AN ABSTRACT OF THE THESIS OF

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Abstract approved_____

The purpose of this study was to determine how farm forestry might be included into Vocational Agriculture programs in those communities where forestry plays a significant role in the local economy. The various aspects of forest instruction that were analyzed are as follows: the importance of farm forestry to the local economy and the number of teachers who recognize a need here by incorporating forest instruction into their curriculums; departments having access to forest land for instructional purposes; the average number of boys in each department and the number of boys involved with forestry projects; total number of hours of instructional time devoted to forest instruction; techniques and methods used in teaching farm forestry; subject material taught in each of the four years of secondary instruction; sources of information

used in teaching the subject and the reasons why some teachers do not include instruction in forestry.

The related studies reviewed in connection with this study revealed that: (1) The same general body of subject material is used nation wide; (2) Most forest instruction on the secondary level centers around two areas--forest management and forest products; (3) A large number of practical field work experiences are included in most curriculums; (4) The laboratory or student centered approach to teaching is receiving rather universal appeal in teaching forestry.

The findings of this study can be illustrated most easily in tabular form and are presented thusly:

1. Out of 54 departments of Vocational Agriculture surveyed, 28 indicated that forestry was an important enterprise locally and 30 indicated that forest instruction was being included in their curriculum.
2. Out of the 30 departments teaching farm forestry, 23 indicated that some type of forest land was being used for practical field work instruction. Thirteen of the 23 indicated privately owned land was being used.
3. The average number of boys enrolled in the departments surveyed was 56 with an average of

three forestry projects in the Supervised Farming Program per department.

4. Total number of hours devoted to instruction ranged from an average of eight during the freshman year to 16 during the senior year with 14 hours each for both sophomore and junior years.
5. There are at least eight methods used in teaching farm forestry, of which the most important are: lecture, field trip(s), and group discussion.
6. There are at least 11 field trips used in Vocational Agriculture forestry instruction, of which the most important are: timber cruising field trip, tree planting, and a trip through a forest nursery.
7. There is an increase in the complexity of subject material as one approaches the senior year of instruction.
8. Public and private forestry organizations are providing a tremendous amount of technical forestry information that Vocational Agriculture teachers may use. The two most important sources of this information are the local county agent and the U.S. Forest Service.
9. From the material gathered through the questionnaire and the review of related literature a course outline for the study of forestry in

Vocational Agriculture was developed. This outline involved a total of 52 periods of classroom instruction and field experiences across all four years of the high school Vocational Agriculture program.

A SUGGESTED FARM FORESTRY CURRICULUM FOR VOCATIONAL AGRICULTURE

by

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Chapter I

INTRODUCTION

The first settlers to the Northwest found one of the world's greatest storehouses of accumulated forest resources. As the settlers viewed their seemingly non-ending expanses of trees they could not help but imagine that the forests would last forever. Because of the feeling that the trees were so plentiful, the management practices used by the settlers and people to follow them for some time resulted in many instances in complete devastation of the forests and forest lands. A century and a half later we have only about 40% of the original timber. Through sustained yield production, management, and modern logging techniques, the approximately 26 million acres which now stand should adequately provide for our future needs.

Only through the careful management techniques currently being stressed in our forest industry can Oregon and Washington hope to continue to employ over 60% of their industrial wage earners. If we are to progress industrially, full use of our forest reserves must be encouraged. The failure to recognize this will prove

harmful not only to the forests themselves but also to the residents of these states and their future prosperity.

The forest industries of the Northwest, representing 35% of the softwood lumber, 50% of the plywood and 25% of the hardboard production in the United States, are greatly dependent upon the knowledge of and attitude towards conservation measures. It is economically less wasteful to have these forests supply raw materials upon which so much of our industry depends than to have them ravaged by fire and other elements of destruction of which man is the primary cause.

The problem being faced is one of managing and perpetuating the reserves that we now have. It is equally important that people become aware of the tremendous importance of our forests and that they develop favorable attitudes towards conservation and its objectives.

A sound educational program in the schools can help in this area not only by developing constructive attitudes, but also by supplying the forest industry with interested, competent people as employees.

STATEMENT OF THE PROBLEM

Farm forestry has been an integral part of the Vocational Agriculture curriculums of some high schools in Oregon and Washington for several years. Because of the

vast expanse of forest land and the large number of young people who pass out of high school into positions in these forests, it has been found that in many departments, instruction in farm forestry is a valuable part of the curriculum. A broadened knowledge by prospective forest employees of the area in which they may choose to seek employment will in many instances better orient a student and give him some of the technical skills and knowledge with which he may attack some of the problems of this profession and be perhaps better founded vocationally.

In the last few years some Vocational Agriculture instructors have shown a greater interest concerning the material that should be taught. The problem then is "what are the means through which a Vocational Agriculture teacher can approach the subject of farm forestry in his classes for maximum teaching advantage?"

AIMS AND PURPOSES OF THIS STUDY

The primary aim of this paper is to develop a complete curriculum for teaching farm forestry to students of Vocational Agriculture in those parts of Oregon and Washington where the teaching of such material is applicable to the secondary school and to a given community. Specifically, it is hoped, that the following problems can be solved:

1. What subject material in the area of forestry should be taught to Vocational Agriculture students.
2. What subject material should be taught in each of the years that Vocational Agriculture is taught.
3. What methods and procedures can be used to best teaching advantage in this area.
4. How many total hours should be devoted to instructing in each subject area.

LIMITATIONS OF THE STUDY

Because of the time factor involved and the scope and nature of this study, certain limitations will be made. A major limitation to this study is that of the information gathering device. A questionnaire was used to gather information from those departments surveyed which consisted essentially of a checklist. Checklists have inherent weaknesses which must be realized if they are to be of any value. Program possibilities rather than actual situations could easily result unless all variables are taken into account when the checklist is formulated. Long lists unless completely objective and adequately defined could reduce the reliability because:

1. Bare titles with inadequate descriptive material

give little information upon which to make an intelligent selection.

2. People often take checklists lightly and their answers may not be truly representative.

Only departments located in Oregon and Washington counties in which $900,000 or more was taken from the forest land in 1959 will be considered in this study. Naturally, only the results obtained from those questionnaires returned can be studied. The material to be studied as to program content will be:

1. Departments offering farm forest instruction
2. Instructional forests
3. Number of forestry supervised farming projects
4. Hours of instructional time devoted to this area
5. Methods of teaching
6. Field trips
7. Course content
8. Sources of information
9. Reasons for not teaching forestry

An explanation of results in each of these areas is treated separately in chapter four of this study.

DEFINITIONS

1. Farm Forestry - Woodlands included as an integral part of the farm.

2. Conservation - Those "wise use" practices employed in planning, preserving and protecting farm woodlands.

3. Development - The cultural and managerial practices employed in the establishment and care of farm woodlands.

4. Vocational Agriculture Program - The total scope of activity under the direction of the department of Vocational Agriculture in a local high school.

5. Supervised Farming Program - The farming activities carried on by the student of Vocational Agriculture; usually, but not necessarily, on his home farm under the supervision of his instructor and parents.

6. Future Farmers of America - F.F.A. - The Future Farmers of America is the national organization of, by, and for farm boys studying Vocational Agriculture in public secondary schools which operate under provisions of the National Vocational Education Act. The F.F.A. is an intracurricular part of Vocational Education in Agriculture of America. It constitutes one of the most effective devices for teaching through participating experiences.

7. Instructional Program - Learning experiences provided for the Vocational Agriculture student in the

classroom, laboratory, farm mechanics shop, field, or on the home farm.

8. Maximum Teaching Advantage - That situation which provides the most learning for the greatest number of students.

Chapter II

REVIEW OF RELATED LITERATURE

Most of the information upon which this chapter is based was drawn from printed material received from various schools of forestry and departments of vocational education in the southeast, east, and midwest states. The author was unable to locate any information pertaining to the teaching of farm forestry that had been printed in either Oregon or Washington.

For the purposes of simplification the material has been organized into four areas in this chapter. These four areas are: (1) introduction to the subject area; (2) farm forest management; (3) products obtained from farm forests and, (4) supplementary information. Each of these topics is discussed individually, omitting as much repetition as possible between references.

INTRODUCING THE SUBJECT AREA

A thorough introduction into the subject of forestry is necessary as it is in any subject area for the purpose of enhancing motivation and personal self-involvement on the part of both students and teacher. This initial introduction must bring into the mind of its learner the basic importance of the topic under discussion in relation

to the individual in his own setting, and to society as a whole, before maximum effectiveness of later instruction can be realized.

The Redwood Region Conservation Council of California has organized a curriculum outline for secondary forestry instruction which is very complete and is the most extensive outline secured by the author.(4) For these reasons this outline will provide the foundation for much of this chapter. The introductory portion of this outline is as follows:

A. The forest
    1. Definition of a forest
    2. Kinds of forests
B. Forests and man
    1. Man's dependence on forest through the ages
        a. Forests and ancient civilization
        b. Forests in the Middle Ages
        c. Forests during the Renaissance
        d. Forests in the Colonial Period
        e. Forests and the Industrial Revolution
        f. Forests and modern civilization
        g. Forests in the future
    2. Forest values
        a. Forest products

(1) Manufactured wood products

(2) Poles, piling, posts

(3) Pulp and paper products

(4) Naval stores

(5) Fuelwood

(6) By-products: plastics, tanning materials, food, nuts, nursery stock, charcoal, medicinal products, alcohol, others

(7) Forage for domestic animals

(8) Fish and game

b. Water conservation

c. Soil conservation

d. Recreation

e. Wildlife

f. Aesthetic, spiritual, and other values

g. Forests and national defense

C. Forest resources

1. Forest resources of the United States: past, present, and potential; forest regions and types

2. Forest resources of other countries: past, present, and potential; forest regions and types

3. Conservation of forest resources

D. Forestry

1. The meaning of forestry: a science, art, business, and public policy
2. Early forestry practices
3. European background and influences
4. Forestry in the United States
5. Branches of forestry

E. History of forests and forestry in the United States; forestry legislation; the development of forest policy

1. Pre-colonial period
2. Revolutionary and Post-Revolutionary period
3. Period of westward expansion
4. Closing of the frontier; the conservation movement
5. Present situation
6. Future outlook

F. Forests and forestry in Oregon (Washington)

1. Forest areas, types, ownerships, and values
2. State forestry legislation; the Forest Practices Act
3. Federal, state, and county forestry agencies, their organizations and functions
   a. United States Forest Service
   b. National Park Service

c. Bureau of Land Management

d. Bureau of Indian Affairs

e. Oregon (Washington) Division of Forestry

f. Extension Forester, Oregon (Washington) State University

g. County Forestry Departments

4. Professional and popular forest conservation organizations

a. Society of American Foresters

b. American Forestry Association

c. Western Forestry and Conservation Association

d. Other organizations

5. Private forest conservation organizations

a. Forest protective associations

b. Foundation for American Resource Management

c. West Coast Lumbermen's Association

d. American Forest Products Industries, Incorporated.

e. Pacific Logging Congress

f. Other organizations

G. Forest research organizations

1. United States Forest Service Experiment Stations

a. Research units

b. Experimental forests

c. Forest products laboratory

2. Oregon (Washington) State Experiment Stations and Forests

3. Research by universities and colleges

4. Private research

a. Western Pine Association Research Laboratory

b. Timber Engineering Company

c. Company Research

This outline seems rather lengthy but still contains a great deal of material that would be of importance if included in an introduction to this area. The problem with length would involve both the loss of time which could be used to better advantage for more instructional purposes and the loss of motivation on the part of the students when the depth of the introductory subjects surpassed their interest level.

Like any subject material to be used in an individual locality, the instructor must choose among all of the data to find the information that is applicable to his situation.

The material that has been organized by the RRCC

is aimed more at a general course in forestry to be taught in high schools than it is specifically for Vocational Agriculture. There are certain differences between the aims of a program as organized by these people and those of a person attempting to apply this material to Vocational Agriculture and these differences must be realized before maximum usefulness can be realized from this information.

The Minnesota State Division of Vocational Education submitted a course outline, the introductory material of which places a considerable emphasis on the continued development of favorable attitudes towards the subject area as a realization of timber crop potential is understood.(14) Continued education with continued motivation is of course necessary to maintain this favorable attitude.

The Alabama Supervisory Staff of Vocational Agriculture has indicated in their publication, "Farm Forest Facts," that this instruction as well as all other subjects taught in Vocational Agriculture should be taught according to the needs and importance and in accordance with the existing local conditions.(1) It is believed that continued emphasis on these three points when introducing farm forestry will enhance motivation and student learning.

Fred Winch, New York State extension forester, has indicated that Vocational Agriculture students would become more interested in a farm forestry program as a part of their supervised farming projects if they had a more thorough knowledge of the importance of the farm woodlot as an integral part of the farm, and if they were familiar with their home farm woodlot conditions.(19) He suggests that practical field work should be included in this first unit of orienting the students in the field of forestry. He suggests that fieldwork jobs such as tree identification and forest survey should be used in the beginning exercises as a means of forming a more broad background as well as initial motivation in the subject area.

FARM FOREST MANAGEMENT

Some curriculum builders apparently believe that forest management should constitute nearly 100% of high school forestry instruction. This statement is made after reviewing seventeen different curriculums in this subject area that have been organized by people from various colleges, universities and divisions of vocational education across the country. Several of these outlines have stressed only that material which the author sees as applicable to the area of forest

management. Perhaps management should be the core of the high school forestry instruction program but the author believes that at least one other important phase of forestry, that of forest products, should be included in the high school curriculum outline.

Because of the interest in and importance of forest management in high school forestry instruction, a great amount of information has been compiled in this area. The following is an outline that has been organized by the RRCC and seems to be the most comprehensive that the author has located.(4)

A. Forest management
    1. Classroom activities
        a. Branches of forest management
            (1) Land management
            (2) Timber management
            (3) Recreation management
            (4) Watershed management
            (5) Wildlife management
            (6) Multiple-use management
        b. Problems of forest management
            (1) Federal and state regulations
            (2) Taxation
            (3) Public support
            (4) Small ownerships

c. Timber management

(1) The timber management plan

(2) Cutting system

(3) Silvicultural treatments

(a) Thinning

(b) Pruning

(c) Burning

(d) Liberation cutting

(e) Planting

d. Wildlife management

(1) The role of animals in the forest

(2) Principles and objectives of wildlife management

(a) Small game management

(b) Big game management

(c) Migratory bird management

(d) Fish management

(3) Problems of wildlife management

(4) Federal and state wildlife legislation

e. Forest utilization

(1) Logging

(a) History of logging

(b) Development of modern logging techniques

(c) Logging processes

(1) Felling, bucking and limbing

(2) Yarding

(3) Loading

(4) Hauling

(d) Laws related to logging

(2) Harvesting other forest crops

(a) Pulpwood

(b) Fuelwood

(c) Posts, piling, poles, ties, etc.

(d) Christmas trees

(e) Miscellaneous crops

f. Forest mensuration

(1) Measurement of logs and other forest crops

(a) Units of measurement, terms and definitions

(b) Scaling theory

(c) Log grades

(2) Measurement of standing trees

(a) Diameter and height measurements

(b) Volume

(c) Age and growth rate

(3) Measurement of forests

(a) Areas, types, boundaries

(b) Stand composition, age classes

(c) Application of sampling principles

(d) Timber cruising

(4) Valuation of forests and forest crops

(5) Forest surveys

(a) Purposes of forest surveys

(b) Types of forest surveys

(c) U.S. land survey system

g. Forest protection

(1) Forest fires

(a) History and significance in this state

(b) Causes of forest fires

(c) Fire prevention activities

(1) Education

(2) Legislation

(3) Elimination of hazards

(d) Presuppression activities

(1) Preplanning

(2) Fire organizations

(3) Training programs

(4) Forest fire plans

(5) Cooperative action

(e) Suppression

(1) Fire fighting techniques

(2) Fire behavior

(3) Damage appraisal

(2) Forest insects

(a) The role of insects in the forest

(1) Beneficial effects

(2) Destructive effects

(b) The extent, kinds and appraisal of damages caused by forest insects

(c) The principle forest insects of this state

(d) Control of destructive insects

(3) Forest diseases

(a) The importance of, extent, and damages of diseases

(b) Kinds and causes of forest diseases

(c) Control and prevention of forest diseases

(d) Forest disease regulation

(4) Protection from other destructive agencies

(a) Forest animals

(1) Porcupines

(2) Bears

(3) Deer and livestock

(4) Rodents

(b) Natural phenomena

(1) Wind

(2) Rain, hail, ice, snow

(3) Unfavorable temperature

(c) Man's activities

h. Growing the forest crop

(1) Seeding and planting

(a) Natural reproduction

(b) Artificial reproduction

(1) Reasons for planting

(2) Choosing species

(3) Seeds or seedlings

(4) Seed collection, testing, storing

(5) The forest nursery

(6) Planting techniques

(7) Federal and state cooperation in planting

i. Marketing the forest product

(1) Valuation of raw materials

(2) Forest markets, types, locations

(3) When and how to sell

(a) Selling directly

(b) Selling through agents

B. Laboratory and fieldwork activities

1. Identification and study of local tree species

2. Design and layout of tree nurseries, practice in seed handling, nursery operation and planting

3. Study of fire behavior, fire fighting techniques, fire planning, damage appraisal

4. Study of important injurious local insects and disease

5. Practice in scaling, log grading and timber cruising

6. Forest surveying instruments, operation, adjustment, uses

7. Forest maps

8. Aerial surveys, photo interpretation

9. Practice in surveying, computing and drafting

Because the RRCC curriculum was organized with the redwood region of California specifically in mind, there are certain alterations which must be made for local adaptability. In view of the somewhat recent increase in Christmas tree production in the United States, Mr. Bill Moder of Cornell University has indicated that a unit of instruction covering this phase of forestry should be included in high school forestry instruction in those areas where Christmas tree production is an important enterprise(15). Mr. Moder has outlined a suggested program which he feels will be functional in most areas.

A. Christmas tree farming

1. Classroom instructional jobs

a. Tree farm planning and planting

(1) Choice of site

(2) Size of tree farm

(3) Tree types

(4) Planting rate and methods

b. Protection of the Christmas tree farm

(1) Livestock grazing

(2) Fire

(3) Disease

(4) Insects and rodents

c. Pruning and shaping

2. Field work jobs

Pruning and shaping Christmas trees

This program as set up allows one period for each job to be taught in the classroom and two periods for the related practical field work jobs to be taught in the woods. It is felt that this number of periods is the minimum number which a good instructional program should contain. The suggested units and jobs are not planned for a specific number of periods. The teacher should allow as much time for instruction beyond the suggested minimum as the situation in the locality warrants.

Mr. Dan Robinson of Oregon State University has stated that the primary objectives of farm forestry instruction in a Vocational Agriculture department should be to stimulate an interest by agriculture students in the farm woodland enterprise as an integral part of the farm economy, to provide basic training in techniques and economic management practices related to farm woodland, and to introduce the student to sources of further information and services related to farm forestry activity in the state.(17)

One point brought out by Mr. Robinson that should receive further consideration in the farm forestry course of study is that of economical farm woodlot management. Before the final goals of vocational education can be

met, the question of economics must be seriously considered, taking into account all of the points upon which economical management is founded.

Mr. Vernon Burlison of the University of Idaho has included in his high school curriculum a rather extensive look at the economics involved in farm forestry and has included topics such as: management planning based on the woodland inventory, the local markets available and the resources of labor and equipment on the farm, and farm forest record keeping including such topics as: the type of information needed, recommended forms for records and how to make use of the information obtained by record keeping.(3)

Mr. Burlison believes that management of the farm woodlot needs to be integrated into the total farm enterprise and the knowledge necessary for farm woodlot management is no more intricate than the knowledge needed by farmers in the management of other facets of their farming operation. Emphasis in forest education in Vocational Agriculture should be placed on the small forest and woodland types of trees because it will normally be on the small scale that the students will be more likely to attempt to apply the learned material.

An outline of instruction prepared by the Minnesota State Division of Vocational Education includes a unit

on forest management terminology to be taught at the beginning.(14) The purpose behind including a unit on terminology is to better acquaint the student with those words or phrases that he may encounter in pursuing his educational program in this area and give him a more sound basis upon which he may discuss and understand forestry topics.

Planning, which should rightfully constitute a large amount of instructional time in any subject where one of the primary objectives is establishment, has been included as a rather large unit in the curriculum of "Forest Practices" as organized by the Georgia State Division of Vocational Education.(10) This should be one of the first topics of discussion when considering establishment in a farming enterprise. There are four topics to consider in this planning process of which the following are representatives:

1. Importance of a good forest program for the farm
2. What kind of land to use for farm woodlands
3. What kind of trees to grow
4. What methods to use in establishment

Through a combination of the various points that have been brought out in connection with farm forest management curriculum outlines, one can see the expanse of information that is related to this phase of forest education

and can better understand the teacher's job here.

FARM FOREST PRODUCTS EDUCATION

Most of the emphasis in forestry education in Vocational Agriculture is placed on the productive enterprise and hence, emphasis lies in the area of management. Before a complete picture of forestry can be seen by the student, a knowledge of the many processes and products that arise from our forests is essential. The following illustrates forest product education as it exists in the institutions in which forest products play an important part of forestry instruction.

The RRCC curriculum for high school forestry instruction in the area of forest products is presented thusly:(4)

A. Classroom activities
  1. Manufacturing and marketing forest products
    a. Lumber manufacture
      (1) The lumber industry
        (a) Economic importance
        (b) Historical background
      (2) The sawmill
        (a) Operation
          (1) The cold deck
          (2) The mill pond

(3) The head saw

(4) The resaw

(5) The edger

(6) The trimmer

(7) The green chain

(8) The saw room

(9) The power plant

(10) The yard

(11) The kilns

(12) The planer

(13) The storage sheds

(b) Subsidiary operations

(1) Lathe

(2) Shingles and shakes

(3) Wooden boxes

(4) Particle boards

(3) Lumber grades

2. Manufacture of other forest products

a. Veneer and plywood

b. Pulp and paper products

c. Hardboard

3. Marketing forest products

a. Location of markets

b. Agents of distribution

c. Supply and demand for forest products

B. Laboratory and field activities

1. Properties and uses of wood
2. Identification of important commercial woods
3. Wood preservation

The only material differing from this basic products outline is the inclusion of a section on cone harvesting taught by Mr. J. Parker,(12) and a section including the use of wood as fuel by Mr. Burlison.(3)

SUPPLEMENTARY INFORMATION

After considerable research in the area of farm forestry instruction for Vocational Agriculture students, Mr. Al Niemi concluded that:(16)

1. There is a body of forest practices which should be taught through the public schools, both to adults and to high school students.
2. Woodland owners or operators (adults) and high school students with practical experience opportunities in forestry are in need of instruction in forest practices to higher average levels of learning than are high school students without these experience opportunities.
3. The level of learning recommended for adults in the program of forest instruction is not significantly different from that recommended for

high school students with practical experience opportunities.

4. There is no significant difference in the number of forest practices which should be taught to adults and the number which should be taught to high school students.
5. Generally, forest practice instruction is not provided at as high a level of learning in the public school program for woodlot owners or operators and high school students as recommended by forest authorities.

Because of the need for local adaptation of topics to be taught in Vocational Agriculture, some of the foregoing material, which is a combination of curriculums across the United States, will not fit all situations. The teacher must be critical in selecting material for his curriculum and this area is no exception.

APPLYING CURRICULUM CONTENT TO THE VARIOUS YEARS IN WHICH FARM FORESTRY IS TAUGHT

The breakdown of subject matter according to the years in which this subject is taught presents problems which very few people have studied. The Department of Vocational Education in Minnesota has organized a yearly course outline which is very complete and is the only

printed material on this subject that was located by the author. An outline of this plan is as follows:(14)

A. Seventh and eighth grades
   1. History of woodlands
   2. Farm woodlands in farm management
   3. Forestry and farm woods
   4. Characteristics of a woodlot forest
   5. How a tree grows
   6. Basic tree identification
   7. A woodlot project
   8. Care and improvement of the woodlot
   9. Tree planting
B. Ninth grade
   1. The hand compass
   2. Direct measurement of horizontal distance
   3. Farm forest mapping
C. Tenth grade
   1. Calculation of areas
   2. Instruments used in woodlot measurement
   3. Use of woods tools
   4. Units of volume, measurement of wood products
D. Junior and senior years
   1. Volume tables, stand and stock tables
   2. Age of a woodlot forest

3. Estimating standing timber
4. Growth studies of trees and stands
5. Log scaling
6. Utilization and marketing of farm woodlot products
7. General material on conservation

Traditionally, Vocational Agriculture, at least in Oregon, is taught on a central theme each of the four years of instruction in all topic areas. Each of these themes represents another step in the development of learning from initial introduction to eventual placement. These themes and their relation to a specific Vocational Agriculture farm forestry enterprise are illustrated thusly:

Freshman - Selection:	The selection of a supervised farming project in which a small forest project is used as a productive enterprise.
Sophomore - Production:	The development of methods and procedures to increase output for increased immediate and future returns.
Junior - Management:	The development of attitudes towards economics as it relates to

means of managing the supervised project.

Senior - Establishment: Planning for and actually becoming established in an economical forestry business.

METHODS OF TEACHING FARM FORESTRY

The methods of teaching farm forestry are similiar to those methods used in teaching other agricultural subjects. The laboratory and field-trip methods are used to a greater extent than in some areas, especially in those areas where farm forestry plays an important role in the economy of the community.

The RRCC has again supplied the most complete outline here and will be used as a foundation to illustrate related literature.(4) This outline is as follows:

A. Classroom activities
   1. Study of source materials, discussion
   2. Collection and preparation of bulletin board materials
   3. Construction of models, diagrams, charts, maps; making posters, writing essays
   4. Experiments
   5. Identification and classification of plants collected in field

6. Outside speakers
7. Additional audio-visual aids
   a. Moving pictures
   b. Film strips
   c. Magazines
8. Tests
9. Individual, oral, and written reports

B. Field work
1. School forest
2. City park
3. Logging operations
4. Tree farms
5. Mills and factories
6. Activities on school grounds
7. Tree planting
8. Public agencies
9. Equipment dealers
10. Trips to other schools; presentation of programs

One teacher of Vocational Agriculture arranged for every interested student to have a minimum of two acres of woodland for his project.(12) Consent was gained from the parents to set these projects up on a long term basis. There was a definite agreement that the boys would receive any income that might be derived from the

use of good management practices while they were in the Vocational Agriculture class.

Some of the practices that this teacher used to present his farm forestry instruction and that worked in his situation are as follows:

1. Students were led to identify the specific problems or jobs growing out of their individual forestry projects.
2. An attempt was made to create a desire within the individual to solve the problems.
3. The group analyzed problems to be studied by breaking down different jobs into necessary decisions.
4. Each decision was considered and a possible solution was drawn by the individual members.
5. Factors influencing the decision were named by the individuals.
6. Experiences of the group and records of farmers were discussed.
7. Authoritative data was presented.
8. Definite conclusions were reached by each individual for his forestry plot.
9. Plans were made to carry out the conclusions reached.

As a device for stimulating interest and simplifying the presentation of some management practices, a sixteen acre plot of forest land was obtained where class groups could work during class hours and field trips. Each time that a decision was reached, it was practiced in the school forest. This was carried on simultaneously with practices the boys were doing at home.

There are many methods that a teacher might employ in teaching any subject and the advisability of using any of these methods can only be determined after analyzing the local facilities for instruction, responsiveness of the students, aptness of the instructor in using a given method and his ability to vary teaching procedures in light of the existing conditions.

A method of teaching not yet discussed but having considerable merit is one that is used in Florida.(9) Each July a one week forestry training camp and forestry contest is conducted, drawing participants from chapters throughout the state. This camp is under the direction of the forest service and is financed by various large wood-using industries throughout the state. The camp is set up to give future farmers a block of instruction in practical forestry methods. Only two boys are allowed to attend from each of the F.F.A. chapters throughout the state, these boys being selected by past accomplishments

and future plans in forestry work. Awards are given during the various contests that the boys are able to participate in.

The major aim of this type of teaching method is to further the interest and participation of youth in the promotion of the best practices in establishing and managing farm woodlots and forestry areas. It is anticipated that the proper care and management of a chapter forest and efficient use of the farm woodlot will provide a maximum of valuable experience, and will further serve to promote added interest among parents, and other farmers and citizens in the community.

Chapter III

RESEARCH PROCEDURES

METHOD OF DATA COLLECTION

The data for this study were obtained through the use of a check list type questionnaire that was sent to certain teachers of Vocational Agriculture in Oregon and Washington. The basis upon which questionnaires were sent was determined by the fact that each department surveyed was located in a county in which the total income from forestry and forest products for the year 1959, totaled at least 900,000 dollars. Eight counties in Oregon encompassing 29 departments of Vocational Agriculture and seven counties in Washington including 31 agriculture departments were surveyed. Those counties surveyed are as follows: Oregon-- Clackamas, Columbia, Curry, Lane, Marion, Multnomah, Douglas and Yamhill; Washington-- King, Pierce, Skagit, Spokane, Stevens, Thurston and Yakima.

Of the sixty departments surveyed, fifty-four or 90% returned the questionnaires that were sent to them. The basis upon which the proceeding chapters are written is drawn from these 54 returned questionnaires.

TREATMENT OF DATA

The data that was collected on the group of departments studied was concerned with these questions:

1. Is farm forestry being taught?
2. What subject material in this area is being taught?
3. What years in the four year curriculum and for how many hours are certain phases of instruction taught?
4. What methods are used in teaching the subject?

For purposes of analysis and comparison between data, tables were set up. A standard check sheet was used to record number and type of response to each of the sections of the questionnaire.

Chapter IV

FINDINGS

An analysis of the farm forestry curriculum of those departments surveyed will be made. Responses to each of the nine categories from the questionnaire will be presented in tabular form for more rapid analysis. These tables will illustrate responses to such categoreis of information as: the importance of farm forestry to the local economy, the number of teachers who recognize a need here by incorporating forestry instruction into their curriculums, departments having access to forest land for instructional purposes, average number of boys in each department surveyed and the number of boys engaged in forestry projects, hours of instructional time devoted to forestry instruction, techniques and methods used in teaching farm forestry, types of field trips used in teaching this subject, subject material taught in each of the four years of secondary instruction, sources of information used in this area and the reasons for certain departments not teaching farm forestry.

TABLE I

THE IMPORTANCE OF FARM FORESTRY TO THE LOCAL ECONOMY AND THE NUMBER OF TEACHERS WHO RECOGNIZE A NEED HERE BY INCORPORATING FOREST INSTRUCTION INTO THEIR CURRICULUM

	Yes	No
Forestry is an important part of the economy of the school district	28	23
Farm forest instruction is incorporated into the Vocational Agriculture curriculum	30	21

THE IMPORTANCE OF FARM FORESTRY AND THE NUMBER OF INSTRUCTORS WHO TEACH IT (TABLE I)

The assumption that farm forest instruction is justified in those departments surveyed has showed to be almost 50% false. The major reason for this was undoubtedly caused by making the sampling technique county-wide instead of using only local information, which would have been extremely difficult to gather.

From the 54 questionnaires returned in which this question was marked, there were 30 responses upon which to draw references necessary for the proposed curriculum. It can be seen that there were two more responses by the

schools including farm forest instruction than there were schools who stated that farm forestry played a role in the local economy significantly large enough to justify instruction in this area. It has undoubtedly been recognized in these two departments that because forestry plays the number one economic role in both Oregon and Washington, as far as total income is concerned, instruction of some type should be offered to the students. Trees, being harvested as a crop and being grown as a crop, are seen by many people as being agricultural in nature, therefore we see a justification for including this type of instruction in an agriculturally oriented course. Some forest instruction takes place in such courses as general science and botany on the high school level, but the type of instruction in these courses is more general in nature than specific as are many phases of Vocational Agriculture instruction.

THE USE OF FOREST LAND FOR INSTRUCTIONAL PURPOSES (TABLE II)

Of the 54 respondents to this part of the questionnaire, there were 23 who have forest land of some type that is being used for instructional purposes. This appears to be a very high figure when consideration is given to the fact that only 30 of these schools teach farm forestry. This means that about 77% of those schools

TABLE II

DEPARTMENTS HAVING ACCESS TO FOREST LAND FOR INSTRUCTIONAL PURPOSES

Type	No. of departments
Privately owned forest	13
School owned forest	5
County owned land	2
State owned land	2
Forest Service land	1

teaching farm forestry use forest land for demonstrational and practical experience.

There are essentially only five ways in which forest land can be acquired for use by the Vocational Agriculture program. The first method as mentioned in the preceeding chart is through the use of school forest land. Only those departments situated in areas where a majority of the income of the community comes from the sale of forest products will be able to justify spending the time and money necessary for the upkeep of such a forest plot. It is surprising that as many as five departments in the survey area are able to utilize this elaborate instructional device.

Publicly owned land, whether at the federal, state or county level, can oftentimes be obtained for instructional purposes. Within these three levels of public domain management, another five departments surveyed can be included.

The greatest number of departments using forest land in the instructional process utilize private land. This type of land is undoubtedly more easily acquired, these is less red-tape and the use will be much less complicated than will the use of public lands. This classification includes 13 of the departments surveyed.

FOREST PROJECTS IN THE SUPERVISED FARMING PROGRAM (TABLE III)

It can be seen that the range of participants both in forestry projects and in Vocational Agriculture in general is very large. In many areas included in the survey, forestry projects as such have received very little consideration in the past. Most of the emphasis in project selection was placed in field crop and livestock enterprises. In the last few years, project philosophies have changed somewhat and a broader attitude on the part of some instructors towards project selection has allowed farm forestry projects to fit into the supervised farming program. This coupled with the

TABLE III

NUMBER OF BOYS IN EACH DEPARTMENT
INDICATING FARM FOREST INSTRUCTION
AND
NUMBER OF BOYS ENGAGED IN FORESTRY PROJECTS

Number of boys in agriculture	Number of boys with forestry projects
56 (average)	3 (average)
20-112 (range)	0-13 (range)

fact that most Vocational Agriculture instructors in the past have finished their college academic program with very little and often no knowledge in the field of forestry, leading them more towards field crop and livestock supervised farming programs to the exclusion of perhaps many good farm forestry projects, has reduced greatly the number of forestry projects in Vocational Agriculture. It is believed that there will be a greater number of Vocational Agriculture farm forestry programs in the near future.

It was found that six of the departments teaching farm forestry have no boys whatsoever involved with forestry projects. It would appear here that the instructor in these departments has recognized a need for this

type of instruction but has not practiced forest project selection for a long enough period for any of his boys to work into this area.

In the opposing direction, three departments surveyed have in excess of 10 boys involved in some sort of forest projects. An extremely large portion of the local economy in these communities undoubtedly comes from the forest industry and the instructor is probably well versed in this area and has a well established program of instruction.

Both of these examples are extremes and lie in both directions from the average three. This number and the many examples that are grouped around it represent different proportions of the total number of Vocational Agriculture students depending, of course, on the number of students in the various departments.

The greater number of the total boys who have projects in this area, the greater the curriculum emphasis here should be, keeping with the approach to curriculum that we "teach according to what's in the community".

HOURS OF INSTRUCTIONAL TIME USED IN TEACHING FORESTRY (TABLE IV)

It is readily apparent that extreme variation exists between departments concerning the number of hours

TABLE IV

HOURS OF INSTRUCTIONAL TIME DEVOTED TO FARM FORESTRY

Year of program	Hours instructional time
Freshman	8 (average) 1-24 (range)
Sophomore	14 (average) 2-60 (range)
Junior	14 (average) 3-50 (range)
Senior	16 (average) 2-50 (range)

instruction which should be used in each of the four years that forestry is taught. The average figures are not a good indication in this case because of the extreme variation. The number of hours instruction will depend, to a large degree, on the individuality of the local community in which the material is to be taught. Some departments, in areas being almost totally forest dominated, would naturally include a greater portion of the total instructional time in this subject as compared to a department located in a nearly totally field crop or livestock area. Vocational Agriculture is taught for local applicability, so the agricultural enterprises of the community, including forestry, are given curriculum time according to their value in the economy of the community.

The average number of hours indicated in Table IV is probably accurate for indicators of the amount of time spent in forestry when one year is compared with another. The maximum number of hours devoted to this field in any one year will most generally occur during the junior or senior years, with the least numbers during the freshman year.

METHODS IN TEACHING FARM FORESTRY (TABLE V)

The methods used in teaching farm forestry are in most respects no different from those used to teach any other phase of agricultural science. The lecture approach to teaching is perhaps the most universally accepted method of teaching. Twenty-nine of the thirty respondents who teach farm forestry are using the lecture method to some extent in their forest instruction.

The number of responses to the field trip approach is rather pleasing with twenty-eight of the thirty people indicating that they use field trips. The application of the "learning by doing" approach has apparently caught hold, at least in this phase of agricultural science. The interest in field work as a part of the instructional program in forest instruction can be better realized by recalling the large number of departments who have forest plots that are used regularly in

TABLE V

METHODS USED IN TEACHING FARM FORESTRY

Method	Number using this method
Lecture	29
Field trips	28
Group discussion	23
Resource persons	18
Supervised study	16
Student reports	15
Panel discussion	3
Team teaching	1

conjunction with classroom teaching.

Group discussion of learned principles is also a rather widely accepted method of teaching. It seems that the number of respondents to this method would be greater though than 23 out of 30. It would seem that lecture and recitation or discussion would bear a higher relationship to each other as total number of responses are concerned.

Most classes in agricultural science seem to be handled on the lecture-recitation approach, but it might be that this is a false assumption in certain instances.

Perhaps supervised study or laboratory experiences are being substituted here by some teachers.

Slightly over 50% of all respondents have indicated that they use supervised study methods; these being used perhaps in conjunction with lecture and/or discussion techniques. There being no textbooks in Vocational Agriculture as agriculture teachers see it, undoubtedly many reference sources are being utilized for these study sessions.

Fifty per cent of all surveyed persons teaching farm forestry have indicated that they use the student report method of instruction. There may be more than this number when student speeches in preparation for chapter public speaking contests are considered as student reports. There are probably many teachers, especially those who are very firmly attached to the traditional approaches to teaching, who have never really considered this method of teaching, as well as the next two to be discussed.

The use of panel discussions and team teaching methods have not received the use in this teaching area that some of the more traditional approaches have received. These are comparatively new teaching methods and until they have been tried and given a chance to work in more departments, in more varying situations, their acceptance may not be rapid.

TABLE VI

THE NUMBER OF TEACHERS USING DIFFERENT TYPES OF FIELD TRIPS IN TEACHING FARM FORESTRY

Type of field trip	No. of teachers using this trip
Timber cruising field trip	16
Tree planting	15
Trip through a forest nursery	11
Trip to appraise and take inventory	9
Trip through a sawmill	8
Log scaling	8
Trip to observe logging methods	5
Trip through a fiberboard plant	2
Trip through a plywood plant	2
Thinning and pruning demonstration	1
Trip to a cone drying plant	1

FIELD TRIPS USED IN TEACHING FARM FORESTRY (TABLE VI)

The laboratory approach to teaching through the use of field trips appears to be quite extensively used. Table VI illustrates a rather large number of different trips that a department might take, but these trips are listed on a purely theoretical basis because each

department can conceivably only take part in a certain number of these trips and then only those in which driving distances are practical. Many departments, of course, will not have access to plants and firms such as fiberboard and plywood mills and cone drying plants. As almost 77% of the departments teaching forestry have access to forest land most of the field work trips are more practical.

Timber cruising and tree planting field trips appear to be the most popular of those listed, but even then only about 50% of the departments teaching forestry use these trips. None of the trips listed carry an overwhelming number of subscribers. It would appear that as yet this area of instruction has not been used long enough for the full merits and disadvantages of each type of trip to have been universally accepted.

Field trips other than those that can be taken in the school-used forest depend to a large degree upon departmental proximity to those places to be visited. If a certain forest products plant is operating in a given community and is drawing employees from that community and if the agriculture teacher is following the philosophy that he should "teach according to what's in the community", it is more natural to expect him to take his boys through this plant than it is for him to go into another area to visit a plant with no home-community ties.

It might be puzzling to some people why so few responses have been made to the sawmill field trip. With the large number of sawmills existing in many rural areas, this type of field observation would seem to offer more opportunities for educational activity than is indicated by the respondents. Perhaps the main reason here is that so many of the smaller mills, which are more numerous now, offer actually very little in the way of instruction because of the "gypo" type operation and low standard of equipment and milling operations. There are actually very few large modern mills in operation.

SUBJECT AREAS TAUGHT IN FARM FORESTRY (TABLE VII)

There seems to be less total instruction in the freshman year than any of the other three years in which Vocational Agriculture is normally taught. This point was also made previously in relation to total hours of instructional time in each of the four years.

Emphasis during the freshman year appears to be on such subjects as tree identification and techniques of tree planting. Nearly half of the total subject area responses for the freshman year were for these two subject areas. Techniques of management, forest protection and Christmas tree production have been given about equal consideration during this year, but the number of

TABLE VII

SUBJECT MATERIAL TAUGHT IN EACH OF THE FOUR YEARS OF A VOCATIONAL AGRICULTURE PROGRAM

Subject area	Responses to various years in the program			
	Frosh.	Soph.	Jr.	Sr.
Tree Identification	9	14	8	10
Techniques of Tree Planting	9	13	10	9
Techniques of Harvesting	13	10	7	9
Techniques of Management	5	14	14	13
Specialty Forest Products	2	8	7	8
Wood Preservation	3	6	8	8
Forest Protection	5	11	11	8
Forest Marketing	1	8	8	13
Forest Mechanization	-	-	5	6
Forest Occupations	-	-	5	10
Christmas Tree Production	5	8	10	7
Techniques of Cruising and Scaling	1	6	12	11
TOTALS	43	98	105	112

respondents to this level of teaching was low. Less than 20% teach these subjects at this level, making this figure rather insignificant. Other areas have been checked as being taught during this year of instruction but the

incidence of the occurance is so low that no discussion need follow here.

As the total number of hours instruction increases from the freshman to the sophomore year, so has the total number of responses indicating more instructors teaching more subject matter than during the previous year.

Emphasis during the second year is again high in tree identification and management techniques. Emphasis on this last topic during this year contradicts the central theme upon which many teachers operate during the junior year - "management". There are undoubtedly many teachers in the area of this survey who have never heard of this theme type approach to teaching which indicated subject emphasis during each of the four years as: selection, production, management, and establishment.

Emphasis on the areas of tree planting, which was also important during the freshman year, forest protection and techniques of harvesting is shown to be greater during the sophomore year. With the increased age and maturity of the students, more complex and abstract topics can be dealt with effectively. This is illustrated in the table by the increased number of responses in the various subject areas as the years in which the material is taught progress. The sequence in which material is normally taught also affects this.

Specialty forest products, marketing, and Christmas tree production have also received the attention of some teachers during the second year but again, the number of responses in these areas is not significant.

The sophomore year appears to be the year of peak emphasis on three points. These phases are tree identification, techniques of tree planting and techniques of harvesting. It is during this year that the greatest portion of formal instruction will be made in these subject areas.

The junior year instructional emphasis appears to be placed on such topics as: cruising and scaling, techniques of management, wood preservation, forest protection and Christmas tree production. Since two periods are allotted to agriculture, in many instances, during the junior year, it seems rather odd that more emphasis is not placed on the entire forestry program of instruction. Perhaps the double period is not as widely used during this year as some people believe.

As one would expect, the senior year forest program includes material on forest occupations, forest mechanization and marketing of forest products with emphasis also being placed on specialty forest products and wood preservation.

The senior year has received more responses in

connection with the number of subject areas taught than any of the other years. It can be seen then that the trend, at least in this survey, is for an increasing emphasis on forest instruction as far as total subject areas to be covered is concerned, as one moves from freshman to senior years.

SOURCES OF INFORMATION USED IN TEACHING FARM FORESTRY (TABLE VIII)

County agents or extension farm foresters are quite important people as far as obtaining reference material or serving as resource persons in the area of forestry. The county agent is relied upon in many other instances with respect to education in agriculture, but the county or state farm forester can play a very important role in the instructional program.

The U.S. Forest Service, as the extension people just mentioned, are very prolific producers of printed material which can be used for instructional purposes. Quite a large portion of the material from this source is not written with reference to local area, such as many of our western associations' material is. This is a disadvantage of material from this source because as a general rule Vocational Agriculture is taught with respect to local adaptability of learned principles and general

TABLE VIII

SOURCES OF FARM FORESTRY INFORMATION USED BY AGRICULTURE TEACHERS

Information Source	Type of information and number of responses				
	Resource Person	Printed Material	Films & Visuals	Word of Mouth	Total Responses
County Agent of Farm Forester	15	20	1	9	45
Warden of Protection District	7	1	1	2	11
Keep Oregon (Wn.) Green Assn.	1	8	2	-	11
U.S. Forest Service	9	15	7	1	32
Industrial Forestry Association	2	11	6	1	20
Western Pine Association	2	7	2	-	11
West Coast Lumberman's Assn.	-	5	2	-	7
State Department of Education	1	2	1	-	4
School of Forestry	1	1	-	-	2
Soil Conservation Service	1	-	-	-	1
Tree Farmers	1	-	-	-	1
State Forestry Department	1	1	-	-	1
TOTAL RESPONSES	41	71	22	13	

information or information about another locality or section of forest land may be faulty or misleading on the local scene and may hinder rather than help local application.

The Industrial Forestry Association, Keep Oregon (Washington) Green Association, Western Pine Association, and the West Coast Lumbermen's Association are other groups in the forest industry who are very prolific with their usable reference materials.

Several other sources are mentioned and each one has received mention by one or more of the surveyed departments, but some of them have not been too active in this area and consequently few instructors have had opportunities to see their materials, however many there may be.

As would be expected, the responses to type of information sources lean heavily toward printed material. There have been many hundreds of articles, pamphlets, books and other forms of printed literature which have been easy to obtain, cheap and many times free, and contain the type of material that is interesting, up to date, well illustrated, practical and in line with what the teacher wants to teach. There is little doubt that printed material will continue to provide the basis and background for teaching in all subject areas.

There seems to be wide acceptance of the use of resource persons as a method of teaching. There have been many responses indicating that resource persons are being drawn from many different areas concerned with forestry, expecially the extension people. It is evident also that protection district personnel are being drawn into the classrooms as resource people.

As with the other types of information, films and visuals are obtainable from many sources, but the total number of sources is smaller than either of the two informational types already mentioned. It would be supposed that a large majority of the references in this area would be found in the form of charts, posters, etc.

Word of mouth, as a means of acquiring instructional information, seems not to be an extremely popular method. The extension personnel again appear to be, as one would expect, important here because of the proximity of this source and the many personal contacts that the teachers of Vocational Agriculture have in the normal course of their positions.

REASONS FOR SOME INSTRUCTORS NOT TEACHING FARM FORESTRY (TABLE IX)

The question "why", was asked of those persons surveyed who indicated that they were not teaching farm

TABLE IX

REASONS FOR CERTAIN DEPARTMENTS SURVEYED NOT TEACHING FARM FORESTRY

Reasons for not teaching this subject	No. of responses
No justification on the basis of total income of the area coming from farm forestry	15
Insufficient background in subject area	8
Insufficient community and student interest	6
Advice from advisory council	1

forestry when a sizable portion of the income of the county in which they were situated came from this enterprise. It was surprising to find that such a large number of departments surveyed do not include this type of instruction in their Vocational Agriculture programs until notice was made of the reasons why this instruction was not taking place.

The major reason for not teaching this subject was because the agriculture teacher felt that there was no

local economic basis for including it in the curriculum. This might seem rather odd when one considers the means by which these departments were chosen for inclusion in this survey; but when full consideration is given to the rather marked line of demarcation between heavily forested and extremely scantily forested areas in certain parts of Oregon and Washington, especially on the east side of the Cascade Mountains, then one can see how a county could conceivably have a large portion of the total county income coming from the forest and still have Vocational Agriculture departments in relatively unforested areas.

Some teachers have indicated that their lack of knowledge of the area of forestry has been the main reason for their not teaching this subject. Some of our agriculture teachers leave college without course work or practice experience in the area of forestry.

Insufficient community and student interest has also received several checks as being the reason that some departments are not teaching this subject. In a democratic society, such as the one in which we live, where the taxpayers support the schools and govern to a certain extent the instructional content, then community interests must be realized in the agriculture curriculum as in the other departments of the school.

Chapter V

PROPOSED COURSE OUTLINE IN FARM FORESTRY

THE COURSE OF STUDY

The material in the preceeding chapter has provided information for the teaching of farm forestry in a Vocational Agriculture program. The purpose for the foregoing section is to categorize and clarify the outline presented earlier so that a clearer picture can be seen of the type of curriculum that is suggested by the survey. The subheadings that are presented are those of the author and are included here merely for clarification of the type of subject material that would most likely be included in an organized, systematic program of instruction in this area.

FRESHMAN YEAR

A. Introduction to farm forestry — 1-2 hours

1. Significance to the local economy
2. Significance to the national economy
3. Significance to watershed and wildlife management
4. Esthetic contributions to modern life

B. Tree identification — 2 hours

1. Important local softwoods

2. Distinguishing characteristics of the softwoods
3. Uses of local softwood species

C. Selection of species and site — 3 hours
1. Christmas trees
2. Forest reproduction

D. Principles of hand planting — 1 hour

SOPHOMORE YEAR

A. Identification of all locally significant tree species — 2 hours

B. Christmas tree production — 1 hour
1. Buying young trees
2. Groundbreaking and soil preparation techniques
3. Caring for the young trees

C. Techniques of tree planting — 1 hour
1. Local soil types and tree growth reaction
2. Ecological considerations

D. Techniques of management — 4 hours
1. Management for maximum Christmas tree production
a. Culling
b. Thinning
c. Pruning

2. Management for maximum nursery production
    a. Thinning
    b. Weeding
    c. Irrigation
    d. Soil preparation

E. Techniques of harvesting 3 hours
    1. Principles of multiple-use management
    2. Selective cutting
    3. Planning for harvest

F. Forest protection 2 hours
    1. Forest fire fighting and fire prevention
        a. Fire behavior
        b. Fire fighting techniques
        c. Fire fighting equipment
    2. The safe use of fire

G. Types and uses of specialty forest products 1 hour
    1. Pulpwood
    2. Fuelwood
    3. Cascara
    4. Conifer cones
    5. Decorative greenery

JUNIOR YEAR

A. Techniques of tree planting 1/2 hour
    1. Principles of machine planting

2. Airplane and helicopter planting

B. Techniques of cruising and scaling 2 hours

1. The land cruise as a measure of forest volume
2. The use of biltmore stick and hypsometer
3. Forest mathematics - computing board feet from standing and fallen timber

C. Techniques of management 3 hours

1. Factors affecting the forest markets
2. Economical consideration in forest production
3. Analysis of costs and returns for forestry enterprises

D. Forest protection 2 hours

1. Local insect and disease problems
2. Control measures for locally significant insects and diseases

E. Specialty forest products 1 hour

1. Shake and shingle production
2. Fence post production
3. Piling and pole production

F. Marketing forest products 3 hours

1. The various forms in which forest products are marketed
2. Methods of handling forest products before

and enroute to market

G. Christmas tree production 2 hours

1. Thinning the stand
2. Pruning
3. Choosing trees for sale
4. Correcting deformaties

SENIOR YEAR

A. Identification 2 hours

1. Wood identification - locally significant species
2. Identification of the various wood products

B. Techniques of harvesting 4 hours

1. Road and landing planning and construction
2. Falling, bucking, and skidding
3. Cat and hi-lead harvesting
4. Laws concerning harvesting

C. Techniques of management 1 hour

1. Forest record keeping
2. Determining labor and equipment needs

D. Wood preservation 1 hour

1. Uses of preserved products
2. Types of preservatives
3. Methods of applying preservatives

E. Forest protection 1 hour

1. The various protection agencies locally important and their work
2. Forest protection laws

F. Marketing forest products 1 hour

1. Supply and demand influences on products movement
2. The local market situation - markets and price structure

G. Forest mechanization 3 hours

1. What are the "tools of the trade"
2. Using and maintaining special equipment

H. Forest occupations 2 hours

1. The various job possibilities
2. Entry qualifications
3. Professional possibilities
4. Local needs

I. Forest products 3 hours

1. Lumber manufacture
2. Veneer manufacture
3. Pulp and paper production
4. Hardboard and fiberboard production

We must realize that this course of study is one that the author himself has constructed and is one that for his needs appears to be satisfactory, although any person

using this outline should keep one question in mind before accepting it for use in any locality other than that of the author, "Does it suit the needs for such a subject in my own situation?" With this question in mind one should consider these points:

1. Is the major subject matter emphasis on those phases of forestry that are most important in my community?
2. Is this quantity of forestry instruction needed in my situation or should the total amount of subject material be lessened or possibly increased to meet the needs?
3. Am I prepared professionally to do a respectable job in teaching this subject and if not, where and how may I prepare myself?
4. What methods and materials am I going to use here and where do I turn to get these?

After these points have been thoroughly considered and an instructor's own position in regard to these points has been evaluated, then the proposed course of study will provide direction for the inclusion of farm forestry in the curriculum that should allow for effective instruction and student learning.

HOURS OF INSTRUCTIONAL TIME

In teaching any subject regardless of what it might be, one of the prime objectives of an instructor is to stimulate the students to absorb at least the major principles concerned with that topic. With this in mind, it may appear as if there is not enough time to do an adequate job of teaching the principles surrounding forestry if one follows the time recommendations offered in the course of study presented earlier. In teaching forestry, as in teaching all subjects, there is never quite enough time to cover the material the way the instructor would like to. With this in mind, a good teacher has to be very efficient in his instruction. The good teacher will take the proposed outline, draw his teaching plans in accordance with his own needs covering those topics indicated and do a good job of teaching the basic principles and still keep within the time allotted in the course of study, allowing for his own modifications in accordance with local conditions.

It is ridiculous for an instructor to plan his classes such that he plans to cover 20 hours of material in 20 class periods. Allowing for such unplanned happenings as: school assemblies, discussion of current F.F.A. or project activities, and testing, an instructor may end up with possibly 14 or 15 of his original 20

hours able to work directly on subject material. With this in mind, an instructor should probably plan approximately 15 extra hours in the four year period if he is going to use the proposed plan which consists of about 53 hours of instruction.

In the proposed plan no allowance has been made for a double period of instruction which normally occurs in either the sophomore or junior year in many departments. It should be noticed that most experiences involving field work or other work in which a double period would be advantageous, occur during either the sophomore or junior years. The freshman year is devoted mainly to introducing the area and forming a foundation of elementary principles upon which to base later instruction. The sophomore and junior problems are of a more practical or manipulative nature and asks the students to participate in field work and laboratory experiences. The senior year is concerned with the "why" rather than the "how" of forestry problems and involves little field work as in the freshman year. With these concepts of instruction in mind, an instructor must make use of his double period in the year in which it might be to his maximum advantage by including in it much of the more lengthy field or laboratory work exercises. If the more lengthy exercises such as: cruising and scaling, tree planting or thinning

and pruning were done during the year with the double period, then classroom activities and shorter and less lengthy trips could easily be taken care of during the years of single period instruction. The main point here is make maximum use of the double period.

In regards to field work comes the question, "What time of year should forestry instruction come?" Instruction during the freshman year makes little difference as far as seasons are concerned except in cases where field work such as tree identification is desired. It is best, of course, that all field work be done either in the fall or in the spring when the weather and growth conditions are optimum rather than in the wintertime. An exercise such as tree planting will normally be in the wintertime, though, during the dormant season. With either sophomore or junior groups it is most advantageous for instruction to come during either fall or spring so that practical field experiences will not be twarted or so that instructional materials may be found.

During the senior year, unlike the others, it has been found that the season makes little difference as far as student learning is concerned. With a fairly broad background in this area and a mind that is more mature, the senior should be able to grasp the material, and if guided, apply it. Again, if field work should be de-

sired during the senior year, plans should be made for including that part of the instruction in either the fall or the spring.

FORESTRY PROJECTS FOR THE SUPERVISED FARMING PROGRAM

Traditionally crop and livestock projects have been the basis for the Vocational Agriculture program. In recent years certain other types of projects such as forestry have come into the program and it is believed that as more emphasis is placed on forestry as a recognized subject in Vocational Agriculture, more forestry projects will be developed.

There are two major types of forestry projects that can be carried as supervised farming projects, these being Christmas tree and market timber production. Because it is extremely difficult for a high school boy to be financially able to have a market timber project unless he buys or manages a stand of trees, there will not be many projects of this type; but Christmas trees offer project possibilities for many boys. Young trees can be bought and planted in the freshman or sophomore year and if taken care of properly, the boy will be able to reap the profits within a few years. A tremendous amount of care must go into young trees if they are to be used for Christmas trees and a great deal of management responsibility lies

here. Planning is an important part of the boys learning and good record keeping is equally as valuable. When these two elements, which the instructor of Vocational Agriculture has the responsibility for teaching, are applied to the Christmas tree project, a rather sizable return on the investment can be realized. It is rather disheartening for some of the boys when they can see no dollar-return but just an increase in total value each November when the books are completed, so it should be emphasized to them that when the harvest is finally made, probably late or after high school when the money will probably be more needed, their total yearly increase in value will be available to them.

There are improvement projects that will increase the total value of the boys' forestry projects in which the Agricultural Conservation Program shares the expenses. These projects should be explained to the boys so that they may participate in the A.C.P. program.

METHODS AND TECHNIQUES OF TEACHING

Every instructor has his own methods that seem to work best for him. There are, however, certain approaches to teaching which have rather universal appeal and work quite well on most subjects. It is realized that with some groups of students certain methods work better than

others, depending a great deal upon the maturity of the group being taught. With maturity in mind, methods are going to differ somewhat between the freshman and senior classes as has been indicated earlier with regard to field or laboratory work. By virtue of their less mature outlook, the younger boys will probably need a more concrete learning atmosphere such as would be provided by laboratory or field work exercises.

The lecture approach to teaching is used with this subject probably as extensively as all other methods combined and it should be noted that this method has its good points if used correctly. There are some phases of forest instruction which, if supplemented with adequate visual material and other techniques, will be very effective, perhaps more effective than any other approach.

Visual aids have much to offer in the way of aids to teaching and many of these are readily available if the instructor will only write for them. Many fine charts, pictures, films, and pamphlets are produced by the large wood-using industries and various public agencies which, if used correctly, will serve as excellent aids. To secure these an instructor should write to these places inquiring as to the availability of such material, and request any such material that they may have for distribution. Most companies, in light of public relations

and advertising are quite willing to supply this material.

The opaque and overhead projectors which are available to most instructors are often not utilized fully in the learning situation. Many diagrams, pictures, charts, or even printed dialog can be used with tremendous success on these tools.

One technique which is unique to Vocational Agriculture and can be used quite effectively in teaching forestry is the use of references to the home farm or supervised farming program. As a means of motivation there is none other that is as effective as teaching in conjunction with and in application on existing local farming conditions. Where the boys in a class have forested land on the home farm or have forestry projects, motivation in this area and consequent learning will be bolstered considerably.

THE USE OF SCHOOL FORESTS FOR INSTRUCTIONAL PURPOSES

The use of forested land for teaching purposes is another excellent technique in teaching forestry and it has been shown earlier that some schools recognize this by using such forests.

It is the feeling of the author that most schools located in areas where a predominant part of the local income comes from forestry, there is probably a piece

of land that is available and suitable for use in the instructional program. When teaching such phases as pruning, and thinning, or cruising and scaling, this aid would prove to be invaluable, if used properly. Often forested land is owned by the school or by the city or by a farmer located near the city that would be willing to let the department use the land for instructional purposes.

Distance is a big factor to consider here and one should be aware of travel time to and from the forested area. Unless working during a double period, class periods are not long enough to allow any major work projects if the forested area is located any distance from the school.

The size and condition of the forest plot will be determined in most cases by what the instructor can get to use. A plot of about five acres would probably suit the needs of instruction quite adequately for a period of several years, this, of course, is entirely dependent upon the condition of the vegetation on the land. An optimum site would include trees ranging from seedlings to second growth and would have some brush and other weedy species as well as some downed timber. This type of site would supply conditions whereby all phases of forestry instruction could take place.

THE USE OF FIELD TRIPS

A philosophy of education known as "learning by doing" surrounds much of the Vocational Agriculture program and provides the most sound basis for learning that we have. Closely following as a learning philosophy might be one called "learning by seeing", for the sense of sight affords us the ability to visualize learning activities not possible to create in the classroom.

There is no question that field trips are an excellent teaching device but there are many complications involved here. A field trip that must be held to a one hour time limit does not generally offer an instructor an opportunity to make the experience meaningful, especially if the place being visited is far from the school. The double period or the possibility of having extended field trips for a full day or possibly on a Saturday are alternatives to the cramped one period trip. There will be times in forest instruction when the one hour trip is necessary such as many of the trips that are taken to the practice forest site, and when these trips have to be made, it is important that considerable thought be done before the trip so that the most can be gained from it. An adequate follow-up is also necessary to insure maximum learning. Without this follow-up a great deal of learning may be lost.

It may sometimes be found wise to take field trips with other classes, such as conservation or science. Where to a certain extent both classes are attempting to teach the same principles, it will often be more advantageous to the learning of the largest number of students to take them together.

Some of the types of field trips concerning forestry that an instructor might want to consider in any given year are as follows:

A. Practical field work trips
   1. Trip to practice log scaling
   2. Trip to practice pruning and thinning
   3. Trip to practice cruising
   4. Trip to make forest appraisal
   5. Trip to plant trees

B. Other good field trips
   1. Trip through a lumber milling operation
   2. Trip through a plywood or veneer plant
   3. Trip through a fiberboard plant
   4. Trip through a paper producing plant
   5. Trip to observe a harvesting operation
   6. Trip to observe a fire protection unit in operation
   7. Trip through a forest nursery

8. Trip to observe conservation measures and practices

SOURCES OF FURTHER INFORMATION

Any study of this type is valuable to a certain extent for some people but to be of most value it is necessary that a list of further references be made to help those who wish to look more deeply into the subject or as in this area to find materials that will aid in the teaching of the subject.

The following list of publications has been compiled both by the author and by the Oregon Woodlands Publications Council of the Oregon State Board of Forestry and is presented here to help the instructor that is planning to teach forestry in Vocational Agriculture gather information from which to draw his teaching materials.

ABBREVIATION, LEGEND AND ADDRESSES

1.	OSBF	Oregon State Board of Forestry Box 2289, Salem, Oregon
2.	SCS	Soil Conservation Service 209 SW 5th Ave., Portland 4, Oregon
3.	USFS	U.S. Forest Service Box 4137, Portland 8, Oregon

4.	USDA	U.S. Department of Agriculture Superintendent of Documents Washington 25, D.C.
5.	Exp. Sta.	Pacific NW Forest and Range Experiment Station, Box 4059, Portland, Oregon
6.	WPA	Western Pine Association Yeon Bldg., Portland 4, Oregon
7.	ORC	Oregon Forest Research Center Box 571, Corvallis, Oregon
8.	WES	Washington State Extension Service Pullman, Washington
9.	OES	Oregon State Extension Service Corvallis, Oregon
10.	IES	Idaho Extension Service Moscow, Idaho
11.	Tri-Ext.	Composed of #8, #9, and #10 above
12.	SAF	Society of American Foresters 425 Mills Bldg., Washington 9, D.C.
13.	WSF	Washington State Division of Forestry Box 110, Olympia, Washington
14.	IFA	Industrial Forestry Association 1410 SW Morrison, Portland 8, Oregon
15.	FLB	Federal Land Bank of Spokane Spokane, Washington

16.	CZC	Crown Zellerbach Corporation Public Service Bldg., Portland 4, Oregon
17.	OSDE	Oregon State Department of Education Salem, Oregon
18.	WIFP	Washington Institute of Forest Products University of Washington Seattle 5, Washington
19.	UM	University of Missouri Agricultural Extension Service Columbia, Missouri
20.	AFPI	American Forest Products Industries, Inc. 1816 N Street NW, Washington 6, D.C.
21.	MSU	Michigan State University Cooperative Extension Service East Lansing, Michigan

TITLE OF PUBLICATION	SOURCE
A. Forest Management - Douglas-Fir Type	
1. Your Trees a Crop, Douglas-Fir and Associated Species	OSBF
2. The Work of the Forest Manager	SCS
3. Management Practices as Related and Influenced by Soils	SCS
4. Pruning Forest Trees Pays	SCS
5. Weeding Forest Stands	SCS

6.	Thinning Guide for Douglas-Fir Stands	SCS
7.	Economic Guide for Management of 2nd Growth Douglas-Fir	SCS
8.	Harvesting Douglas-Fir for Maximum Income	USFS
9.	Increasing Value and Volume of Forest Trees	USFS
10.	Commercial Thinning of Douglas-Fir in PNW	USFS
11.	Pre-commercial Thinnings	USDA
12.	Yield of Douglas-Fir in Pacific NW	USFS
13.	Better Yields Through Wider Spacing	USFS
14.	Managing the Small Forest	USDA
15.	Forest Practice Policy for Columbia River District	CZC
16.	Leo Issaac on Silviculture	OES
17.	Measuring Trees	USDA
18.	Pruning Increases Forest Tree Quality	WES
19.	Farm Woodland Management	UM

B. Forest Management - Ponderosa Pine Type

1.	Your Trees a Crop, Ponderosa Pine and Associated Species	WPA
2.	Young Ponderosa Pine Management and Yields	SCS
3.	Thinning Guide for Ponderosa Pine	SCS
4.	Yield of Even-Aged Stands of Ponderosa Pine	USDA
5.	Lodgepole Pine Management Guides	USFS
6.	Spacing Tables for Thinning Ponderosa Pine	USFS
7.	Log Grading Studies in Ponderosa Pine Region	ORC

C. Reforestation

1.	Weed and Brush Control	OES
2.	Forest Nurseries and Seed Dealers in PNW	USFS
3.	How to Plant a Tree	SCS
4.	Improving Survival of Old Field Plantings	USFS
5.	Raising Forest Seedlings at Home	OES
6.	Deer, Mouse and Reforestation - Tillamook Burn	ORC
7.	Effect of Ground Cover on Seedling Germination	ORC
8.	Spot Seeding Ponderosa and Jeffred Pine	ORC
9.	Seeding Dates and Douglas-Fir Germination	ORC
10.	Natural Regeneration on Staggered Settings	ORC
11.	Western Hemlock Seed Germination	ORC
12.	Ponderosa Pine Seed Germination	ORC
13.	Direct Seeding of Western Red Cedar	ORC
14.	Douglas-Fir - Spot Seeding	ORC
15.	Aerial Seeding	ORC
16.	Clearing Land of Brush and Stumps	USDA
17.	Direct Forest Tree Seeding	WES
18.	Grow Trees, Not Brush	WES
19.	Plant Your Trees Right	USDA

D. Hardwood Management

1.	Alder Thinning	SCS
2.	Aspen in the Western States	SCS

3.	Oregon Hardwoods	OES
4.	Utilization of Bigleaf Maple	USDA
5.	Silvicultural Characteristics of Red Alder	USFS
6.	Volume Tables for Red Alder	ORC
7.	Northwest Hardwood Industry	ORC
8.	Seasoning and Preservation of Oregon White Oak Ties	ORC
9.	Oregon Hardwood Plywood	ORC
10.	Seasoning and Preservation of Tan Oak Lumber	ORC
11.	Oregon Maple Log and Lumber Grading	ORC
12.	Red Alder Log and Lumber Grading	ORC
13.	Basic Data for Oregon Hardwoods	ORC
14.	Seasoning of Oregon Hardwoods	ORC
15.	Utilization of Oregon Hardwoods	ORC

E. Forest Protection and Conservation

1.	Forest Protection in Oregon	OSBF
2.	Woodland Protection - Fire Prevention	USFS
3.	Woodland Protection - Grazing	USFS
4.	Conservation Education in Oregon Schools	OSDE

F. Insects, Disease, Rodents, Animals

1.	Forest Tree Diseases of Pacific NW	WES
2.	Principal Forest Insects in Pacific NW	USFS
3.	Forest Tent Catapillar	USFS
4.	Western Pine Beetle	USFS
5.	The Mountain Pine Beetle	USFS

6.	Fir Engraver Beetle	USFS
7.	Decay Following Logging Injury to Hemlock, Spruce, and True Firs	USDA
8.	Dusky Footed Wood Rat	ORC
9.	Mid-summer Baiting to Control Seed Eating Mammals	ORC
10.	Shrews as Tree Seed Eaters in Douglas-Fir Region	ORC
11.	Conk Rot in Old Growth Douglas-Fir	ORC
12.	Environmental Factors Affecting Spruce Budworm	ORC
13.	Cone and Seed Insects of Western Forest Trees	USDA
14.	Controlling Rodents and Other Small Animal Pests	OES

G. Forest Soils, Erosion

1.	Correlating Soils with Douglas-Fir Site Quality	SCS
2.	Soil Interpretations for Woodland Conservation	SCS
3.	Erosion Control in Woodlands	SCS
4.	Management Practices as Related and Influenced by Soils	SCS
5.	Effect of Physical Soil Properties on Douglas-Fir Site Quality	SCS

6.	Factors Affecting Productivity in Willamette Basin for Douglas-Fir	SCS
7.	Interpreting Soil Surveys for Use in Growing Wood Crops	SCS
8.	Correlation of Soil and Timber Site in Douglas-Fir in Southwest Washington	SCS
9.	Guide for Forest Soil Examination in Douglas-Fir Region	Exp. Sta.

H. Minor Forest Products

1.	Management and Marketing Floral Trade Products	Exp. Sta.
2.	Cascara Bark Production and Other Crude Drugs	Exp. Sta.
3.	Cone Buyers in Pacific Northwest	OSBF
4.	Collecting Forest Seed Cones in PNW	USFS
5.	Cone Collection, Extraction Storage	USFS
6.	Minor Forest Products in Pacific NW	USFS

I. Christmas Trees

1.	Christmas Tree Production and Marketing	Tri-Ext.
2.	Christmas Tree Producers in Oregon	OES
3.	Christmas Tree Stump Culture	SCS
4.	A Christmas Tree Plantation	SCS
5.	Selecting a Good Area for Christmas Trees in Pacific Northwest	USFS
6.	Cultural Practices for Growing Christmas Trees in Pacific Northwest	USFS

7.	Regulatory Measures Affecting Harvest of Christmas Trees	USFS
8.	Christmas Tree Harvesting and Marketing for PNW	USFS
9.	U.S. Standards for Christmas Tree Grades	USDA
10.	Christmas Trees, the Tradition and the Trade	USDA
11.	Douglas-Fir Site as a Basis for Selecting Christmas Tree Lands	Exp. Sta,
12.	Raising, Christmas Trees for Profit	OES
13.	Shearing and Shaping Christmas Trees	MSU
14.	Christmas Tree Harvesting and Marketing for Pacific NW Growers	USFS
15.	Selecting a Good Area for Growing Christmas Trees in Pacific NW	USFS

J. General Information

1.	Forest Consultants in PNW	WSF
2.	Markets for Forest Products in Oregon	WIFP
3.	Trees to Know in Oregon	OES
4.	Small Woodlands Handbook	SCS
5.	Trees Against the Wind	SCS
6.	Guide to Regulations Affecting Harvest and Marketing Forest Products	USFS
7.	Oregon Forest Laws (Washington)	OSBF
8.	Forest Practices Handbook	OSBF

9.	How to Sell Timber	OES
10.	Measuring Trees	OES
11.	Salt Treatment for Green Posts	OES
12.	Treated Pine Posts Will Last	OES
13.	Loans on Forest Lands	FLB
14.	Forest Statistics for PNW	USFS
15.	Small Sawmill Operators Manual	USFS
16.	Building with Logs	USFS
17.	Federal Income Tax Tips for Small Timber Owners	USFS
18.	Preservative Treatment of Fence Posts and Timbers	USDA
19.	Volume Tables for Pacific NW Trees	USFS
20.	Timber Sale Agreement Guides	USFS
21.	Logging Farm Wood Crops	USDA
22.	Service Life of Treated and Untreated Fence Posts	ORC
23.	Marketing of Farm Forest Products (Western States)	OES
24.	Managing the Small Forest	USDA
25.	Trees and Tree Growth	USDA
26.	Its a Tree Country	AFPI
27.	How You Can Become a Tree Farmer	WPA
28.	Harvesting Evergreen Brush and Ferns	WES
29.	Building Woodland Roads	WES

30.	Oregon, A Timber State	OSBF
31.	Trees and Game - Twin Crops	AFPI
32.	The Story of Lumber	AFPI
33.	Growing Paper on Tree Farms	CZC
34.	Public Forestry Assistance for Small Woodlands	USFS
35.	Why We Have Multiple-Use Forest Management	AFPI
36.	Look at Your Timber America	USDA
37.	Farm Forestry in Clackamas County, Oregon	OES
38.	The Story of Pulp and Paper	AFPI

Chapter VI

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

SUMMARY

This study was undertaken for the purpose of determining how farm forestry might be included into Vocational Agriculture programs in those communities where forestry plays a significant role in the local economy. It was felt by the author that the educational opportunities offered by instruction in this area were not being fully utilized.

There were nine major topics selected for study in this paper, these areas being:

1. The importance of farm forestry to the local economy and the number of teachers who recognize a need here by incorporating forest instruction into their curriculums
2. Departments having access to forest land for instructional purposes
3. Average number of boys in each department and the number of boys involved with forestry projects
4. Total number of hours of instructional time devoted to forest instruction

5. Techniques and methods used in teaching farm forestry
6. Types of field trips used in teaching farm forestry
7. Subject material taught in each of the four years of secondary instruction
8. Sources of information used in teaching the subject
9. The reasons why some teachers do not include instruction in forestry

Research done in other parts of the country indicated that groups of people across the nation were also interested in answering the same questions as the author. Basic curriculums secured from the various people having worked in this area indicated several points to consider in the formulation of a curriculum for Oregon and Washington for which this study was made. Those points indicated were:

1. There is a rather universal body of subject material nation-wide which has been found to be important enough to include in basic curriculums of farm forestry.
2. The two major areas of instructional content are forest management and forest products. There is

also a small body of material which is included in most curriculums which might be called forest engineering.

3. There is a "learning by doing" philosophy surrounding most instruction in this area. Practical field work experiences are used almost universally to aid the instructional process. The need for practical forest demonstrations of learned knowledge is rather universally accepted.
4. There is a gradual shift in teaching methods in this area from the lecture or teacher centered approach to the discussion and laboratory approach which is more student centered.

The means through which data was secured for this paper consisted of a check list questionnaire that was sent to sixty departments of Vocational Agriculture in Oregon and Washington. There were fifty-four of the questionnaires returned to the author.

The basis upon which questionnaires were sent was determined by the total forestry income in 1959 from the county in which any given Vocational Agriculture department was located. Each department surveyed was located in a county in which at least $900,000 worth of natural resources was removed from the land in the survey year.

The tabulation of the questionnaires revealed the following:

1. Over 50% of the questionnaires returned indicated that forestry was not a major industry in the community to which the questionnaires were sent.
2. All the teachers who felt that forestry was important to their local economy were including instruction in this area in their curriculums.
3. Over 75% of those schools teaching farm forestry use forest land for practical field work experiences.
4. Of the forest land used for field work, the majority indicated the use of privately owned land.
5. The average student enrollment in those departments surveyed was 56, with an average of three forestry supervised farming projects per department.
6. The total hours of instructional time devoted to farm forestry in each of the four years range from an average of eight during the freshman year, to 14 during both the sophomore and junior years, and to 16 during the senior year.
7. Responses for the various teaching methods used in teaching farm forestry indicated the following

methods in order of preference: lecture, field trips, group discussion, resource persons, supervised study, student reports, panel discussions and team teaching.

8. Responses to the various types of field exercises that an instructor and class might take indicated a preference for taking trips in which certain manipulative skills might be learned over those trips where only knowledge of forest industry operations is learned.

9. Responses to the many topics concerned with curriculum indicated that the theme approach to curriculum construction where the broad areas: selection, production, management, and establishment guide instruction in each of the four areas seems to have received consideration from many teachers. The course of study resulting from the survey indicates a gradual deepening and increased complexity of subject material as one approaches the senior year.

10. A number of private industries and public agencies are supplying a great amount of technical information in the form of printed material, films, and visuals. Resource persons are also available from these sources.

11. Several reasons were given by those instructors that were not teaching farm forestry. By far the most common was that no justification could be seen on the basis of the total income of the area coming from farm forestry.

The various points on current instructional practices illustrated in Chapter IV of this study have been compiled and placed in Chapter V in a course of study. The basic headings for this plan were taken from the original survey and will serve here only as a main topic guide.

The proposed course of study begins with a general introduction of the student to forestry and, because this year is exploratory, will include elementary introductory topics that will not develop into any depth, this depth being reserved for later years.

The sophomore year is devoted to essentially the same topics as the freshman year, with a few exceptions, but the material is covered in more depth. A large number of hours (14 as compared to eight during the freshman year) or instruction is given during this year.

It is expected that during the junior year a greater depth in material can be included because of previously covered material and also because of the increased level of understanding and maturity of the students. In this year a greater magnitude of technical topics are taught

and a large amount of time is spent in field work experiences.

In the senior year the level of learning of the students should be such that the total scope of instruction in forestry can be completed. Advanced forestry topics such as economics of mechanization and forestry vocations are indicative of the types of material that can be included during this year.

CONCLUSIONS

In the light of this study, the following conclusions have been reached:

1. There is a body of subject material in the area of farm forestry which should be included in the curriculums of some Vocational Agriculture departments of Oregon and Washington. The criteria upon which it is decided that this material will or will not be included in the curriculum will be decided by local applicability.
2. Where s need is recognized by a teacher of Vocational Agriculture for the inclusion of forestry material in the curriculum, this material is being taught. All instructors surveyed who indicated that forestry played an important role in the economy of the community revealed that their

programs contained some forest instruction.

3. There is a need for forest land to be used for practical field work experiences in connection with classroom instruction. Instructional land was used by 77% of those schools teaching forestry.

4. On the average, there is a rather small number of boys in each department who have supervised farming projects within the area of forestry. This number is increasing as a broader outlook on the selection of supervised farming programs is taken by more Vocational Agriculture teachers.

5. The total number of hours devoted to instructional time in farm forestry increases from an average of eight hours during the freshman year to an average of 16 hours during the senior year.

6. There are many methods of teaching forestry. The lecture, group discussion and field trip methods are the most important.

7. Field trips have received great support in this subject area. The most important trips are those to plant trees, cruise a plot of timber, and observe a forest nursery operation.

8. There is an increase in the depth of practical involvement in the subject area as the senior

year approaches. The freshmen are concerned with such problems as hand tree planting whereas the seniors are concerned with a more mature level of thinking such as the topic of forest mechanization.

9. There is a tremendous scope of companies and publicly owned operations which supply technical sources of information for use in teaching farm forestry. The two most important sources are the local county agents and the U.S Forest Service. Printed material is by far the most used type of technical information supplied.

10. There are good reasons why some instructors are not teaching farm forestry. The most important reason is that not enough of the local economy is dependent upon this industry to justify the time spent in instruction.

RECOMMENDATIONS

The following recommendations based on the conclusions made in this study are:

1. Teachers of Vocational Agriculture in those parts of Oregon and Washington where forestry provides a portion of the local economy large enough to

justify instruction, should include in their curriculums subject material in the area of forestry.

2. The area of forestry should be approached in the Vocational Agriculture curriculum the same as any other areas of crop science.
3. It is advisable that a plot of forested land be used in conjunction with the instructional program. This plot need not be large or elaborate but should provide conditions whereby learned principles may be applied.
4. The teacher of Vocational Agriculture should encourage forestry projects in conjunction with the supervised farming program. This encouragement should be in accordance with the importance or need for forestry programs on the home farm.
5. Subject material taught in the four years of forest instruction should vary in depth and complexity from the introductory approach during the freshman year to the technical skills in management during the senior year.
6. Total hours devoted to instruction in the area of forestry should increase as the senior year approaches.
7. The methods of teaching this subject will depend on the individual instructor, each instructor

having his own methods which for him seem to work best. The lecture, group discussion and field trip methods are the most popular. Any given method should be used when it is felt that more learning will take place by it than by an alternate method.

8. Teachers of Vocational Agriculture who teach farm forestry should utilize all available sources of information so that a more effective job of teaching may be done. Printed information will be the most important here although resource persons, films and other visuals can be used to advantage if used correctly.

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16. Niemi, Alfred O. Graduate Student, Northern Michigan College. Personal letter. Marquette, Michigan, October 26, 1961.

17. Robinson, Dan. Professor of Forestry, Oregon State University. Personal interview. Corvallis, Oregon, October 12, 1961.

18. Swanson, Gordon I. Teaching unit in forestry. St. Paul, University of Minnesota Press, 1959. 26 p.

19. Winch, Fred. New York State Extension Forester. Personal letter. New York, New York, October 12, 1961.

20. Wisconsin. Conservation Department. Laboratory and field manual for vocational agriculture instructors. Madison, 1960. 150 p.

21. Wisconsin. Cooperative Educational Planning Program. Guide to conservation education in Wisconsin schools. Madison, 1949. 96 p.

A P P E N D I X

November 7, 1961
Corvallis, Oregon

Dear Mr.

I am making a study of instructional programs in farm forestry as taught in Vocational Agriculture in Oregon and Washington. With the results of this study I am going to develop a suggested program of content to meet instructional needs in farm forestry.

I turn to you for cooperation in answering the enclosed questionnaire. Because of your on-the-job experience you can contribute valuable information to such a study.

A stamped, addressed envelope is enclosed for your convenience in returning the questionnaire.

I greatly appreciate the time you may devote to checking the questionnaire. Thank you for your cooperation.

Sincerely yours,

Fred A. Fowler
Weatherford 477
Oregon State University
Corvallis, Oregon

FAF/bjc

Enclosures

A survey of census of agriculture records indicates that farm forestry plays an important part in the economy of your county.

1. Is this reflected in your school district?

_____Yes _____No

2. Do you include farm forestry in your Vo. Ag. program?

_____Yes _____No

If your answer to number two above was yes, please answer questions under the heading A. If your answer was no, please answer questions under heading B.

"A"

1. Does your department own a school forest or have access to forest land for instructional purposes?

_____None

_____School Forest

_____Other Forest Land (explain)

2. How many of the boys in your department are engaged in farm forestry projects?

_____

3. How many students do you have in each class and approximately how many hours of instructional time is devoted to farm forestry in each of the years that this topic is taught?

	No. Students	Hours Instruction
Freshman	_____	_____
Sophomore	_____	_____
Junior	_____	_____
Senior	_____	_____

4. Which of the following teaching techniques and field trips do you use in teaching farm forestry?

___Lecture
___Student reports
___Group discussion
___Supervised study
___Panel discussion
___Field trips
___Resource persons
___Team teaching
___Other (explain)

___Trip to a sawmill
___Trip to a plywood plant
___Trip to a fiberboard plant
___Trip to a forest nursery
___Trip to appraise or take inventory
___Timber cruising field trip
___Tree planting field trip
___Log scaling field trip
___Other (explain)

5. Please indicate what you teach in each of the years that farm forestry is taught in your department.

	Frosh.	Soph.	Jr.	Sr.	Out of School
Tree Identification	___	___	___	___	___
Techniques of Tree Planting	___	___	___	___	___
Techniques of Cruising and Scaling	___	___	___	___	___
Techniques of Harvesting	___	___	___	___	___
Techniques of Management	___	___	___	___	___
Specialty Forest Products	___	___	___	___	___
Wood Preservation	___	___	___	___	___
Forest Protection	___	___	___	___	___
Marketing of Forest Products	___	___	___	___	___
Forest Mechanization	___	___	___	___	___
Other (explain)					

6. From which of the following have you found useful reference material and what type of material did you receive from each?

	Resource Person	Printed Material	Films & Visuals	Word of Mouth
County agent and farm forester	____	____	____	____
District warden of protection district	____	____	____	____
Keep Oregon (Washington) Green Association	____	____	____	____
U.S. Forest Service	____	____	____	____
Industrial Forestry Assn.	____	____	____	____
Western Pine Association	____	____	____	____
West Coast Lumbermen's Assn.	____	____	____	____
State Dept. of Education	____	____	____	____
Other (explain)				

- - - - - - - -

"B"

1. From the following, check the reasons or reasons for your department not teaching farm forestry.

_____Advice from advisory council

_____Advice from local industry

_____No justification on the basis of total income of the area coming from farm forestry.

_____Insufficient community and student interest

_____Insufficient background in subject area

_____Other (explain)

copy

State of California
Department of Education
State Education Building
721 Capitol Avenue
Sacramento 14, California
November 17, 1961

Mr. Fred A. Fowler
Weatherford 477
Oregon State University
Corvallis, Oregon

Dear Mr. Fowler:

Your recent letter addressed to the Chief of the Bureau of Agricultural Education has been given to me for a reply. In the north coast counties in California, the redwood and fir lumber industry has been quite active through the Redwood Region Conservation Council in promoting forestry classes in the area of high schools.

Some of these have been exclusively occupational in nature, preparing for entry in positions in industry. Others have been related to vocational agriculture, since farmers and ranchers produce a considerable volume of saw timber. Others have been quite general in nature.

In this promotion activity, the Redwood Region Conservation Council produced, with the assistance of a foundation grant, a curriculum outline for "High School Forestry, Logging & Lumbering Instruction". I am sending a copy of this to you together with an earlier bulletin, which gives some information on forestry instruction. Perhaps these may be helpful to you.

Yours very truly,

SIDNEY E. McGAW
Regional Supervisor
Bureau of Industrial Education

SEM:jmf
encs:

COPY

Northern Michigan College
Marquette, Michigan
October 26, 1961

Mr. Fred A. Fowler
Weatherford 477
Oregon State University
Corvallis, Oregon

Dear Mr. Fowler:

I just came upon your letter of the 10th of October and am sorry to say I had mislaid it somehow. Am very sorry and hope what information I can give you will still be of help to you.

The pertinent information concerning the results of my dissertation can be found in The Agricultural Education Magazine, Volume 33, No. 10, April, 1961. I believe this would give you most all of the information which you might want concerning forest practices which are recommended to be taught to high school students and to adults owning farm woodlands. Since I do have the recommended practices and the percentage recommending each practice in the summary in a table form, it should give you much information. I did not make any course outlines or teaching units for high school teaching since it was somewhat out of the scope of my study.

If you should like to see the copy of my dissertation, I believe this could be arranged on an interlibrary loan basis from the Interlibrary Loan Section, Michigan State University, East Lansing at the Library Building. I believe this would be sent in a microfilm however. The only advantage in obtaining the microfilm would be to see the percentage of Michigan teachers using the various practices, and the relative homogeneity between recommended and presently used practices as shown by chi-square analysis.

If I were to do the study over again, I would have a much finer breakdown of practices since many practices really are a series of practices in my study. Since it was somewhat of a pioneer study in the area here in the Midwest, there no doubt is a lot more room for related studies in the forest practice area.

Hoping that this will give you some help, I remain

Sincerely yours,

Alfred O. Niemi
1940 Neidhart St.
Marquette, Michigan

P.S. My abstract of thesis would not give enough information to be of value, therefore am not enclosing a copy of same.