Managing Nursery Information in the 1980's[1]

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Faced with a rapidly expanding reforestation program and an outdated manual record keeping system, the British Columbia Ministry of Forests developed a Nursery Information System to manage information on seedling production and distribution. A brief description of the system is presented.

INTRODUCTION

Seedling production in British Columbia went through a period of rapid expansion during the last two decades. The number of seedlings planted in B.C. rose from 26 million in 1969, to 63 million in 1979, and to almost 200 million seedlings in 1987 as shown in Figure 1. This rapid expansion of the reforestation program prompted the Ministry of Forests to review the process of nursery information management in the fall of 1982. The aim was to develop an information system which would cope with the expanding seedling production program, and provide dependable reporting capabilities.

NUMBER OF TREES PLANTED IN B.C.
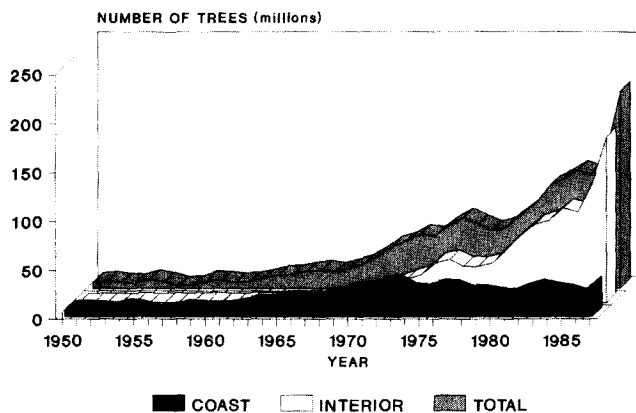### FROM 1950-1987

Figure 1. Number of Trees Planted in B.C.

The Problem

The record-keeping system in use in 1982 was a manual file card system which provided a few simple summary and detailed reports. This manual system had two major deficiencies. The first was an inability to reconcile the number of seedlings shipped for planting and the number of seedlings actually recorded as planted. In 1981 this difference in seedling numbers produced a "paper loss" gap approaching 10 per cent, and this was expected to get worse as the planting program expanded. The second was the limited number of reports that were manually compiled from the file cards. Any additional reports demanded by forest managers required a large amount of time and effort to produce. Recent advances in information management had raised the information expectations of both the nursery managers and the field foresters, and they were anxious to see this technology applied to seedling information. Thus, it was obvious that the manual system would not cope with the information needs of a rapidly expanding seedling production program, and that some form of computerized information management system was needed to maintain control.

The Ministry of Forests had already utilized computers to assist with the management of the reforestation program. The ordering of seedlings was being handled by a Sowing Request System which assisted in matching the orders from field foresters for seedlings, called sowing requests, with the various government and privately owned nurseries and ensured that forest tree seed and nursery materials arrived at the assigned nurseries at the proper time. A Planting Report System was also under development to capture and report on information related to the annual planting program. The next step was to develop a system to bridge the gap between these two activities and provide the field foresters with information on their seedlings while the stock was being grown in the nurseries and subsequently transported to the planting sites.

The Solution

In the fall of 1982 approval was given to investigate the feasibility of producing a system to manage nursery information. Over the next two years, the existing manual system was evaluated and a proposed Nursery Information System was described. The development of the new system was initiated in the fall of 1984.

The Nursery Information System was to provide an integrated information system to the various agencies involved in reforestation while reducing the overall manual paperflow process of compiling, transcribing, and reporting nursery information. The main objective was to be able to track a sowing request from inception, through the growing cycle in the nursery, to the dispatch of seedlings to the field forester at the planting location. Development of the system was done in phases, with each phase tested in at least two different nursery sites prior to implementation on a province wide basis. The first phase, dealing with inventories and seedling quality, was operational in the spring of 1986, while the seedling storage and distribution phase of the system was operational in the summer of 1987.

The System

The Nursery Information System is a data management system composed of a central system located on a mini-computer at the Headquarters office, and local systems located on personal computers at each automated nursery site and each Nursery Zone Administrative Office as shown in Figure 2.

complex relationship between nurseries and their clients. At any time a client may have seedlings being grown at several nurseries to take advantage of each grower's expertise with a particular species or stock type. As well, each nursery may be producing seedlings for more than one client. The only way to provide the clients with a report containing all their seedlings is to gather all the data together at one time.

There are three subsystems which make up the local Nursery Information System. These are the Nursery Growing Subsystem, the Quality Control Subsystem, and the Storage and Distribution Subsystem.

The Nursery Growing Subsystem, represented in Figure 3, manages the bulk of the seedling information. The main purpose of this subsystem is to process and report on information pertaining to growth progress, seedling quality, inventory estimation, cultural treatments, and transplant and lift scheduling for all seedling stock from the sowing phase to shipping of these seedlings. The subsystem operates as an online system with local reporting and screen display functions at the nursery sites. Data processing is done throughout the day, and data transfer to the central computer is accomplished electronically over phone lines during the night. A reduced version of this subsystem is also available at the Nursery Zone Administrative Offices to record inventory estimations and pesticide information from nurseries with no local online processor.
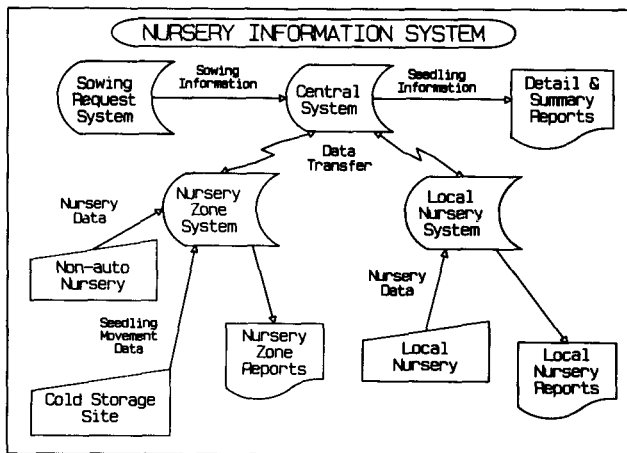

Figure 2. Nursery Information System

The main function of the central system is to receive data from the local sites in the province and update a central database which is then used to produce detailed and summary reports for distribution to the various agencies involved in reforestation, and to the B.C. Forest Service managers and executive officers. A central database is required to handle the
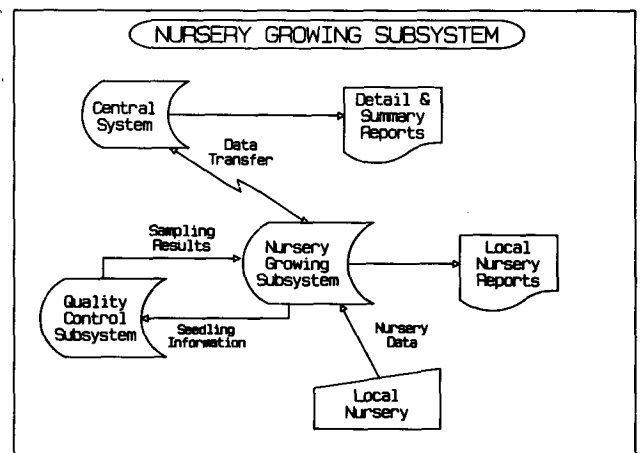

Figure 3. Nursery Growing Subsystem

The Quality Control Subsystem, represented in Figure 4, which assists the nursery technicians with data analysis of seedling information. This subsystem is only available at the nursery sites with local processing capabilities. To estimate inventories and determine seedling quality throughout the growing period, seedling growth status and trends are sampled, measured, statistically analyzed, and reported. The separation of

quality control data from the nursery growing data allows the technicians to sample and analyze seedling data repeatedly and use only those results which they are satisfied with to update the Nursery Growing Subsystem information. This computer aided analysis provides the nurseries and their clients with the ability to modify culling standards and evaluate the impact on the estimates of inventory in order to attain planting priorities. Based on these estimates the field foresters can plan their planting program and define specific shipments for specific sowing requests. This subsystem also records the cultural treatments applied to the crops while the crops are at the nurseries.
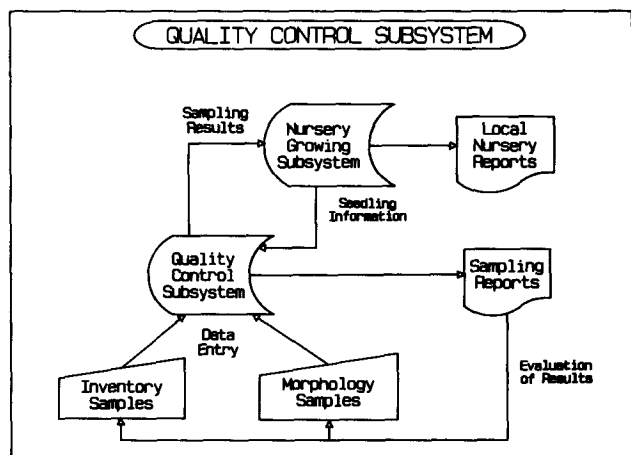

Figure 4. Quality Control Subsystem

The Storage and Distribution Subsystem, represented in Figure 5, is used to coordinate the storage and distribution of seedlings prior to and during the planting season. This subsystem provides the online nursery sites with seedling storage and shipping management functions. Once seedlings are shipped from the nurseries, the management responsibility transfers to the Nursery Zone Administrative Office where a local online version of this subsystem is used to manage seedling movement and storage within the nursery zone.

Shipping can be initiated by a pre-arranged schedule submitted prior to lifting, or via telephone instructions from the field foresters during the planting season. A multicopy Shipping Order/Invoice is utilized to monitor seedling movement from the nurseries to the planting sites. The information on the stock being issued is recorded by the shipper and a copy of the invoice is sent to the local Nursery Administrative Office where the data is entered into the system. The remaining copies are sent with the seedling shipment. At the destination the field forester confirms the amount of stock received and another copy of the invoice with the receipt information is sent to the local Nursery Administrative Office for data entry. This process of matching stock issues and

receipts provides stock movement and storage monitoring, regardless of how many times the seedlings are moved, as well as the ability to reconcile stock shipped by the nurseries with stock received by the designated final receiver.
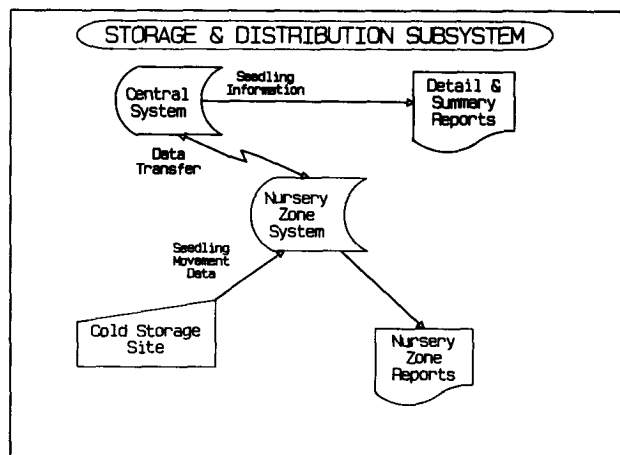

Figure 5. Storage & Distribution Subsystem

Retrospect

The development of an information system to manage the production of over 200 million seedlings was a major undertaking, requiring close cooperation between the users of the system and the programming staff over the five years that the system was developed and implemented. Even with this close cooperation, a large portion of the time and effort was devoted to maintaining and enhancing the system in response to feedback from the users, and changes to government legislation and forest policy. Overall, the system has met the stated objectives and the users have been satisfied with the results. Everyone involved has agreed that the previous manual system would not have been able to cope with the expansion of the seedling production program.

Providing an accurate information system while maintaining the flexibility needed to manage a biological product was a formidable challenge. Of the many lessons learned from the development of this system three stand out as critical to the success of the system: 1. Involve the users from the very beginning. 2. Accurately describe the requirements of the
   new system.
3. Start small, having a solid foundation of basic functions will provide the necessary support for the additional functions which will be required as the system matures.

Agencies and individuals desiring further information on this system are invited to contact the author.