuakana, Terii Taia
PALMERSTON PUKAPUKA	Supervisor/Enumerator: Moetu Tangitamiiti Supervisor: Neiao Topetai Enumerators: James Auora, Tuakana Tariau, Tukia Mataora
NASSAU	Supervisor: Neiao Topetai Enumerator: Topetai Neiao
MANIHIKI	Supervisor: David Greig Enumerators: Apiianga Tepania, Faiteru Makira, Makirau Itama, Ruau Tamahunu
RAKAHANGA	Supervisor: Teariki Rauru Enumerators: Araipu Munokoa Tini, Taunga Tuteru
PENRHYN	Supervisor: Nooroa Roi Enumerators: Alex Maretapu, Dorothy Solomona, Teanau W. Taripo, Tetuariki Mariri Supervisor: Enumerators:

SAMPLE QUESTIONNAIRES

Five types of questionnaires were used to capture the agriculture and fishing activities of the household; pearl farming activities and information on the disposal activities of commercial livestock and poultry raisers. They were also printed on different coloured paper to assist with ease of identification in the field. The description of each questionnaire is as follows:

Household Form

This was completed for all households covered in the enumeration to determine the level of involvement of the household in agricultural activity and fishing activities (white form).
(Insert HH form)

Holding Form

This form was completed only for agriculturally active households with a holding area of at least one-eighth (1/8) of an acre. The number of holding forms completed corresponded to the number of holdings operated by the households (green form).
(Insert Holding form)

Parcel Form

This was completed only for those households that completed a holding form. The number of parcel forms completed corresponded to the number of parcels, whether in use or fallow, as reported in the holding form (pink form).
(Insert Parcel form)

Livestock Form

This was completed for those households engaged in commercial pig, goat or poultry raising. It was assumed that households reporting more than 10 pigs, 10 goats or 50 chickens at the time of enumeration fell into this category (yellow form).
(Insert Livestock form)

Pearl Farming Form

Those households engaged in pearl farming completed this form. It was mostly administered in Manihiki, Penrhyn and Rakahanga (blue form).
(Insert Pearl Farming form)