

STATUS OF WILDLIFE CONSERVATION EDUCATION
IN SELECTED TWO-YEAR COLLEGES

By

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CHAPTER I

INTRODUCTION

The late 1960's and early 1970's encompassed two major movements in our society. The first was increasing awareness of environmental concerns which led to Earth Day, 1970 and declaration of the 70's as the "Environmental Decade." The second was the phenomenal expansion of two-year colleges.

In August, 1970, in the first report ever made to Congress on the state of the nation's environment, President Nixon called for the educational system to develop an "environmental literacy." This understanding and awareness of man's relationship to his environment would require the development and teaching of environmental concepts throughout the educational process. Furthermore, the President called upon the educational system "to train professional environmental managers to deal with pollution, land planning, and all the other technical requirements of a high quality environment" (Train, 1970, p. vii).

Community colleges responded vigorously to this request. Pratt (1971) described the extent of environmental studies in community and junior colleges based on a survey conducted early in 1971 with respondents from more than half of the two-year colleges in the United States. The survey results revealed that 41 percent did offer or were

planning to offer a course in environmental topics; and 33 percent offered or were planning to offer complete degree programs.

An especially popular aspect of environmental concerns was wildlife conservation. Enrollments in wildlife curricula at colleges and universities soared. A survey conducted by the Wildlife Society (1975a) showed a 64 percent increase in students studying wildlife between 1968 and 1974.

Statement of the Problem

Student interest in wildlife conservation, coupled with the growth of two-year colleges, produced a number of courses and programs devoted to the study of wildlife. However, most directories of two-year colleges list wildlife programs under such classifications as natural resources, conservation technology, or forestry/wildlife. Courses or programs devoted to the study of wildlife are subsumed within these classifications. Therefore, the extent of education in wildlife conservation at the two-year college level was unknown.

Need for Study

For both employers and colleges planning technical programs, there is a need for information concerning the supply and demand of graduates. Mackin (1971) shows the usefulness of such manpower predictions made by the Federal Water Pollution Control Administration for pollution control technicians, and by the Environmental Health Service for Environmental Health Technicians. Unfortunately, he was not able to utilize manpower predictions for technicians in resource

conservation (including wildlife) because no such statistics were available.

This study focused on gathering information about the supply of technicians with wildlife conservation training. Such information on the extent of training presently being offered in community colleges can provide a basis for estimating the employment situation for this occupation.

Furthermore, a comparison of technical content of those programs leading to associate degrees in wildlife conservation can provide:

1. Potential employers with a better understanding of the training and capabilities graduates can be expected to possess.
2. Two-year colleges with a basis for comparing their own programs.
3. Students who wish to obtain education in this field with a more realistic idea concerning types of programs available and jobs obtained by graduates.

Purpose of the Study

The purpose of this study was to determine the status of wildlife conservation education in two-year colleges with regard to the number of individual courses and complete degree programs being offered, the number of students graduating, and the types of jobs obtained by graduates.

Objectives

The objectives of this study were to:

1. Determine the number of two-year colleges with curricula leading to degrees in wildlife conservation.

2. Compare these curricula with regard to the amount of technical content.
3. Determine the number of two-year colleges which offer one or more courses in wildlife conservation as part of curricula leading to degrees in related areas.
4. Gather information on the number of graduates of two-year wildlife conservation programs for the academic year previous to this study.
5. Gain an idea of the types of jobs obtained by graduates of these programs.

Definition of Terms

Wildlife Conservation - for clarity, all courses and programs pertaining to the study of wildlife are referred to under the general heading of wildlife conservation. This includes courses or programs titled wildlife biology, wildlife management, game management, and wildlife ecology.

Course - a class, meeting regularly throughout a semester or quarter.

Program or Curriculum - the combination of courses and work experience required for a degree.

Two-Year College - includes community colleges, junior colleges and technical institutes which grant associate degrees. Also included are those colleges and universities which have programs leading to associate degrees.

CHAPTER II

REVIEW OF LITERATURE

The purpose of this study was to determine the status of wildlife conservation education in two-year colleges with regard to the number of individual courses and complete degree programs being offered, the number of students graduating, and the types of jobs obtained by graduates. This chapter presents a review of selected publications relating to the problem outlined in the previous chapter. First, the conditions which created the growth of environmental programs are described. Secondly appears a summary of studies and literature pertaining to the education and employment of wildlife conservation technicians. The last area covered is curriculum models for technician training.

Growth of Environmental Programs

During the 1960's, the National Planning Association compiled a list of sixteen areas for which goals have been identified for overall improvement in the pattern of American life (Lecht, 1968). They include all sectors of the public and private economy, account for virtually all of the national production, and offer a framework for relating the utilization of the nation's resources to its objectives.

The goal area of Natural Resources is of special concern to this study. According to Lecht (1968), the deterioration of available

resources, plus the increasing demands of a more heavily populated and affluent America will require a significant increase in manpower involved with conserving and developing the nation's natural resources. In order to meet the aspired goal, the study estimated a need to increase the number of technicians (other than electronic and medical) by 180 percent.

Reports such as this, plus other influences, resulted in a blossoming of environmental programs in community colleges. Pratt (1971-72) describes this condition:

With the advent of Earth Day, the creation of the President's Council on Environmental Quality, and formation of the Environmental Protection Agency, 1970 has been termed by many as the year that the environment was finally 'discovered.' Just as interest in the environment has heightened, the number of occupational-program offerings in environmental/ecological education (E.E.E.) also showed a marked increase during the year (p. 30).

An even clearer idea of the rapid increase in environmental programs is provided by Pratt (1970-71). He states that in the 1960's only a half dozen occupational programs existed that could be described as environmental. By 1970, over 50 such programs were offered by community colleges, and 25 more were being planned.

By 1971-72, nearly one hundred colleges were listed as offering associate degrees in just the area of forestry/wildlife technology (Baker and Wells, 1975).

However, by the mid-70's, there had developed conflicting opinions about this proliferation of environmental programs. In the 1975-76 issue of the Technical Education Yearbook, Harris expressed concern about this situation.

At one time or another, we have all been bitten by the bandwagon bug. The most recent manifestation of bandwagon fever was probably the rash of technical programs

which erupted a few years ago following the announced 'national need' for persons trained in technologies related to the environment. The need was there but demand was not. Hundreds of carefully planned programs produced thousands of well-trained graduates, most of which did not secure employment in the field and at the level for which they were trained. The 'national needs' approach to manpower planning is a useful planning tool only if the 'needs' are realistically interpreted within the parameters of the supply-demand equation (p. 4).

Surprisingly, in the same publication, Brooking (1975-76) paints a much brighter picture of careers in environmental occupations.

More and better programs to prepare skilled workers, technicians and supportive specialists, and professional personnel to solve the problems and perform the work which will improve our environment are clearly needed. Further, it is likely that the greatest shortage of manpower in the environmental fields is, and will continue to be, at the technician and similarly specialized worker level (p. 9).

Furthermore, he specified some opportunities for those interested in wildlife:

Youths looking for outdoor careers contributing toward environmental control will also find opportunities as wildlife management specialists and technicians and as skilled workers for the administration of fish and wildlife resources (p. 11).

It is this combination of technical positions under the umbrella of "environmental occupations" that has created difficulties. Given the information that there would be a high demand for technicians in occupations associated with environmental occupations, two-year colleges initiated programs in a variety of areas. However, the training, type of employer (public or private), and the employment situation vary widely for technicians in such diverse areas as wildlife management, water pollution and environmental health.

This situation was addressed at the Community College Environmental Ecological Technician Education Workshop held in Denver in 1970.

Participants at this workshop identified four clusters of environmental jobs exhibiting similar characteristics (Pratt, 1971). They were:

1. Pollution prevention and control technology.
2. Disease prevention technology-sanitation, environmental health.
3. Environmental planning technology.
4. Resource Conservation Technology - which includes wildlife conservation.

Pratt (1971) identifies other attempts to provide some consistency to titles and descriptions for environmental occupations. One which divides all occupations into professional or supportive functions was developed for the Environmental Control Administration of the Department of Health, Education and Welfare. Another was presented by Fanning (1975) who designated five career groups. None of these appear to have been widely adopted. Nor do they provide much help for developing curricula.

Tillman (1972) found this problem with titles very detrimental in his study of the role and status of natural resource technicians in New York State.

The titles of possible program offerings in New York State community colleges illustrate a crucial problem: language. Fanning (1971) accuses educators and scientists of taking the approach of Humpty Dumpty speaking to Alice: 'When I use a word, it means just what I choose it to mean, neither more or less.' Each college, after defining environmental technology in personal terms, offers unique programs but places them under the common banner of environmental technology, thereby creating confusion among students, educators, and potential employers. There exists, in New York State, an incredible lack of coordination between community college units in respect to the design and implementation of environmental curricula. The program titles shared by several institutions hide a real diversity of curricula that has not been adequately researched or discussed at state planning levels (p. 19-20).

Tillman (1972, p. 20) feels this situation seriously jeopardizes employer - institutional relationships. He thinks "employers should have the right to expect standardization in training and education within a state educational system for specific degrees . . ."

Whether or not this problem of lack of conformity exists in wildlife conservation curricula was not known. An objective of this research was to compare the content of such curricula. The remainder of this paper is concerned only with those environmental programs that include training in wildlife conservation, which fall under Pratt's Resource Conservation Technology classification.

Education and Employment of Wildlife

Conservation Technicians

An overview of the history and definition of wildlife technology is given by Soles (1973). The position and required competencies for fish and wildlife technicians are described as follows.

Wildlife resources technicians assist wildlife biologists, game commissioners, game farm managers, farmers, ranchers, foresters, and park managers to locate, inventory, develop, distribute, and maintain wildlife resources . . .

The fish and wildlife resources technician works under the general supervision of the professional fish and wildlife resources scientists or manager. The technician is a person competent to occupy a responsible position in the line of authority between the skilled worker and the professional man. The technician often directs the activities of skilled workers. The fish and wildlife resources technician differs from the skilled worker in his theoretical and applied knowledge of fish and wildlife resources and differs from the professional man in his more limited of specialized background and in his use of technical skills in support of fish and wildlife resources management. The technician requires an education and training sufficient to enable him to understand the reasons for, and the purposes of, the operations for which he is responsible.

Competencies Required

Technicians who work with fish and wildlife resources must be capable of working and communicating with professional scientists, managers, and administrators as well as the skilled workers whom the technicians must supervise. Some technicians perform manipulative tasks while others supervise the application of such skills, but most do both. Their work is distinguished from that of the skilled worker primarily in that it is less repetitive, involves more objective analysis and problem solving, and requires an understanding of the principles of science, engineering, mathematics, and statistics in addition to their own particular skills in fish and wildlife resources technology (p. 51).

Employment opportunities for wildlife technicians exist with Federal agencies and state governments which are the largest employers of wildlife technicians. Limited employment opportunities may be found with county or municipal governments, academic institutions which conduct wildlife research, and private organizations which have large land holdings, such as paper manufacturers and hunting clubs. Some position titles are Wildlife Conservation Technician, Wildlife Research Technician and Game Warden (Soles, 1973).

Additionally, Soles reports this type of work had usually been done by persons with a baccalaureate degree or students working for one, or by persons without formal training who had gained practical experience in the field.

One of the earliest publications dealing with two-year college programs was a study done by Whaley (1965) of the need for natural resource technicians in northern California. He found the projected number of full-time placement opportunities for 1970 was 30 professional, 20 technical and 31 skilled and semi-skilled employees in wildlife conservation. On this basis, he recommended that Modesto Junior College begin a program to train technicians in wildlife conservation.

To gather his information, Whaley surveyed natural resource management agencies, both public and private. When these sources were asked what kinds of training they considered important for technicians in these areas, the following competencies were identified: communication skills, applied mathematics, personnel management, technical drawing, sketching, and reading maps and blueprints.

Two programs including wildlife conservation were described in the December, 1969 issue of the Agricultural Education Magazine. One was at Shasta College in California and the other at the State University of New York Agricultural and Technical College in Morrisville. The program in Natural Resources at Shasta College was organized in response to two influences (Dubose, 1969). One was a growing awareness of the existence of a job market for students with technical training in natural resources. The other influence was a large number of students with interests in this area. Before starting the program a study was done to determine specific training needs for natural resource jobs and to examine job placement opportunities. As a result of this study, a variety of courses were developed, most having three-hour laboratory periods. The author admitted to some competition with graduates of four-year programs for jobs, but was optimistic about placement possibilities for students.

The program in New York was Conservation Technology started in 1966 (Greene, 1969). Student interest was high for this program which also included considerable laboratory experience. However, placement of graduates was a significant problem.

For students who do not plan to transfer to four-year colleges there is considerable difficulty in finding positions commensurate with their training and ability. To put it simply, job opportunities in conservation work have not

kept pace with the needs dictated by the plight of our natural environment. This is particularly true at the technical, sub-professional levels. Many persons in executive or supervisory positions have indicated that such persons are needed desperately but that civil service machinery and funds are lagging far behind present and future needs (p. 141).

Despite these difficulties, the author was hopeful about future opportunities for technicians. He expected the need for sub-professionals to increase as the complexities and responsibilities of biologists increase. Positions as conservation officers may provide opportunities for two-year graduates as the duties of this position come to require more training than the traditional high school education. He felt potential for future job opportunities to be very good.

Consideration of the status of wildlife conservation training at the professional level will also have repercussions on programs in two-year colleges. It is a well accepted fact within the field that colleges and universities are graduating many more students than there are job openings. The Wildlife Society, the professional organization for this occupation, has conducted periodic placement surveys of graduates from colleges and universities granting bachelor and advanced degrees in wildlife conservation. The results of the last three surveys for bachelor graduates are as follows (Zagata, 1977):

<u>Year of Survey</u>	<u>% Obtaining Wildlife Related Employment</u>	<u>No. of Colleges Reporting</u>
1971	20	59
1973	30	70
1976	28	60

The 1976 report includes the information that of the 89 institutions offering wildlife curricula which were surveyed, 60 responded that they graduated 1,626 people with bachelor, 292 with masters, and 69 with doctorate degrees. Even with 10 fewer schools responding, this

number represents an increase of 18 percent compared to the number of graduates reported for 1973.

It is estimated that there are approximately 20,000 wildlife conservationists employed in the United States and Canada (Fanning, 1975). With colleges and universities graduating nearly 2,000 students each year, there is little wonder that competition is keen for jobs.

The Wildlife Society (1975b) admits to this situation in its brochure "A Wildlife Conservation Career for You." It raises an interesting point in light of the number of associate degree programs now offered. "Increasing numbers of applicants for the available positions make it imperative that you earn at least a bachelor's degree in order to land a position in this highly competitive field. A graduate degree is even more desirable."

In the Report of the Committee on North American Wildlife Policy, Allen (1973) acknowledged this problem and suggested it would result in employers adjusting minimum job qualifications.

Wildlife and conservation curricula in the universities are training more undergraduates than the present employment market can absorb. This situation will improve as more states upgrade standards and require a college degree for law enforcement officers. In both Canada and the United States employment opportunities for students with graduate degrees have been good, and future needs for basically trained professionals should increase (p. 91).

The fact that there is a surplus of graduates with baccalaureate degrees, coupled with rising job qualifications, indicates the likelihood that students with associate degrees will have difficulty finding wildlife related jobs.

Career literature relating to opportunities in wildlife conservation may be somewhat misleading in light of this difficulty. There

are a number of books and publications describing careers in conservation. Those written before the community college era seldom mention the sub-professional technician level.

By 1971, the Ferguson Publishing Company had published Career Opportunities - Ecology, Conservation and Environmental Control which is totally devoted to technician level positions. It describes the work of the wildlife and conservation technician as an

interesting, exciting, and rewarding job, and a most important one . . . The services of the wildlife and conservation technician are increasingly in demand. Technicians are needed in wildlife refuges, parks, recreation areas, on private shooting preserves, in industrial forests, and on game farms (pp. 196-197).

It would appear that if a person went through a college technical program which combined practical experience with specific training, employers would come knocking at the door:

Most graduates in wildlife and conservation technology receive offers from several agencies; but the graduate should apply to these agencies ahead of time so there will be no time lost. Federal and state agencies usually send representatives to the schools to encourage trainees to apply for positions.

. . . Private companies and universities send representatives to interview students for job openings or they may send notices of openings to teachers (Career Opportunities, 1971, p. 201).

Also included in Career Opportunities (1971) are examples of entry level job titles for wildlife technicians and the duties they perform.

Wildlife Aide

Works with foresters, biologists, or recreationists in charge of federal or state forest lands; carries out cutting and planting operations; leads fire crews; lays out roads and trails; plots and supervises water developments; guards endangered wildlife; conducts animal censuses.

Wildlife and Conservation Research Aide

Aids in varied research activities from collecting samples for biochemical analysis to sampling people's attitudes as to what should be found in wildlife areas; captures animals

live for study, marking, and release, sometimes using special capture guns to shoot and immobilize animals.

Animal Aide

Helps to care for and to design and build shelters for a wide variety of wildlife, ranging from tiny mice or shrews to giant elk or moose and from songbirds to hawks, owls, and eagles.

Land Manager

Provides the proper habitat for game so that it will multiply and prosper; works more directly with animal surroundings than with the animals themselves.

Game Protector or Warden

Enforces game laws; has considerable responsibility for public relations, conducting informational programs, gathering data, sometimes takes complete managerial charge of certain districts (p. 202-203).

It is interesting to compare these position titles to those described by Soles (1973) mentioned earlier in this chapter. The expression "Aide" is used here, whereas Soles uses "Technician." The job duties reported for each title are essentially the same. Soles indicated that technician jobs were usually held by people with a baccalaureate degree or with considerable experience. For the wildlife field, technician positions, both at the state and federal level, are usually filled by persons with at least a bachelor's degree.

Little information on the technician level position in the Fish and Wildlife Service could be found in Civil Service literature. The professional positions of Wildlife Biologist and Refuge Manager are the only ones described in detail. However, some mention is made of "wildlife aides" (Department of Interior). Aides assist professional biologists, are employed in small numbers at national wildlife refuges and have salaries ranging from GS-2 through GS-5. This position would apparently be available to graduates of two-year colleges, since bachelor's graduates are qualified to start with a GS-5 rating.

Thus, the term "technician" in the wildlife field does not necessarily imply the educational background typified by technicians in other occupations. This is a source of confusion since graduates of two-year occupational training programs have traditionally been considered technicians.

A second book covering careers in conservation is the Concise Handbook of Occupations (Costello and Wolfson, 1976). It also describes the outlook for wildlife and conservation technicians as excellent "due to the demanding needs of habitat management and extensive wildlife studies of all kinds" (p. 303). An especially useful component of this publication is the attempt to assign a tentative classification to this occupation in accordance with the instructions in Volume I of the Dictionary of Occupational Titles (DOT). The DOT, published by the Department of Labor, lists over 20 thousand occupations with their duties and required training. Because wildlife technician is such a new position level, it does not appear in the DOT. Therefore, educators cannot look to this traditionally useful source for a job description for determining competencies which should be included in training wildlife technicians.

The tentative number assigned to this position by the book's authors is 466.181. The first three digits indicate an occupation within the category of agriculture, forestry and fishing, specifically an animal caretaking occupation. The last three digits indicate the importance in the job of relating to data, people and things respectively. With zero being the highest rating and eight being the lowest, this .181 number assignment implies that the work of wildlife technicians is associated mainly with data and things, very little with people.

Tillman's (1972) study of natural resource technicians in New York State was an attempt to gain a better understanding of the role and status of natural resource technicians in actual working situations. When Tillman attempted to clarify the role of technicians he found two difficulties due to the newness of the concept of a sub-professional technician. One problem was identifying the duties of technicians, the second concerned the relationship of the technician to an already established work-hierarchy.

In his study, Tillman found such a variety of duties performed by natural resource technicians that he did not even attempt to list them. But his findings relating to the role of technicians - as perceived by administrators, professional scientists and technicians - are of use in designing a training program.

The basic function of technicians was considered to be habitat management, with field monitoring operations second. The primary role of the technician was generally seen as that of an aide or assistant to professional scientists. However, professional scientists indicated that office duties were demanding a larger proportion of their time, forcing them to delegate much broader responsibilities to technicians. Therefore, it appeared that "while the conceptual role of technicians may be that of an aide, the functional role may be more like a field extension of the environmental scientist (Tillman, 1972, p. 51)." A secondary role that appeared to be developing was one of supervision of work crews. Because the operation of equipment has become more sophisticated, there is more of a need for trained supervisors to replace unskilled laborers that had been traditionally promoted on the basis of experience.

Office duties were another important obligation of technicians. The conceptual function of technicians has traditionally been that of doing field work, yet report writing and record-keeping required some time spent in office work.

Generally, the technician was expected to be a source of data for a professional scientist actually conducting field research and collecting data for subsequent professional analysis. Yet there was evidence of conflict concerning the relationship between technicians and professional scientists. Often the professional scientist sees a technician as an aide, while the technician perceives himself to be a co-worker.

It appears that professional scientists and technicians are in a subtle competition over status . . . a hierarchical understanding is necessary to maintain present levels of agency effectiveness and to insure continued success of technical programs in natural resource management (Tillman, 1972, p. 74).

This confusion of responsibilities and status were no doubt due in part to the newness of the sub-professional technician level. Now that some time has elapsed since Tillman's study, the technician's niche in the wildlife profession has probably become better defined. The information gained in this study concerning the types of jobs obtained by graduates should provide a better picture of the role technicians fill.

Curriculum for Technician Training

Program planning and curriculum content is a crucial element in technician training at two-year colleges. Yet, due to the newness of the technician level of education and the very recent rise of environ-

mental occupations, curriculum has sometimes been an obstacle to, rather than an instrument of, technician training.

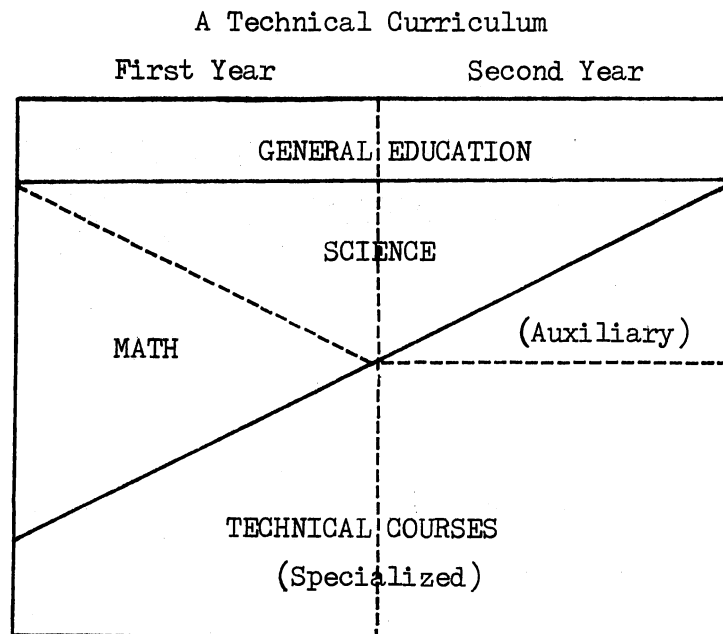
This section describes some general guidelines developed for technician education, problems with curricula in environmental areas and two models proposed for natural resources technologies.

Two sources of guidelines for designing curriculum are Roney's (1966) "Curriculum Design in Technical Education" and the HEW publication "Criteria for Technician Education" (1968). Roney (1966) identifies the following six principles as important considerations:

1. Assuming the total program to contain 65 hours, the curriculum should have at least 30 credit hours of specialization and from 15 to 20 credit hours of mathematics and science.
2. The technical speciality should be introduced in the first term by one or two major courses.
3. Mathematics and science courses should be coordinated with technical courses whenever possible, to introduce concepts as they are needed.
4. Auxiliary technical courses should be included to broaden the student's understanding of the technology.
5. Provision should be made for either individual or small group problem work during the final term to promote independent thinking and to test each individual's comprehension of the total curriculum content.
6. The total class and laboratory load for students should not exceed 30 hours per week and should not include more than 5 courses requiring extensive outside preparation (pp. 8-9).

See Figure 1 for a graphical representation of Roney's (1966) principles for the distribution of subject matter in a two-year technical program.

In "Criteria for Technical Education," (HEW, 1968) the importance of course sequence is stressed. Because technician training occurs in a limited amount of time, subject matter must be "carefully coordinated



Source: Roney, "Curriculum Design in Technical Education." Oklahoma State University, 1966, p. 9.

Figure 1. Roney's Model for Distribution of Subject Matter in a Two-year Technical Program.

in groups of concurrent courses which are arranged to blend smoothly from one group of courses into the next, and to carry the student to a deeper understanding in his field of specialization (p. 57)."

Introducing specialized course work in the first semester is also advocated. Supporting reasons for this are: maintaining student interest, achieving greater depth of understanding in specialized subjects by the later stages of the program, and allowing the student to see immediate application of the science and mathematical principles he is studying.

Laboratory time is emphasized. The first year is recommended as the time for students to acquire elementary laboratory skills and

knowledge of materials and procedures. Theory should be incorporated into laboratory work to increase the student's total comprehension of the subject. The second year is seen as having even more time spent in laboratory experience. Optimally, the total semester hours of science or technical speciality work should be at least equal to the classroom hours spent in these courses.

Also included in this publication is a grouping of the courses that make up a technical curriculum and the purposes which they are to achieve.

1. Basic science and courses which provide the foundation of scientific facts, principles, methods, and attitudes on which the technician's specialized application of that science depends.
2. Mathematics courses as required by the technology to enable the student to quantify scientific phenomena and to establish precise definition and interpretation of such phenomena, observations, or applications.
3. Technical speciality courses and their auxiliary supporting studies which teach the special skills, knowledge, techniques, applications, procedures, materials, processes, apparatus, operations, and services that identify the technology and prepare the student for a variety of employment opportunities in that technical field.
4. Communications courses which teach oral, written, and graphic skills, the required reading capability, and the ability to communicate successfully with co-workers and others.
5. Social studies courses which provide a technician with an elementary frame of reference in economics, citizenship, and social relationships as an individual, member of a family, employee, and citizen (HEW, 1968, p. 55).

Even with the existence of such guidelines as those outlined above, there remain many problems with curricula in environmental areas. When Pratt (1971) analyzed occupational programs in environmental education, he found the following weaknesses:

1. In many cases the curriculum consists of a "patchwork" of current course offerings from other curricula.
2. Very few of the programs include a cooperative work experience as a part of the curriculum.
3. Several programs purportedly being offered have never had students. In a few instances the college wanted to tie up the curriculum title, because they knew a neighboring college had planned to offer it.
4. In at least two colleges programs were started for specific technician preparation, in spite of extensive surveys indicating that no jobs were available throughout the state.
5. Hundreds of thousands of dollars have been spent in a few colleges for facilities and equipment, before any curriculum planning or development has taken place (pp. 73-74).

Hopefully, most of these problems have resolved themselves.

Probably the biggest remaining problem is the "patchwork" approach to course sequence. One objective of this study was to compare wildlife conservation technician curricula. This research provides information as to the extent two-year colleges are following guidelines for effective technician training with well-designed curricula.

There have been two curriculum outlines developed which served as a basis of comparison in this study. The following example was proposed by Tillman (1972) after his study of the role of natural resource technicians (Figure 2). This model meets the guidelines for technical education discussed above. An especially attractive feature of this curriculum is the time allotted for cooperative work study.

The second curriculum was developed specifically for wildlife technology by Soles (1973) at Pennsylvania State University (Figure 3). While many of the courses are the same as in Tillman's model, the work experience is arranged differently.

<u>First Semester</u>		<u>Second Semester</u>	
Subject	Credits	Subject	Credits
General Chemistry	4	Forestry Science	3
English Composition	3	Technical Reading	3
Ecology	4	Soil and Water Technology	4
Technical Mathematics	4	Surveying	4
Drafting	2	Physical Education	1
Physical Education	<u>1</u>	Elective (optional)	<u>3</u>
Total	18	Total	18

<u>Third Semester</u>		<u>Fourth Semester</u>	
Subject	Credits	Subject	Credits
Wildlife Science	3	Environmental Law	2
Public Speaking	3	Cooperative Work Study	<u>12</u>
Air Photo Interpretation	3	Total	14
Public Relations	3		
Elective	3		
Health Education	<u>2</u>		
Total	17		

Source: Tillman, "The Role, Status and Training of Natural Resource Technicians in New York State." Cornell University, 1972, p. 156.

Figure 2. Tillman's Curriculum Model for Natural Resource Technology.

First Semester

Elementary Forest and
Range Surveying
Communication Skills
Applied Mathematics
Botany
Elementary Soils
Wildlife Technology
Orientation Seminar

Second Semester

Technical Reporting
Food and Cover Plants of
Forest and Range
Technical Drawing
Zoology
American Government Insti-
tutions
Elementary Chemistry

Work Experience: On-the-Job Experience in
the Wildlife Technology Field - usually
a summer program, 10-16 weeks duration
at 40 hours per week.

Third Semester

Principles of Ecology
Natural History of
Vertebrates
Aerial Photo
Interpretation
Elements of Forest and
Range Management
Principles of Wildlife
Conservation

Fourth Semester

Wildlife Management
Wildlife Law Enforcement
and Public Relations
Elements of Social Science
Wildlife Field and Lab,
Techniques
Outdoor Recreation

Final Extended Field Trip-Regional Wildlife
Management Practice. Three weeks of con-
centrated field observation at the close
of the second year, at 40 hours per week.

Source: Soles, "Natural Resources Technologies. A Sug-
gested Post High School Program Development
Guide." Penn. State University, 1973, p. 52.

Figure 3. Soles' Model for Wildlife Technology

Summary

Two-year college environmental programs came about at the end of
the 1960's and early 1970's in response to national reports predicting
an increasing need for technicians in environmental occupations. A
number of colleges initiated training programs in a variety of areas.

Recently, some authors have expressed a feeling that colleges may have gotten "bandwagon" fever and graduated many people trained for jobs which never materialized.

Language has been a major problem with a tremendous number of diverse jobs categorized under the umbrella term of "environmental occupations." Some attempts have been made to develop a uniform nomenclature. The 1970 Community College Environmental Ecological Technician Education Workshop indentified four clusters of environmental jobs, with the one designated Resource Conservation Technology of most interest to this report.

Literature concerning resource conservation technicians indicates employment possibilities are generally poor. Because there is a low percentage of bachelor degree graduates finding jobs related to wildlife management, it is likely they are in competition for jobs with two-year college graduates. Furthermore, this surplus of professionally trained persons is likely to result in minimum job qualifications being raised.

In contrast, popular career literature concerning technicians in wildlife conservation indicate job opportunities are very good. Some job competencies and position titles are identified. In a study conducted by Tillman (1972) the exact role and responsibilities of natural resource technicians was found to be vague due to the newness of the position.

Minimum standards have been identified for curriculum in technician training. However, curriculum for environmental occupations was practically non-existent before 1970 and has necessarily undergone a few growing pains. Two curriculum models, Natural Resource Technology (Tillman, 1972) and Wildlife Technology (Soles, 1973), are presented.

CHAPTER III

METHODOLOGY

The purpose of this study was to determine the status of wildlife conservation education in two-year colleges with regard to the number of individual courses and complete degree programs being offered, the number of students graduating, and the types of jobs obtained by graduates. To achieve this purpose four steps were followed: (1) subjects were selected by compiling a list of two-year colleges offering programs in wildlife conservation or related majors; (2) a technique for gathering data from the colleges was devised; (3) the data was collected and analyzed; and (4) the results were reported.

Selection of Subjects

Six sources were used to compile a listing of two-year colleges with programs related to wildlife conservation. The reason several sources were used was due to the apparent lack of comprehensiveness of any one publication. While some colleges were named in all six, each source contained some additional colleges. The sources were:

1. Directory of Postsecondary Schools with Occupational Programs (Kay, 1977).
2. 1976 Directory of Two-Year Post Secondary Education in Agriculture, Agribusiness, Natural Resources, and Environmental Occupations (Erpelding, 1976).
(See Appendix A for more information.)
3. Associate Degrees and Other Formal Awards Below the Baccalaureate 1971-72 (Baker and Wells, 1975).

4. "SAF-Recognized Forest Technician Schools in the United States and Canada" (Society of American Foresters).
5. Technical Education Yearbook (Prakken Publications, Inc., 1975-76).
6. College Blue Book, Degrees Offered by College and Subject (1977).

An objective of this study was to determine the number of degree programs being offered in two-year colleges, as well as the extent of wildlife courses being taught in related majors. Each college that appeared under one or more of these program areas was included: agricultural resources, conservation, forestry-related, natural resources, and wildlife-related. (An exception to this was colleges with only natural resource or wildlife programs were taken from the 1976 Directory of Two-Year Post Secondary Education, Erpelding, 1976. See Appendix A for more details.) A total of 266 were found. Because of the time and expense involved, no attempt was made to include those programs listed under "environmental" titles. While some of these may include wildlife courses, usually they are oriented more towards air and water pollution control.

Data Gathering Instrument

A questionnaire was initially considered as a means of gathering information about the status of wildlife conservation education in two-year colleges. However, the response rate of mailed questionnaires is often low. According to Travers (1969), the expected return rate is 20 percent even under favorable conditions.

Since this research involved a comparison of curricula, a better approach appeared to be simply sending a letter to each college requesting catalogs and asking direct questions about the number of graduates and types of jobs they obtain. A somewhat similar approach

was used by Robertson (1970) in his research on evaluation of electro-mechanical technology curricula. He sent a letter requesting program details to schools identified as having courses in electro-mechanical technology. This was very successful. Catalogs and pamphlets were received from every school except those which responded that they did not offer such courses.

With this in mind, a letter requesting information was prepared with the cooperation of a high school senior. Since this senior was in the process of collecting career information and choosing a college, he was interested in participating in this study. With permission, his name and address were used on handwritten letters which were sent to the Admissions Office of the selected colleges. In addition to requesting a catalog, the letter asked the following specific questions: (1) does your college give an associate degree in wildlife conservation; (2) what types of jobs have graduates of your program gotten; (3) how many graduated last year; (4) how many got jobs working with wildlife; and (5) the name of a person who could act as an advisor. A copy of the letter appears in Appendix B.

Because of the time involved preparing handwritten letters, a second method was employed to contact some colleges. These were colleges listed in either or both the Technical Education Yearbook or College Blue Book as having a forestry-related program. However, these colleges were not listed in any of the other four sources as having forestry or any of the majors of interest to this study. The information desired about forestry programs was whether they contained courses in wildlife conservation. Therefore, these colleges were contacted by form letters on letterhead stationery. The form letters

were addressed to the Director of the Forestry Department and requested a copy of their forestry curriculum. An example of this letter appears in Appendix B.

Collection and Analysis of Data

The handwritten letters were prepared with the assistance of department personnel and mailed during the first two weeks of December, 1977. These letters were sent to 188 of the 266 colleges. During the third week of December, the form letters were sent to the remaining 78 colleges. Only those responses arriving before March 20, 1978, were included in the study.

The Statistical Package for the Social Sciences (Klecka et al., 1975) computer program was used for analysis of the data.

The literature and answering letters received from colleges were reviewed and summarized as follows:

1. The number of colleges with programs in wildlife conservation was reported.
2. Programs in related majors were reviewed with regard to whether they contain wildlife courses.
3. For the colleges which received the handwritten letter, responses to the following inquiries are reported:
 - a. What types of jobs graduates have gotten.
 - b. Number of students that graduated last year.
 - c. Number of graduates placed in wildlife related jobs.
 - d. The name of an advisor who could provide more information.
4. For those colleges which offer associate degrees in wildlife conservation, their programs were analyzed with regard to the portion of technical content and

requirements for work experience, summer camp or individual research projects.

Limitations

The reliability of these analyses were influenced by certain factors. Course titles and descriptions as stated in catalogs may not represent what is taught. And the possibility exists that the course may not actually be taught.

Information provided in the answering literature may be somewhat exaggerated as a result of a college wishing to attract a potential student.

Categorizing courses as to technical, related, or general education must be done according to the discretion of the researcher. In practice, better knowledge of actual content may lead to categorizing some courses differently.

Finally, while the number of college directories reviewed and the total colleges contacted was extensive, there are still other colleges which may offer wildlife courses under such programs as biology, range management, parks and recreation, and other titles.

CHAPTER IV

RESULTS AND ANALYSIS

The purpose of this study was to determine the status of wildlife conservation education in two-year colleges with regard to the number of individual courses and complete degree programs being offered, the number of students graduating, and the types of jobs obtained by graduates.

Six directories of schools with two-year postsecondary programs were used to generate a list of 266 colleges with majors in wildlife conservation or related majors of agricultural resources, conservation, forestry and natural resources. Through the cooperation of a high school senior, handwritten letters expressing an interest in the study of wildlife conservation were sent to 188 of the colleges. The letters were addressed to the Director of Admissions and asked very specific questions. Form letters on letterhead paper and signed by the author were sent to 78 colleges. This letter was addressed to Directors of Forestry Departments and asked for information on their programs.

Results

Considerable discrepancies were found among the six directories. Table I shows the total number of schools found in each source and the number of schools common to each pair of sources. It must be kept

TABLE I

NUMBER OF SCHOOLS LISTED IN THE SIX DIRECTORIES USED
TO COMPILE MAILING LIST AND NUMBER OF
SCHOOLS COMMON TO EACH PAIR

	Source 1	Source 2	Source 3	Source 4	Source 5	Source 6
Source 1	<u>128</u>	38	78	46	70	70
Source 2		<u>48</u>	28	14	38	34
Source 3			<u>98</u>	39	55	56
Source 4				<u>48</u>	39	37
Source 5					<u>121</u>	65
Source 6						<u>146</u>

Source 1: Directory of Postsecondary Schools with Occupational Programs, 1975-76.

Source 2: 1976 Directory of Two-Year Programs in Postsecondary Education in Agriculture, Agribusiness, Natural Resources, and Environmental Occupations.

Source 3: Associate Degrees and Other Formal Awards Below the Baccalaureate 1971-72.

Source 4: "SAF-Recognized Forest Technician Schools".

Source 5: Technical Education Yearbook 1975-76.

Source 6: College Blue Book, Degrees Offered by College and Subject.

in mind that most of these sources contained many more colleges than were included in the study, but only those colleges shown with majors of interest to this study were selected. Furthermore, only colleges with natural resource and wildlife conservation programs were taken from the Directory of Two-Year Post Secondary Education in Agriculture, Agribusiness, Natural Resources and Environmental Occupations. It was not possible to include colleges with forestry-related majors because the complete publication was unavailable. (See Appendix A.)

Even with these considerations, it is surprising that none of the larger directories contained all the schools listed in any of the other sources for these particular majors (Table I). A point which is not shown in Table I is that only 10 colleges were common to all six sources.

The bulk of responses arrived in December and January. Responses arriving after March 20, 1978 were not included in the study. Two hundred and sixteen of the 266 colleges contacted sent some kind of response, making a return rate of 81.2 percent. Of the 188 handwritten letters, 172 or 91.5 percent were answered. Of the 78 form letters, 44 or 56.4 percent were answered. Forty-three states were represented.

Responses from 12 colleges were such that it could not be determined whether they had a wildlife conservation program. These were either a form letter stating no out of state students were accepted or a request for payment for a catalog. This reduced the number of usable responses to 204. A direct request for payment for catalogs came from 22 colleges, but 19 of these enclosed additional information, usually in the form of a brochure. The average payment requested was \$1.21. Unless additional literature was enclosed with

the request for payment, no information was obtained from these colleges.

The type of literature received from colleges responding to the handwritten letter was grouped into five categories as follows: 93 colleges sent personal letters, 37 sent form letters, 109 sent one or more brochures, 84 sent application forms, and 76 colleges sent catalogs. These five categories came in a number of combinations ranging from a short form letter to complete packets of information. Appendix C contains a more detailed break-down of these combinations.

The form letter was sent to 78 schools listed as having forestry programs in one or two directories, but were not shown as having such a program in any of the other four directories. The 44 responses from these revealed that 36 did, in fact, have a forestry program. Thirteen of these were mainly general education for transfer to a four-year program. And an additional four were not two-year programs, but turned out to be vocational high schools or short-term occupational training.

Responses to the form letter also revealed the existence of three programs in wildlife conservation which were not included in any other source. Two of these programs were transfer oriented, the other occupationally oriented.

Colleges with Programs in Wildlife Conservation

Of the 204 useable responses, it was determined that 44 colleges had some type of program in wildlife conservation. See Table II for descriptions of the programs.

TABLE II
 NUMBER OF COLLEGES WITH PROGRAMS IN WILDLIFE
 CONSERVATION AND TYPE OF PROGRAM

Type of Program	Number of Colleges
<u>Transfer Oriented</u>	
Curriculum Contains all General Education Courses	23
Curriculum Contains a Single Course in Wildlife Conservation	3
<u>Occupationally Oriented</u>	
Approximately 50% or More of the Program is Made up of Technical Courses or Closely-related Courses	10
Technical or Closely-related Courses Make up Less than 50% of the Curriculum	5
A one-year certificate program with at Least 50% Technical Content (Option Exists for Fullfilling requirements for Associate Degree)	1
<u>Other</u>	
Unable to Determine Program Orientation Because Literature Received Contained Little Information	<u>2</u>
Total	44

Much variation was found in the manner in which colleges with wildlife conservation programs were reported in the sources used to compile the mailing list. More colleges were generally reported in the sources as having programs in this area than were found to actually have wildlife conservation. In addition, colleges with programs sometimes appeared under several majors other than wildlife, such as

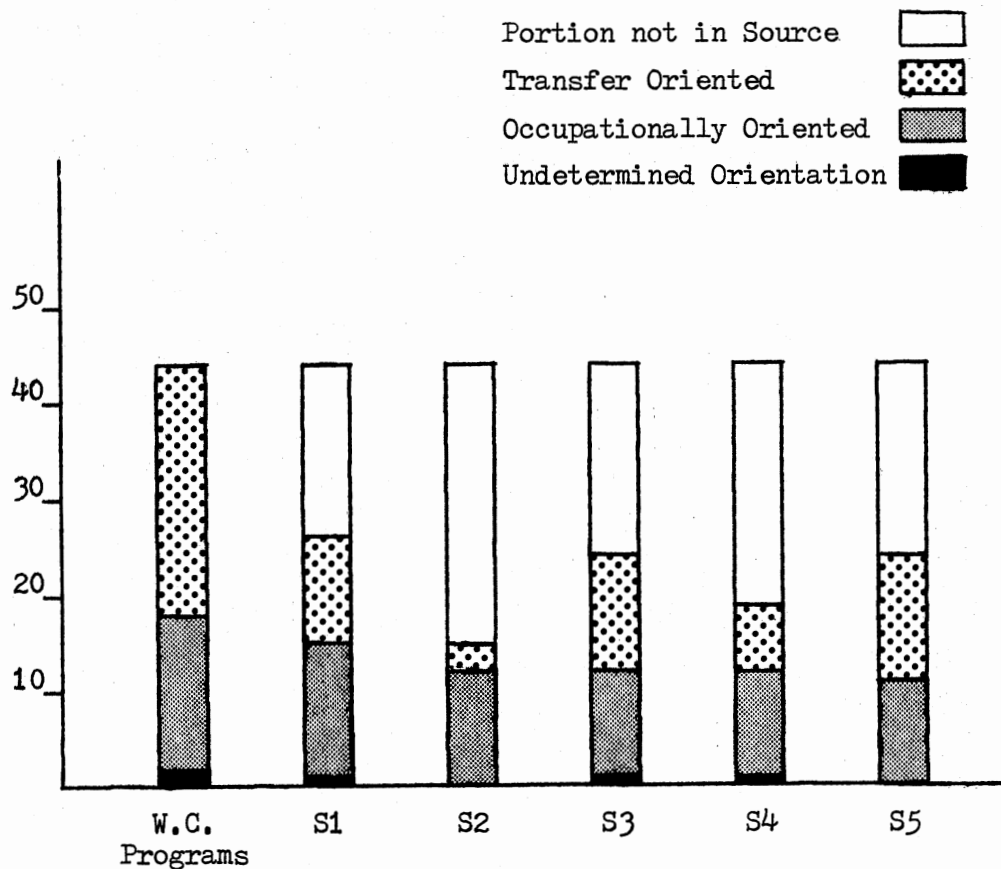
natural resources, conservation technology or forestry. The Technical Education Yearbook 1975-76 was an example of this. Colleges were selected in two areas from this source; (1) forestry and (2) natural resources management and conservation. None of the 44 colleges with wildlife conservation programs appeared under the second major, but 19 were listed under forestry. All of these 19 had both forestry and wildlife conservation programs. This leads to the question of whether this source regularly reports wildlife conservation under forestry majors, or whether it does not attempt to list it at all.

The 44 colleges with programs in wildlife conservation were found among the colleges listed in one or more of the sources as having programs in agricultural resources, conservation, forestry, natural resources and wildlife conservation. It was found that not one source included all 44 of these among the colleges it listed under these majors. However, for the 16 colleges with occupationally oriented programs, the majority appeared in almost all the sources. Figure 4 illustrates the portion of the 44 colleges with wildlife conservation programs appearing in each source.

Responses to Questions Asked in Handwritten Letter

Few colleges responded completely to the questions asked in the handwritten letter. Table III shows the number of responses for each area. Included here are colleges which sent some type of information relating to the question, even though it may have been very general in nature.

For the question about what types of jobs are obtained by graduates, responses were quite variable. Because of the methodology used, these



- W.C. Programs: 44 Total - 26 Transfer Oriented, 16 Occupationally Oriented, and 2 of Undetermined Orientation
- S1: Directory of Postsecondary Schools with Occupational Programs.
- S2: 1976 Directory of Two Year Post Secondary Education in Agriculture, Agribusiness, Natural Resources and Environmental Occupations
- S3: Associate Degrees and Other Formal Awards Below the Baccalaureate 1971-72
- S4: Technical Education Yearbook 1976-76
- S5: College Blue Book 1977

Figure 4: Portion of the 44 Colleges with Wildlife Conservation Programs Listed in Five Directories¹

¹The sixth source, "SAF Recognized Forest Technician Schools", was not used to locate majors in wildlife conservation but to determine the number of wildlife courses given in related majors. However, this source contained 11 of the colleges which had wildlife programs.

TABLE III

NUMBER OF RESPONDENTS SENDING SOME INFORMATION RELATING
TO QUESTIONS IN HANDWRITTEN LETTER

Questions Asked:	Information was Provided By:		
	<u>Letter</u>	<u>Brochure or Fact Sheet</u>	<u>Catalog</u>
1. What types of jobs have graduates of your program gotten.			
Wildlife-related majors	7	4	1
Natural resources/conservation	6	9	2
Forestry-related majors	4	14	3
2. Number of students graduating last year.			
Wildlife-related majors	5*	2	
Natural resources/conservation	4	3	
Forestry-related majors	0	1	
3. Number of graduates obtaining jobs in wildlife.			
Wildlife-related majors	8	2	
Natural resources/conservation**	6	4	
Forestry-related majors**	3	1	
4. Name of an advisor who could provide more information.	37		

* Includes one respondent that gave the number of students who transferred to a four-year school.

** The respondents gave placement figures for these particular majors, not for the wildlife area.

Two additional institutions supplied placement information that was not applicable to the above - one was for an Agribusiness major and the other was for graduates of a vocational-technical high school forestry program.

responses were impossible to quantify. However, they do provide an indication of job opportunities available to graduates of wildlife conservation programs. Portions of two representative responses appear below. Appendix D contains the remaining responses which were considered informative.

The job situation is difficult all over the country right now. We did have 2 of our people get jobs with the state. The jobs are usually assisting a wildlife or fisheries biologist in the field. Your chances of a job are enhanced by more education although the state is starting a new job category for 2 year grads. It will be called a Wildlife Conservation Aid.

Letter from an Instructor of Biology and Wildlife.

In the past, our graduates have been employed as game wardens, technicians, refuge managers, and environmentalists, but there is so much competition from four year graduates today that most of our students transfer to complete Bachelor of Science Degrees. Approximately fifteen percent of our two year graduates are employed in wildlife-related jobs.

Letter from an Admissions Counselor.

Colleges with majors other than wildlife conservation also responded to the question about types of jobs obtained by graduates. It was found that for programs in natural resources or conservation, the job opportunities available overlapped those open to graduates of wildlife conservation programs. The following portions of letters are examples of information received relating to this question.

Employment opportunities for our graduates with the [state] Resources Department begin as a technician and includes advancement through competitive examination . . . Entry level with Federal Civil Service is at the GS-4 level with advancement procedures available. Employment opportunities with private industry and municipalities are increasing in the form of game farm managers, park managers, surveyor technicians, tree farm operators, wood product company workers, and county land managers.

From brochure on a Natural Resource Technology Program.

Concerning jobs, I'm afraid that the situation is rather bleak. Wildlife Management is the toughest area in all of Conservation to try and find a job. Last year, we

averaged one in sixteen graduates who found a job in Wildlife. The types of jobs our graduates have been placed in are as follows: Surveying technician, Forest Cruiser, Fire technician, Conservation officer, Game area manager, Wildlife technician, Lumber and timber buyer.

Letter from Admissions Counselor concerning a Natural Resource Technology Program.

A two-year degree program in Natural Resources Conservation will prepare students for a variety of paraprofessional employment opportunities, e.g., wildlife and fishery technicians, land managers, rangers, park and outdoor recreation technicians, nature center directors, naturalists, general environmental technicians, soil conservation technicians, outdoor recreation specialists and general natural resources conservation technicians.

Catalog description of Natural Resources Conservation Program.

Responses to the questions about number of graduates and number finding jobs are presented in Tables IV and V. Table IV contains information from colleges with programs in wildlife conservation and Table V has information about related majors. Due to the methodology used, it was difficult to summarize this data. However, the number of students graduating from wildlife conservation programs ranged from 6 to 37 and the percentage finding wildlife-related job was generally quite low. The information from related majors shows the number of graduates from these programs ranged from 1 to 80 and that employment opportunities are somewhat better.

Thirty-seven colleges responded to the request for the name of an advisor who could provide more information. Seventeen of these came from colleges with wildlife programs. Most of the letters (27) answering this question came from an admissions officer or counselor, and 10 came directly from departments of instruction.

TABLE IV
 RESPONSES TO QUESTIONS ABOUT NUMBER OF GRADUATES AND
 NUMBER FINDING JOBS RELATED TO TRAINING
 FOR WILDLIFE CONSERVATION

Name of Program	Number of Graduates	Number Obtaining Jobs Related to Training
Wildlife Technician	-----	Letter reports two people got jobs with the state.
Wildlife Technology	Approx. 35	"I must admit to you that the number getting jobs with wildlife has been extremely small. This is a very difficult area in which to secure employment here in the southeast." Letter from Professor of Forestry.
Fisheries & Wildlife	-----	"In a recent survey of our 1977 alumni graduating in wildlife science, two of the five respondents landed jobs working in their area." Letter from Admissions Officer.
Wildlife Technology	6	1 (17%) employed in field.
Fisheries & Wildlife Technology	For Class of 1976, there were 37 graduates	Based on Class of 1976: 4 (11%) employed in field at an average salary of \$6546 24 (64%) employed outside of field or transferred for further study, etc. 9 (24%) status unknown
Fish & Wildlife Management	For 1976, there were 25 graduates	1 (4%) employed in field 14 (56%) employed outside of field, transferred for further study, etc. 10 (40%) status unknown
Wildlife Management	-----	Approximately 15% of the graduates are employed in field.

TABLE IV (CONTINUED)

Name of Program	Number of Graduates	Number Obtaining Jobs Related to Training
Wildlife Conservation	Program is mainly for transfer, 3 or 4 students transferred last year.	-----
Forestry/ Wildlife Technology	33	"Our latest Job Placement Survey shows that 80 percent of those graduates are employed in their field of education, or closely related areas. Job opportunities in Forestry Management have been greater than in Wildlife Technology." Letter from College Counselor.
Fish & Game	15 graduates - this program emphasizes fisheries and it is possible most of these are in this area.	5 (33%) got technician jobs starting at \$9,000 to \$10,000 5 (33%) transferred to a university in fisheries 5 (33%) took non-conservation jobs

TABLE V
 RESPONSES TO QUESTIONS ABOUT NUMBER OF GRADUATES AND
 NUMBER FINDING JOBS RELATED TO TRAINING
 FOR RELATED MAJORS

Name of Program	Number of Graduates	Number Obtaining Jobs Related to Training
Recreational Land Management	1 to 5 people per year graduate	-----
Forestry	3 to 10 people per year graduate	-----
Forest and Park Technology	-----	Approximately 70% get jobs. Usually employed seasonally 2 to 4 years before getting permanent jobs.
Forestry Technology	-----	100% placement over the past five years.
Natural Resources Technology	-----	"Wildlife management is the toughest area in all of conservation to try and find a job. Last year we averaged one in sixteen graduates who found a job in wildlife." Letter from Admissions Counselor.
Natural Resources Technology	23	6 (26%) employed in field (3 permanent, 3 seasonal) 12 (52%) employed outside of field, transferred for further study, etc. 5 (22%) status unknown
Forest Technology	-----	75-80% placement
Natural Resource Technician	22	20 (91%) employed in field 2 (9%) employed outside of field, unemployed

TABLE V (CONTINUED)

Name of Program	Number of Graduates	Number Obtaining Jobs Related to Training
Natural Resources Conservation	22 graduated (in the 3 options of Conservation, Parks and Recreation, and Biological Laboratory Technician.)	45-50% of the people majoring in Conservation were employed in the field. "The number of students who specifically wanted a job in wildlife and received it was about 5%." Letter from member of Natural Resources Department.
Natural Resources Technology	-----	Data for last 3 graduating classes: 80% employed in related or closely related field (includes temporary jobs) 20% employed out of field or continued training.
Natural Resources Conservation	80	"Of the eighty (80) students who graduated last year, there was only one individual who might be considered involved with wildlife since our program does not specifically train for that field." Letter from Director of Admissions.
Natural Resources Conservation	-----	70% employed in field.
Natural Resources Conservation	15 graduated in 1976	6 (40%) employed in field at an average salary of \$7228 9 (60%) employed outside of field, transferred for further study or unemployed.
Forest Management	46 graduated in 1976	17 (37%) employed in field 17 (37%) employed outside of field, transferred for further study, etc. 12 (26%) status unknown

TABLE V (CONTINUED)

Name of Program	Number of Graduates	Number Obtaining Jobs Related to Training
Park Management	-----	8 employed in field
Conservation Technology	41 graduated in 1976	16 (39%) employed in field at a monthly salary of \$658.75 ave. 22 (54%) employed outside of field, seeking employment, etc. 3 (7%) status unknown.

Comparison of Wildlife Conservation Curricula

There were 15 colleges found to have occupationally oriented associate degree programs in wildlife conservation. One additional college was found to have a one-year certificate program. These programs were reviewed with regard to recommendations for technical curricula outlined in the previous chapter. Roney (1966) proposed that technical courses should be introduced in the first year, the curriculum consist of at least 50 percent technical or closely related courses, and provision be made for an individualized problems course. Tillman (1972) proposed a cooperative work study experience and Soles (1973) advocated on-the-job work experience during the summer.

It was found that of the 16 colleges with occupationally oriented programs, 11 had curricula consisting of approximately 50 percent or more technical or closely related courses. Five had curricula with technical content decidedly less than 50 percent.

Twelve of the programs included courses of a technical nature in the initial part of the program. One program which emphasized fisheries management did not have a course considered pertinent to wildlife in the first year. Another college which did not have such a course in the first year offered a program designed mainly to provide the second year of technical content to students who had received the first year of general education requirements at another college. The remaining two colleges sent only a listing of courses with no indication of course sequence. Therefore, it could not be ascertained whether the first year's study included technical content.

It was determined from the literature received that field experience was provided in a variety of ways. Ten of the 16 programs had information on this topic. Five programs included a term of work experience, also called summer internship and coordinated work experience. Three of these appeared to be optional, and two an integral part of the program. Another program incorporated a summer camp to teach field techniques, procedures and equipment usage. Individual problems study were a part of at least two other curricula. Two colleges utilized extended field trips to provide experience.

Extent of Wildlife Conservation Courses

Being Taught in Related Majors

From the literature sent by respondents, it was determined that 117 colleges had forestry programs. An additional 14 gave some type of training in forestry, but were not two-year college programs, i.e., they were short-term occupational training programs, vocational high schools or four-year colleges.

Of the 117 colleges with forestry, 38 had programs consisting mainly of basic general education courses for transfer to four-year colleges. Literature from another 23 indicated they had forestry but not enough information was received to determine curricula content.

This left 56 colleges with known occupationally oriented programs. It was found that 23 (41%) had one or two wildlife conservation courses as part of their curricula. Another seven (13%) included a course which covered wildlife conservation, plus other topics, such as Natural Resources or Forest Wildlife and Recreation Management. Twenty-six colleges (46%) apparently have no wildlife conservation courses in their curricula. Such a course may have been available as an elective, but no mention was made of it in the program description.

With regard to colleges with technical programs recognized by the Society of American Foresters, it was determined that 16 of the 44 respondents had one or two wildlife courses in their programs. Six others had a course which included wildlife conservation, plus other topics. Seven had no wildlife in their curricula and 15 did not send enough information to be able to determine curricula content.

After forestry, the major reported most often was natural resources which was offered at 21 colleges. Three of these programs were preparation for transfer, and not enough information was received from three others to determine their curricula content. Descriptions of 12 natural resource programs indicated they provided training for wildlife-related careers such as wildlife technician or game manager. The remaining three programs made no mention of employment in wildlife, but did incorporate one or two courses on this subject.

An analysis was made of the curricula of the twelve programs which mentioned wildlife as a career option for graduates. A review of the curricula models proposed by Soles (1973) and Tillman (1972) revealed that both had six subject areas in common, in addition to wildlife conservation and general education courses. These six were: ecology, surveying, forestry, soil science, air photo interpretation and technical drawing or drafting. When these twelve natural resource programs were analyzed, nine were found to contain courses in at least four of these subjects.

Two other programs were found which specifically mentioned careers in wildlife as employment options for graduates. Conservation technology was the title of one and the other was agricultural resources. In contrast to these, two programs were found titled conservation and another in agricultural resources which contained one or two courses in wildlife, but did not train for wildlife-related jobs.

A summary of the majors which train for wildlife-related employment is contained in Table VI, along with the number of wildlife courses in each program and whether they contain courses in the technical areas identified by Soles (1973) and Tillman (1972).

In addition to the majors mentioned above, wildlife conservation courses were found to occur in the curricula of a variety of other majors. One or two courses were taught in majors with the following titles: Agriculture, Life Science, Biology, Park Management, Recreational Land Management, Recreation-Conservation Technology, Parks and Recreation Technology, Rural Recreation Technology and Park Technology.

TABLE VI
 RELATED MAJORS WHICH INCLUDED TRAINING
 FOR WILDLIFE-RELATED CAREERS

Name of Program	No.	No. of Wildlife Courses	Included at Least 4 of the 6 Recommended Technical Subjects*	Had Less Than 4 of the Recommended Technical Subjects
Agricultural Resources	1	1		X
Conservation Technology	1	1	X	
Natural Resources	1	0	X	
Natural Resources	2	1		X
Natural Resources	4	1	X	
Natural Resources	4	2	X	
Natural Resources	1	3		X

* Six subjects common to both curriculum models proposed by Soles (1973) and Tillman (1972): ecology, surveying, forestry, soil science, air photo interpretation and technical drawing (or drafting or cartography).

CHAPTER V

SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Summary of Findings

The purpose of this study was to determine the status of wildlife conservation education in two-year colleges with regard to the number of degree programs being offered, the number of students graduating from these programs, the percentage obtaining jobs in wildlife, the types of jobs available, and the extent to which courses in wildlife conservation are being taught in related majors.

The late 1960's and early 1970's saw numerous two-year colleges initiating environmental occupational programs in response to popular interest and projected manpower demands. However, the extent of wildlife conservation education at the two-year college level was unknown.

To gather information on this subject, a mailing list was compiled of colleges with majors in wildlife conservation or the related majors of agricultural resources, conservation, forestry and natural resources. Six sources were used to generate a list of 266 colleges. A hand-written letter, prepared with the cooperation of a high school senior and expressing interest in studying wildlife conservation, was sent to 188 of the colleges. This letter was addressed to the Director of Admissions and requested very specific information about the types of jobs obtained by graduates, the number of students graduated last

year, the number which found jobs in wildlife, and the name of an advisor who could provide more information.

The remaining 78 colleges were listed in one or two sources as having a program in forestry. When these colleges were checked in the other directories, there was no indication they had such a program. Therefore, due to the time involved in preparing handwritten letters, a form letter on letterhead stationery was sent to these colleges addressed to the Directors of Forestry and asking for information on their programs.

Responses were received from 216 of the 266 colleges contacted, making a return rate of 81.2 percent. Forty-three states were represented. Of the 188 handwritten letters, 172 or 91.5 percent were answered. Of the 78 form letters, 44 or 56.4 percent were answered. Responses from 12 colleges were such that it could not be determined whether they had a wildlife conservation program. This reduced the number of useable responses to 204.

The type of literature received from colleges responding to the handwritten letter was grouped into five categories as follows: 93 colleges sent personal letters, 37 sent form letters, 109 sent one or more brochures or enclosures, 84 sent application forms and 76 colleges sent catalogs. These five categories came in a number of combinations ranging from short form letters to complete packets of information.

Of the 44 colleges which responded to the form letter, it was found that 36 did, in fact, have some type of forestry program.

Considerable discrepancies were found among the six sources used to compile the list of colleges with majors of interest. While each

source contained a portion of the colleges listed in the other sources, no directory contained all the colleges listed in any of the other sources for these particular majors. Only 10 colleges were common to all six.

Of the 204 useable responses, it was determined that 44 colleges had programs in wildlife conservation. Twenty-six of these were transfer oriented, 16 were occupationally oriented and two were of undetermined orientation due to limited information received.

Much variation was found in the manner in which colleges with wildlife conservation programs were reported in the sources. More colleges were generally reported in the sources as having programs in this area than were found to actually have them. In addition, colleges with programs sometimes appeared under several majors other than wildlife, such as natural resources, conservation technology or forestry. Not one source listed all 44 of the colleges found to have wildlife programs under the majors selected for the study. However, the majority of the 16 colleges with occupationally oriented programs appeared in almost all the sources.

Few respondents to the handwritten letter completely answered the questions it contained. Because of this methodology, the responses received were too variable to be accurately quantified. However, they did give an indication of the status of wildlife conservation programs.

Responses to the question concerning the types of jobs obtained by graduates indicated employment opportunities ranged from wildlife biologist aid, to game warden and game managers. In addition, a number of the respondents frankly indicated that graduates faced considerable difficulty in finding jobs in wildlife.

Seven respondents provided information on the number of students graduating wildlife conservation. The number ranged from 6 to 37 students and was based on data from 1976 or 1977. The percentage of graduates finding wildlife-related jobs was generally very low.

This information was also supplied by some colleges with the related programs of forestry, conservation or natural resources. The number of graduates from these programs ranged from 1 to 80 and employment opportunities appeared somewhat better.

Thirty-seven colleges responded to the request for the name of an advisor who could provide more information. Seventeen of these came from colleges with wildlife programs. Most of the letters (27) answering this question came from an admissions officer or counselor, and 10 came directly from departments of instruction.

The curricula of the 16 colleges found to have occupationally oriented programs were analyzed with regard to the recommendations for technical curricula made by Roney (1966) and for wildlife and natural resources curricula proposed by Soles (1973) and Tillman (1972). It was found that of the 16 colleges, 11 had curricula consisting of approximately 50 percent or more technical or closely related courses. Five had curricula with technical content decidedly less than 50 percent.

Twelve of the programs included courses of a technical nature in the initial part of the program. With regard to the provision for work experience, ten of the 16 programs had information on this area. Five programs included a term of work experience, also called summer internship and coordinated work experience. Three of these appeared to be optional, and two an integral part of the program. Another program incorporated a summer camp to teach field techniques, procedures and

equipment usage. Individual problems study was a part of at least two other curricula. Two colleges utilized extended field trips to provide experience.

The final area covered by this study was a review of the extent wildlife conservation courses were being taught in related majors. Forestry was found to be offered at 177 colleges, with 38 of these programs being mainly for transfer and 23 of undetermined orientation due to lack of information.

Of the remaining 56 colleges with known occupationally oriented programs, 41 percent were found to have one or two wildlife conservation courses as part of their curricula. Another 13 percent included a course which covered wildlife, plus other topics.

After forestry, the major reported most often was natural resources which was offered at 21 colleges. The programs at three of these were mainly for transfer, and not enough information was received from another three to determine curricula content. The remaining 15 were found to have incorporated one to three wildlife courses into their curricula. Twelve of these mentioned wildlife-related employment as an option for their graduates.

Two other programs which specifically mentioned careers in wildlife as an option for graduates were agricultural resources and conservation technology. Altogether 14 programs were found which indicated they trained for wildlife-related jobs. Ten of these were found to contain at least 4 of the 6 technical subjects recommended by both Soles (1973) and Tillman (1972).

A variety of other majors were found which incorporated wildlife

conservation courses. They included agriculture, life science, biology, and a number of others in the area of park and recreation technology.

Conclusions

A number of two-year associate degree programs in wildlife conservation are available to persons interested in pursuing education in this area. In addition, many courses in wildlife conservation are offered in a variety of other majors which is probably an indication of high student interest in this subject.

Potential students of wildlife conservation would encounter difficulty in locating wildlife programs through traditional college directories. Colleges with programs were found to be listed under wildlife conservation, as well as conservation technology, forestry and natural resources.

The small number of complete responses to the questions asked in the handwritten letter also indicates potential students would have difficulty making informed choices about programs even after such programs were located. However, those respondents which did provide information on the types of jobs obtained by graduates generally appeared extremely forthright. They indicated that because this is a popular field, competition is keen for jobs. The types of jobs obtained by graduates were similar to those described in the literature for the technician level.

The occupationally oriented wildlife conservation programs generally met recommended standards for technical education. A list of 11 colleges found to have programs consisting of approximately 50 percent or more of technical subjects appears in Appendix E. This

list is based on responses to the letters and is not meant to be comprehensive. No doubt programs exist at colleges which did not respond to the letters or were not listed under any of the majors selected from the sources. In addition to these, it was found that some programs titled conservation technology, agricultural resources, and natural resources offer wildlife conservation courses and many of the technical courses recommended for wildlife curricula.

Recommendations

Based on the findings in this study, the following recommendations are made in regard to wildlife conservation education in two-year colleges.

1. Colleges should be aware of the limited employment opportunities available to two-year graduates and should advise students of this situation.
2. Persons interested in studying wildlife conservation are advised to consult several college directories to locate programs. Colleges which appear in two or three sources are more likely to have an occupationally oriented program than those which appear in only one source. Related majors, such as conservation technology and natural resources, should also be given consideration.
3. For persons interested in pursuing a two-year program in wildlife conservation, even in light of few job opportunities, a listing of colleges with such programs should be available. It is recommended that the list of colleges found in this study be published as a starting point.

As other programs are found, they should be reviewed for technical content and added to this list. A possible organization for distribution of this information is The Wildlife Society.

4. A study using similar methodology should be made of another technical area to determine if college directories are as unreliable in listing programs as was found for this area. An objective of that study should be to determine whether the problem lies in colleges over-reporting what programs they offer or whether their reports are misinterpreted by the directory compilers.
5. Employers in the wildlife conservation field should make an attempt to define the competencies and educational background required for all levels of positions. This may help to reduce the competition and confusion over "technician" positions. At least one state has created a job category especially for two-year graduates called Wildlife Conservation Aide. It is recommended that "Aide" be adopted to describe all positions for two-year graduates and "Technician" be reserved for four-year college graduates. Titles and descriptions of two-year college programs should also be brought in line with this terminology. This recommendation for the use of technician and aide applies only to the wildlife conservation field.

6. Professionals and employers in the wildlife conservation field should be made more aware of the objectives and training capabilities of two-year colleges.
7. A survey of employers should be made to determine their opinions in the following areas:
 - a. the type of practical experience considered most valuable - internships, cooperative work experience, summer camps or extended field trips.
 - b. whether the title of a program of study (i.e. wildlife conservation verses natural resources) has any influence on a graduate's chances of being considered for employment.
 - c. would certification of competency in individual skill areas serve to make a job applicant more attractive over an applicant with the traditional graduation qualifications.
8. An attempt should be made, either on a state by state basis or nation-wide, to estimate the average number of support personnel required per wildlife biologist. With this information, employers could readily estimate the number of technicians, aides, semi-skilled and unskilled workers needed in this area. This would also be helpful to colleges for planning training programs should the number of wildlife biologists in a certain region rise or fall due to economic or other conditions.

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APPENDIX A

EXPLANATION OF USE OF 1976 DIRECTORY OF TWO YEAR
PROGRAMS IN POSTSECONDARY EDUCATION

1976 Directory of Two Year Programs in Postsecondary Education in Agriculture, Agribusiness, Natural Resources, and Environmental Occupations. Larry H. Erpelding, Jr., Department of Health, Education and Welfare.

A complete copy of this publication was not available to the author when the mailing list was compiled. Only a typewritten list of selected colleges had been acquired through an acquaintance. This list was assumed to contain all the colleges with natural resource and wildlife-related majors included in the 1976 Directory. The list did not include programs in forestry or agricultural resources even though they undoubtedly appeared in the Directory.

A newer issue of this publication was finally obtained by writing first to its author's address, then to H. N. Hunsicker, Education Program Specialist, Agriculture, Agribusiness, Natural Resources, and Environmental Occupations. This copy of the directory contains titles of programs of study as well as the number of students in each program.

The citation for this issue is given here for the reader's information.

1977 Directory of Two Year Postsecondary Programs in Agriculture, Agribusiness, Natural Resources and Environmental Occupations. Compiled by Larry H. Erpelding, Jr. Distributed by Office of Education, Department of Health, Education and Welfare, Washington, D. C.

APPENDIX B

COPIES OF HANDWRITTEN LETTER AND FORM

LETTER SENT TO COLLEGES

Director, Office of Admissions

Dear Director:

I am a high school graduate and am very interested in studying wildlife conservation. Does your college give an associate degree in this area? Please send me a catalog and information about your program.

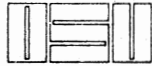
I would also like to know:

1. What specific types of jobs graduates of your program have gotten,
2. How many graduated last year from your program and how many got jobs working with wildlife, and
3. The name of a person who could act as my advisor in case I need more information.

Any help or information you can give me about studying wildlife or getting jobs in conservation would be greatly appreciated.

Sincerely,

Thomas T.



Oklahoma State University

SCHOOL OF OCCUPATIONAL AND ADULT EDUCATION

STILLWATER, OKLAHOMA 74074
CLASSROOM BUILDING, 406
(405) 624-6276

December 16, 1977

Director
Department of Forestry

Dear Director:

As part of my research, I am compiling a listing of two-year colleges with programs in forestry or wildlife conservation. According to various college directories, your college offers a program in forestry. Would you please send me a list of courses that make up your program or zerox this information from your catalog.

Your assistance in this research is greatly appreciated.
Thank you.

Sincerely,

Vicky Ramakka
Graduate Assistant

VFR/bh

APPENDIX C

REPLIES TO HANDWRITTEN LETTER

BY CATEGORIES* OF RESPONSE

No. of Colleges	Personal Letter	Form Letter	One or More Brochures	Application Form	Catalog
18	X		X		
17	X				
14	X		X	X	
14	X		X	X	X
13					X
12			X	X	X
11		X	X	X	
9			X	X	
8	X			X	X
8	X				X
8			X		
7		X	X		
5		X			
4	X		X		X
3				X	X
3		X	X	X	X
2			X		X

No. of Colleges	Personal Letter	Form Letter	One or More Brochures	Application Form	Catalog
2		X		X	X
2	X			X	
2	X	X	X		X
2	X	X		X	X
2	X	X	X	X	
2	X	X	X	X	X
1		X	X		X
Total: 93 37 109 84 76					
<u>3</u> Cards requesting payment for catalogs.					
172 Total Responses to 188 handwritten letters.					

* See below for composition of categories:

<u>Personal Letter</u>	<u>Number of Responses</u>
from admissions office	70
from department of instruction	12
from both admissions office and department	4
from admissions office indicating letter forwarded to department of instruction, but no response from department ever received	4
original handwritten letter returned with note	<u>3</u>
Total:	93
<u>Form Letter</u>	
from admissions office	32
from department of instruction	<u>5</u>
Total:	37

(When both a personal and a form letter were received, usually the form letter came from the admissions office with a follow-up personal letter from the department.)

Brochures General term used to cover any type of enclosure which did not fit into other categories.

Application Form In addition to the above, 7 respondents enclosed self-addressed post cards to return for ease of requesting forms.

Catalogs In addition to the above, 5 respondents indicated they would send a catalog but none were received, and another 22 made direct requests for payment before sending a catalog.

APPENDIX D

TYPES OF JOBS AVAILABLE FOR GRADUATES OF WILDLIFE

CONSERVATION PROGRAMS AND SELECTED COMMENTS

ABOUT EMPLOYMENT OPPORTUNITIES

Program: Wildlife Technology

"Our graduates are qualified to be a biologist aid, law enforcement personnel, and some have even secured jobs with forestry oriented organizations."

". . .I must admit to you that the number getting jobs with wildlife has been extremely small. This is a very difficult area in which to secure employment here in the southeast."

Letter from Professor of Forestry.

Program: Wildlife and Fisheries Technology

Letter from Admissions Office gives positions of three graduates: biological wildlife technician with the Department of Interior, keeper at a game shelter and employee of a municipal land use planning board.

Program: Wildlife

"We have former students working as technicians in the Soil Conservation Service and another in the Wildlife Administration. The job market . . .is highly competitive."

Letter from Director of Admissions.

Program: Fish and Wildlife - transfer program

"The Associate Degree will not make it possible for you to obtain work in Fish and Wildlife in the state. All of the biologists in the State Fish and Game Department have Masters Degrees. A Bachelors Degree is required for a warden's position. You should not plan to obtain a position in Fish and Wildlife work without a Bachelors Degree."

Letter from the Chairman of the Department of Sciences.

Program: Wildlife Conservation and Management - transfer program

"There is a demand for people who are well trained in Wildlife Conservation and Management. The state of . . . affords unusual opportunities for young people who are interested in these fascinating fields."

Letter from Director of Admissions.

Program: Fish and Wildlife Management

"Placement is primarily with State agencies, to a lesser extent with the Federal Government, and there is almost no opportunity with private agencies."

Letter from Director of Admissions.

Program: Fish and Wildlife Management

The college catalog indicates the curriculum is designed to train for positions at a technical level with federal and state agencies as well as private fish and wildlife related industries.

Program: Recreation and Wildlife Technology

"Job opportunities are good in the Rec. and Wildlife field if you are willing to relocate."

Letter from Admissions Director.

Additional literature indicates training is provided for positions as labor foreman, park ranger, park manager, wildlife area manager, game production foreman, game protector, or assistant naturalist. For those employed in the field, about 95 percent find jobs with public agencies such as the state Division of Wildlife, Division of Parks and Recreation, and metropolitan, federal or other states' park areas.

Program: Wildlife Technology

Most graduates obtain jobs outside of the state with other state and federal agencies.

"At the present time, the job outlook is not good because jobs are few in comparison to the number of qualified people seeking them. A well-qualified, dedicated, and determined individual can find employment in wildlife management or related natural resource fields."

From information sheet describing Wildlife Technology.

APPENDIX E

SELECTED LIST OF TWO-YEAR COLLEGES WITH
WILDLIFE CONSERVATION PROGRAMS

<u>College</u>	<u>Program Title</u>
College of the Siskiyous California	Natural Resources & Wildlife Management
Feather River College California	Wildlife Technician
Abraham Baldwin Agricultural College Georgia	Wildlife Technology
Unity College Maine	Wildlife & Fisheries Technology
S.U.N.Y. Agricultural & Technical College Cobleskill, New York	Fisheries & Wildlife Technology
Haywood Technical Institute North Carolina	Fish & Wildlife Management
Martin Technical Institute North Carolina	Fish & Wildlife Management
North Dakota State University Bottineau Branch, North Dakota	Wildlife & Ecology Technology
Hocking Technical College Ohio	Recreation & Wildlife Technology
Pennsylvania State University DuBois Campus, Pennsylvania	Wildlife Technology
Dabney S. Lancaster Community College Virginia	Wildlife Management

VITA 2

Valorie Frances Ramakka

Candidate for the Degree of

Master of Science

Thesis: STATUS OF WILDLIFE CONSERVATION EDUCATION IN SELECTED
TWO-YEAR COLLEGES

Major Field: Vocational-Technical and Career Education

Biographical:

Personal Data: Born in Watertown, New York, January 2, 1949,
the daughter of Harold and Evelyn C. Bovee.

Education: Graduated from Clayton Central High School, Clayton,
New York, in June, 1966; received a Bachelor of Science
degree in Conservation Education from Cornell University in
June, 1970; completed requirements for the Master of Science
degree, with a major in Vocational-Technical and Career
Education, at Oklahoma State University, Stillwater, Oklahoma,
in July, 1978.

Professional Experience: Junior High Science Teacher at Bangor,
Maine, 1970-71; Peace Corps Volunteer in Wildlife Biology,
Colombia, South America, 1972-74; YWCA Instructor of Macrame,
Newburyport, Massachusetts, 1974-76; Environmental Education
Specialist with Youth Conservation Corps, Parker River
National Wildlife Refuge, Massachusetts, Summer of 1976;
Graduate Assistant in the School of Occupational and Adult
Education, Oklahoma State University, 1976-78.

Professional Organizations: Member of Association of Interpretive
Naturalists, Oklahoma Adult and Continuing Education
Association, Oklahoma Community Education Association,
Phi Delta Kappa.