be plotted against probabilities of retention, P_i, of successive lengths, L_i, in the commercial gear. In such a case, estimates of Z_i pertaining to lengths below the retention range of the commercial gear (where $P_i = 0$) are direct estimates of natural mortality M.

Putting the foregoing in a different form, if estimates of R_m, and thus Z_i, can be obtained for length groups outside of (usually smaller than) the retention range of the commercially utilized fishing gear, estimates of the natural mortality rate, M, of the unexploited size groups can be directly obtained from the sample length-frequency distributions.

Conclusion

Data which should, in theory, be available in any fisheries laboratory can be used to obtain routine estimates of M using this method. However, in practice, it has proven to be difficult to obtain suitable data for application of the model and data sets are now sought whereby the robustness and/or sensitivity of the method might be tested. If a time series of data is available, it might be possible to document changes, if any, in the value of M in response to development of the fishery and consequent changes in the composition of multi-species stocks.

I thank Dr. J.M. Hoenig for some useful comments on an earlier draft of this paper.

References

Hamley, J.M. 1975. Review of gill net selectivity. J. Fish Res. Bd. Canada 32(11):1943-69.

Pauly, D. 1982. Studying single-species dynamics in a tropical multi-species context. p. 33-70. In Pauly, D. and G.I. Murphy (eds.) Theory and Management of Tropical Fisheries. ICLARM Conference Proceedings 9, 360 p.

Pauly, D. 1983. Length-converted catch curves: A powerful tool for fisheries research in the tropics (Part I). Fishbyte 1(2), 9-13.

Pope, J.E. 1975. Manual of methods for fish stock assessment. Part 3. Selectivity of fishing gear. FAO Fish Tech. Pap. (41) Rev. 1; 65 p.

AUTOMATIC DATA PROCESSING FOR LICENSING AND INFORMATION MANAGEMENT OF FOREIGN VESSEL ACCESS FISHERIES

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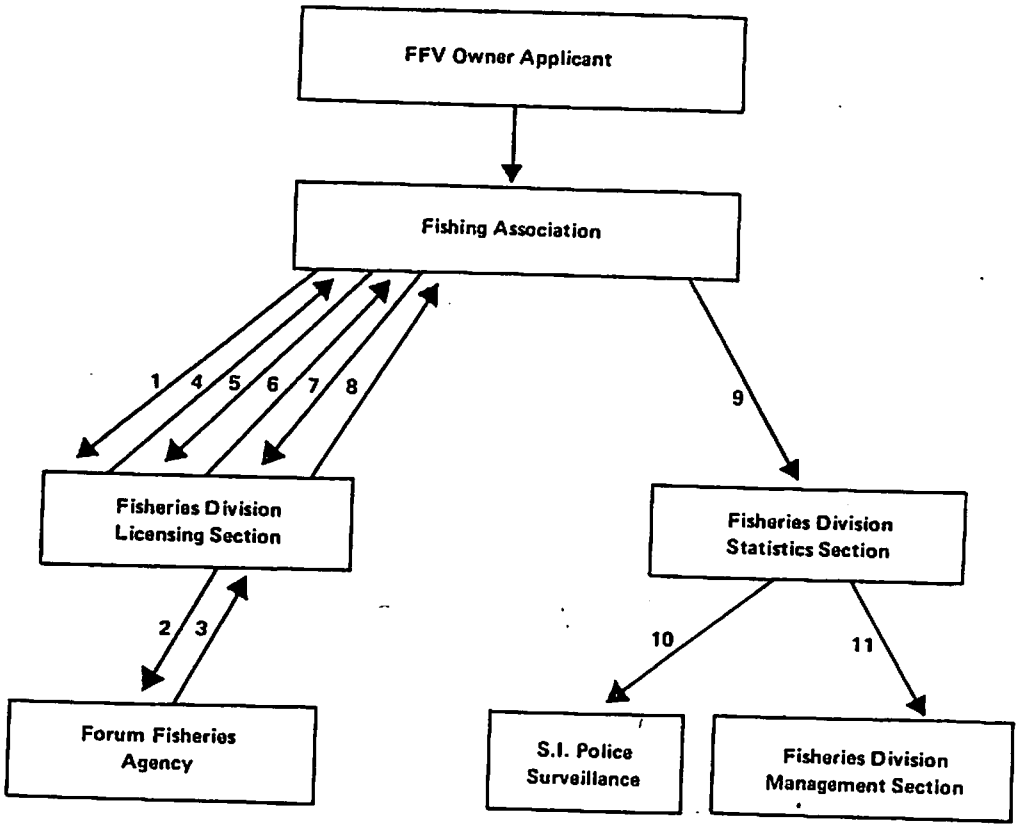
The issuing of foreign fishing vessel (FFV) licenses and the subsequent collection and compilation of current FFV fishing data for various purposes are administrative procedures which lend themselves readily to automatic data processing.

In the Solomon Islands there exists a relatively complex procedure for registration of FFVs, and this is now further complicated by the requirement for all FFVs to be registered in the Regional Register of Fishing Vessels of the South Pacific Forum Fisheries Agency.

Figure 1 shows the information flow between Fisheries Division (Research and Management) and the FFV applicant before and during his activity in the 200 n.mile Fisheries Zone. In general, all communications with the Japanese FFV industry are by telex through one or more of the Japanese Fishing Associations [Nikkatsuren, Kinkatsukyo or Zengyoren.]

A suite of programs for a Hewlett-Packard HP85 desktop computer has been developed which will process the incoming telexed information (when



1. Request for regional registration by applicant.
2. Request to FFA for regional registration of applicant.
3. Confirmation of regional registration with registration number and vessel details feedback.
4. Confirmation of regional registration to applicant.
5. Request for license/permit by applicant.
6. Issuance of permit number [valid one year].
7. Request for activation of permit [valid one trip].
8. Issuance of Activation Sequence Code, start and end dates and period of validity.
9. Fishing zone activity reports from associations—entry, weekly position and catch, last weekly position and catch, transit and departure.
10. Fishing zone vessel activity report to S.I. Police Surveillance Unit—vessel and permit details and last reported position.
11. Summary to Management Section on catch and operations for quota control and statistical purposes.

Fig. 1 Licensing and Information Flow

manually entered), store it in raw and summarised form and generate appropriate output for telex responses or reports.

All programs are linked through a master Licensing System Program [LSP]. This is an "autostart" program which loads and runs when the computer is turned on and the LSP disc is placed in the drive. It is therefore suitable for unskilled operators to directly enter the LSP, without any knowledge of system commands or programs.

Through programmed special function keys accessing a screen menu, the LSP will link via 'CHAIN' commands to the active programs. After any program has been completed the operator has the choice to chain back to the LSP for other work. Again, the chaining method of scratching, loading and running various programs within a suite is most suitable for unskilled operators.

Table 1 shows the basic system for data entry, information response and report generation. At present, we can enter both Japanese and Korean FFV information, though the reporting procedures

Table 1. Structure and function of suite of licensing system programs.

Program	Function	Input	Output
Autost	Master Licensing System Program [LSP] links together all other programs	Operator requests active programs from screen menu of the various system functions	None
Create	Creates data files for country/year licensing data eg. JP1983 (Japan Permit file 1983) and monthly summary files eg. JM0883 (Japan monthly summary file for August 1983)	Operator inputs file name, number of records and their length eg KP1983, 100 records, each 200 bytes	Disc files created
Permit	Registers vessel data on country/year (C/Y) data file in preparation for activation of permit—vessel name, type, GRT, call sign and permit number (which usually pass on from year to year)	Telexed vessel details from Associations (plus, at first time of operating permit number supplied by Licensing Officer)	C/Y updated and confirmation report on registration and permit issue
Activation	Enters activation request, checks registration validity. Generates and adds new activation sequence code (ASC) to vessel record of C/Y file	Vessel details, previous years ASC	Issues new ASC, start/end dates, validity period as printed message to telex operator
POS/ENT	Multiple function program for entering telexed operating reports on vessel status to C/Y and Monthly summary files	1. ENTRY—position and catch on board 2. Weekly position and catch (Wednesdays) and fishing days 3. Last weekly position and catch on last day of fishing before departure 4. Transit report—position, entry and exit 5. DEPARTURE—position and catch on board	Updates C/Y records with vessel status eg. fishing/transit etc. Updates summary files with catch and effort
POSREP	Reports vessels in zone by searching all C/Y files for status flag E—entered	Current date	Printout of currently entered vessels with all details on permit number, call sign, last reported position etc.
ADHOCreps	Multi-function program will provide latest information on vessels/groups of vessels	Current date and report type required ie. all registered, all entered, all fishing or for one vessel (named)	Operating details for 1 (named) or all vessels
Summary	Summarizes catch and effort for each C/Y data file for requested months	Starting month for summary	Prints out catches by species and effort, and number reports made

(Fig. 1 line 9) are less complex under the Korean access agreement.

The LSP stands as a small independent system for a relatively large amount of data transactions. Clearly, it is a first step in small scale processing on a computer whose size and cost make it generally accessible to small Fisheries Divisions. Future enhancements that could be envisaged are full, on-line operation for automatic reception and processing of requests via telex modem. Ideally, all information would be entered to a database system with modified versions of the programs described here overlying it but also independently accessible through a query language.

An important point for the development of such a relatively complex system was the expected computer skills of the operators who would change from time to time. The LSP is "user-friendly" and can be operated by any member of staff from observer to senior management. It has been running daily for 2 years.