AN ABSTRACT OF THE THESIS OF

Stanley Addison Sprecher  for the M. S. in Education
(Name)  (Degree)  (Major)

Date Thesis presented  July 1941  

Title  A Study of Conservation Education as the Basis
Of a Unit in High School Biology for Oregon

Abstract Approved:  Redacted for privacy

(Major Professor)

The purpose of the thesis is to present a practical study
which will be of use to those interested in conservation education. To do this it was necessary to determine what has been
done and is being done by both educators and conservationists,
and to find out what they consider most desirable. Though divided into five chapters, the thesis has two major divisions: (1) the study which includes the survey, an analysis of text-books, correspondence and interviews, and library work; (2) the proposed source unit on Conservation for High School Biology which was developed in light of the trends indicated by the study.

Introductory material constituted the first chapter; in the second chapter the importance of giving consideration to attitude
building and to what psychologists and educators have contributed on the subject was indicated. Authoritative comments on the importance of conservation education were included in the chapter together with an analysis of biology texts as to their conservation content. The analysis revealed that writers of textbooks realize the importance of conservation of natural resources. Though the trend is not uniform, increased space is being given to conservation.

The results of the survey were tabulated in the third chapter
together with the comments of those answering the questionnaires.
A STUDY OF CONSERVATION EDUCATION AS A BASIS FOR A BIOLOGY UNIT FOR OREGON

by

STANLEY ADDISON SPRECHER

A THESIS submitted to the
OREGON STATE COLLEGE

in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

July 1941
APPROVED:

Redacted for privacy

Professor of Science Education

In Charge of Major

Redacted for privacy

Head of Department of Education

Redacted for privacy

Chairman of School Graduate Committee

Redacted for privacy

Chairman of College Graduate Council
ACKNOWLEDGEMENT

The writer wishes to express his sincere gratitude to Dr. E. N. Stevenson, who as major professor gave generously of his time in the guidance and supervision of this thesis. His helpful criticism and encouragement throughout the writing and preparation is greatly appreciated.

The writer also wishes to thank Mr. W. F. McCulloch and Mr. George Griffith for their helpful criticism and suggestions. Thanks must also go to those who cooperated in the survey and made the study possible.

S. A. S.
# TABLE OF CONTENTS

## CHAPTER I INTRODUCTION

- Statement of the Problem ........................................ 1
- Interest in the Study ............................................ 2
- Purpose of the Study ............................................ 3
- Method of Procedure ............................................. 4
- Limitations of the Study .......................................... 5

## CHAPTER II THE IMPORTANCE OF CONSERVATION EDUCATION

- Conservation as an Attitude .................................... 7
- The Need for Conservation Education ............................ 10
- Analysis of textbooks

## CHAPTER III A SURVEY OF CONSERVATION EDUCATION IN THE UNITED STATES AND IN SOME OF THE LARGE SCHOOLS IN OREGON

- Procedure of the Survey ......................................... 21
- Totaled Tabulations from Tables II and III ..................... 29
- Summary of Tables II and III ..................................... 31
- Totals of the Tabulation from Table IV .......................... 40
- Summary of the Results of Questionnaire to State Departments of Education .......................... 41
- Comments from the Survey ......................................... 44
- Summary of the Results of the Survey ............................ 50

## CHAPTER IV A PROPOSED UNIT FOR HIGH SCHOOL BIOLOGY IN OREGON

- Suggestions for the Use of the Proposed Unit .................. 53
- Introduction to the Unit ......................................... 58
- Objectives .......................................................... 60
- Approaches to the Problem ........................................ 60
- General Introduction to Concepts of Conservation ............... 62
- Soil, Its Relation to Wildlife .................................... 66
- The Grasslands, Their Relation to Wildlife ....................... 71
- The Marshlands, Their Relation to Wildlife ....................... 74
- Water Resources, Its Relation to Wildlife ....................... 77
- Forests and Their Relation to Wildlife .......................... 82
- Wildlife as a Crop ................................................. 87
- Evaluation .......................................................... 90
- Selected References for Student Use ............................. 93
A Selected List of References for Teachers and More Mature Students
Annotated List of Sources of Information on Conservation

CHAPTER V SUMMARY AND CONCLUSION

Implications of the Study
Conclusions
Suggestions for Further Study

BIBLIOGRAPHY

APPENDICES

A. Letter and Questionnaire Sent to First Class Schools and Counties in Oregon
B. Letter and Questionnaire Sent to Departments of Education of the States
C. Bibliography of Biology Textbooks
LIST OF TABLES

I. Summary of Textbook Analysis of Biology Textbooks----------------------------- 17

II. Tabulation of Results of Questionnaire Sent to First Class Schools in Oregon---------- 23

III. Tabulation of Results of Questionnaire Sent to Counties in Oregon----------------- 26

IV. Tabulation and Results of Questionnaire Sent to States-------------------------- 36

vi
A STUDY OF CONSERVATION EDUCATION AS
A BASIS FOR A BIOLOGY UNIT FOR OREGON

CHAPTER I

INTRODUCTION

Statement of the Problem

The need for the conservation of our natural resources is apparent to every thinking citizen, but just how this is to be brought about best is a problem to which much thought has been given. Among the proposals for the solution of the conservation problem is that of education; not only through the public schools, but through the press, private organizations, individual writers, and other agencies concerned about the apathy and ignorance too often displayed by citizen and future citizen alike.

Though some progressive schools and teachers have included conservation in their programs for twenty or thirty years, it is only recently that there has been a definite move to make conservation a part of the curri-
culum. In a few states the fight to give conservation education a recognized place in the school curriculum has succeeded to the extent that it is required by state law. In an address in 1937 to the meeting of the American Nature Study Society, Richard L. Weaver of Cornell University, said:

Just as nature study, health, vocational, and music education have challenged our educators for a recognized place in our school curricula, so does this new challenger, conservation education, present its qualifications for recognition. We are launched on a fight for conservation education. (31:647)

Interest in the Study

The following excerpts from correspondence, together with the ever-increasing amount of available printed materials on conservation education, has made it apparent that a study of this nature is worthwhile.

George F. Dunning, Chief of Regional Division (Pacific Northwest Division) of Information in the Soil Conservation Service, Spokane, Washington, states:

The ambition you expressed in your recent letter to prepare a thesis which will contribute some advanced attention to the techniques of teaching conservation is most laudable.
I. R. Watts, Director of the Service Division of the National Wildlife Federation, Washington, D. C., wrote:

I can assure you that I'd like very much to help you with your Master's Thesis... I am very pleased to know that it relates to Conservation Instruction in the Secondary Schools.

When inquiry was made of the United States Office of Education at Washington, D. C., as to whether a previous study on the subject had been made, Mrs. K. M. Cook, Chief, Division of Special Problems, replied:

So far as I know no survey of schools in the United States which offers instruction in conservation has been made.

George Griffith, of the Division of Education and Information in the Forest Service, wrote in reply to an early inquiry:

I believe that you have chosen a good subject and agree with you that it is a rather large subject to be covered in one thesis.... It seems to me that your thought of producing a unit for use in the science area at the high school level has merit. This is a fertile field and we have not explored it.

Purpose of the Study

It is the purpose of this study to determine the present status of conservation education in Oregon in comparison with what is being done in other states,
and in the light of this to present information of a practical nature that may be of definite use to teachers. This has been accomplished: (1) by ascertaining the extent to which conservation is being taught in the United States, and the way in which it is being handled through the use of textbooks and other materials; (2) by determining in a measure the degree to which conservation is being taught in Oregon's larger schools; (3) by preparing a source unit for the teaching of conservation in secondary school science; and (4) by making available a list of practical materials which can be of use to interested teachers.

The study is intended to determine some trends in conservation instruction in the schools of Oregon and in the state departments of education throughout the United States. The suggested unit at the end of this thesis is designed to serve as a practical summary to bring together materials and information that can be used to meet the needs of those interested in teaching conservation.

Method of Procedure

The data and information used in this study have been collected by means of: (1) questionnaires,
(2) correspondence with both governmental and private agencies, (3) personal interviews with conservationists and educators in Oregon, (4) an analysis of biology textbooks, and (5) the facilities of the Oregon State Library at Salem and the Oregon State College Library. After careful study and examination of data and materials together with the perusal of library references, it was possible to formulate a source unit which takes into consideration the trends indicated from the study.

**Limitations of the Study**

Though the study embraced conservation education in both the elementary and the secondary schools, conservation education in secondary school science has received most emphasis. Conservation education taking place outside of public schools has received little attention.

The biological sciences have been stressed. Although the proposed unit was designed for high school biology, it might also serve for general science, or portions of it may be used in an incidental program. The replaceable natural resources, rather than both the renewable and non-renewable, have been emphasized at the expense of the irreplaceable resources—mineral wealth in particular. The importance of the latter is fully realized, but in Oregon it is secondary to the biotic
resources. It is also realized that the regional approach to conservation is ordinarily preferable to following the political subdivisions. It was necessary, nevertheless, to follow the educational division of Oregon as a state rather than the Northwest as a region.

The limitations of the questionnaire method are realized as to reliability; however, the results obtained therefrom are used only as indications of trends, and as information for sources of materials. It also served as a guide by which the materials might be best used in light of the trends indicated.
CHAPTER II

THE NEED AND IMPORTANCE OF CONSERVATION EDUCATION

Conservation as an Attitude

Conservation is an attitude, "a point of view, a habit of thinking, a philosophy" (4:224); it is an attitude toward a single problem having several phases. Too often conservation education is directed at a single phase of the problem instead of building an attitude of conservation-mindedness toward all resource-use. But building attitudes and even defining the term attitudes is a topic in itself.

Psychologists have long realized the importance of attitudes but are not entirely agreed on many aspects of the problem, including the definition and limitations of the term. Young defines an attitude as "an acquired predisposition to ways or modes of responses, not to particular acts except as, under special conditions, these express a way of behaving" (34:8). Gordon Allport, an authority on the subject of attitudes, after discussing several definitions made by various psychologists (Thomas, Znaniecki, Murphy, and others) sums the term "attitude" as "a mental and neural state of readiness organized through experience, exerting directive or
dynamic influence upon the individual's response to all objects and situations with which it is related." (19:810).

The same writer discusses four common conditions for the formation of attitudes: (1) the rough imitation of parents, teachers, and playmates, (2) a dramatic experience or trauma, a single emotional experience, (3) differentiation or segregation of action-patterns and conceptual systems, the two primordial non-specific attitudes of childhood--approaching and avoiding, and (4) the accretion of experience...an attitude is a fusion or 'residuum of many repeated processes of sensation, perception, and feeling'." (19:811).

Attitudes are influenced both by the opinions of the majority and by the opinion of the expert; on certain issues the latter is more influential, while on social and political issues (of which conservation is an example) the influence of the majority seems to be more marked. (19:834).

Most psychologists are agreed that attitudes are learned, do change and can be developed. On attitudes and how they can be developed, J. B. Morgan has written:

Attitudes are the dynamics behind behavior, but it must be remembered that there is no particular force in an attitude except the force of habit. Every
attitude is the formation of a habit of conduct which the individual has learned through experience.

Experiments have demonstrated that teaching a child verbal precepts, if they have little or no relation to experience, is virtually ineffective in formulating attitudes and consequently in controlling behavior. An attitude is a habit and habit cannot be taught by telling a child ...about it, he must practice it....

A verbalized attitude is of value only to the degree that it expresses habitual activities. (18:43-4)

Verbalization on such matters as honesty is generally conceded to be no proof of an individual's honesty. In like manner the student who glibly parrots statements on the desirability of conservation, is not necessarily conservation-minded. To talk of cleaning up a camp after a picnic in the woods is one thing, to want to do it is another.

The same technique of learning by experience applies to changing attitudes as well as developing them.

If an attitude is to be changed, the result is obtained by objective experience and not by any introspective study of the attitude itself. Attitudes grow as a result of experience and they are changed only by changing the type of experience of the individual to the sort which will effect a different attitude. (18:47)

Educators have spent considerable time and effort in determining how attitudes can be changed and taught.
E. L. Thorndike, Columbia University, after considerable research comes to the conclusion that:

The results of our experiments support the conclusion that a person can be taught new attitudes and tastes as surely, though not as easily, as he can be taught facts or skills. The basic principles of learning by repetition and reward seem to operate with wants, interests, and attitudes as they do with ideas and movements. (27:189)

C. D. Ketchum, head of the committee on construction of units of conservation education in the Appleton, Wisconsin High School writes as follows in the introduction to his series of units:

It has become the duty of the schools to develop a conservation consciousness among the younger generation. It is not enough to formulate a program of conservation. It is only through developing conservation consciousness that a wise conservation program may and will develop.... Conservation ideals must be developed in all subjects. (14:iili)

The Need for Conservation Education

Though not all are agreed as to when, where, and how conservation can be best taught, there is complete accord in that conservation education is important throughout the United States. Several quotations taken from speeches and writings of conservationists and educators show that it can hardly be over-estimated.

Ira N. Gabrielson, Chief of the Fish and Wildlife
Service of the United States Department of Interior pointed out at a meeting of the National Wildlife Federation:

There are too many people in this generation who will never understand conservation but we have a chance...to educate in a greater degree the younger generation. As we educate the children we will also...educate the adults, for they will see the material that children read. If we can make every man, woman, and child conservation conscious, I would not worry about the future of this country. (27:1,4)

A. F. Gustafson, one of the co-authors of "Conservation in the United States" has the following to say:

A great need of our nation today is the development by the individual citizen of a consciousness of the definite necessity for the conservation of our natural resources. Much of real value has been accomplished during the past three decades but a widespread campaign of conservation is imperative. (12:14)

Paul B. Sears, author of "Deserts on the March" said the following at a meeting of the American Association for the Advancement of Science:

We have been asking science to change this world about us faster than we can make the adjustment. The modern city, no less than the rural areas, exemplify this unbalanced way of living. Proper conservation education should aim to remedy it.... I am certain that the creative work in conservation education must be done right in the classroom, under the conditions as the teacher finds them. (27:1,2)
H. H. Bennett, Chief of the Soil Conservation Service, writes:

Regardless of what we may do today, the future of our natural resources depends on the knowledge and attitude of our children toward these resources. If the value of these resources (wildlife, soil, and forests) -- to the individual and to the nation -- is well understood, we need have no fear that our vast bank account of natural wealth will ever be permitted to vanish.

Education in conservation is one of the great needs and opportunities of the day. It also is one of our great responsibilities.

It is generally conceded that both high school science and social studies are courses which lend themselves to the inclusion of conservation materials. Biology, especially, according to many writers, is an excellent course in which to teach conservation. Few educators have expressed themselves in favor of a separate course on conservation at the high school level. From the following comments it becomes apparent that science, and particularly biology, serves as an excellent medium by which conservation might be taught.

In an address to teachers Rudolf Bennett, of the University of Missouri, made the following comments:

What is the best means of presenting conservation to the school boys and school girls of this country? ... in the schools
there are two alternatives: separate courses in conservation, and introduction of the conservation ideas into all natural-resource studies.

I wish to unreservedly endorse the latter. There is some... clamoring for courses in conservation by legislative fiat.... If successful, they are likely to increase an already overcrowded curriculum; to set conservation apart as a field in itself...is to endanger the sound teaching of conservation. Conservation mistaught is worse than conservation untaught. (4:225)

Ellsworth D. Lumley of the Emergency Conservation Committee wrote in the Nature Magazine:

Real conservation cannot be practiced until the youth of the nation are educated in this field. Until recently the conservation of our wild animal life was a phase of biology seldom taught in the schools.... The fact that our wildlife has steadily and rapidly declined even though millions of people have taken Nature Study courses and have belonged to bird clubs rather conclusively proves that the old type of conservation teaching was ineffective. It was based too much upon sentiment and failed to cause the learners to think. Thus it failed to influence their behavior. (16:113)

E. M. Dalhberg, author of "Conservation of Renewable Resources, a book designed for secondary school biology teachers, writes:

In the high school curriculum there are several subjects in which conservation should be taught. Citizenship, general science, biology, and agriculture all touch on vital questions concerning the conservation of natural resources. There can be
no doubt that if conservation is to be taught as a part of any existing course in the high school it fits most appropriately into the biology courses. (7:iv)

According to W. P. Beard, Education Specialist, U. S. Forest Service, in an article in the Washington Curriculum Journal:

The teacher who desires to teach conservation education finds a number of real problems. One is a lack of properly organized materials.

In the high school, biology offers the greatest opportunity for conservation education of any high school science because it deals primarily with the life processes of the renewable resources... So fertile is the field of biology for developing fundamental understandings of how to deal with natural resources that certain biology teachers are revamping their courses into a series of conservation problems. (1:3)

Many more sources could be enumerated showing the importance of teaching conservation and how it is taught in the high school. In secondary school biology, the writers of recent textbooks have reflected this increased interest in conservation education. Whole units are devoted to conservation of the biotic resources whereas many of the earlier books barely mentioned the subject.

An analysis of twenty-five textbooks* in high school biology was made to ascertain the trend, nature, and

* See Appendix C
extent of conservation education as evidenced by space devoted to the subject. The books were chosen from a selected list in Alfred C. Kinsey's "Methods in Biology" (15:96). Five books were taken from each five year period since 1920 and one group contained available books published before 1920.

In the earlier books much of the conservation material was not labelled as such in the index or in the table of contents. In more recent books the reverse was true, for under Conservation Units topics of eugenics and anthropology, and other distantly related subjects, were to be found. It became necessary, therefore, to set up definite criteria by which the conservation content of a biology high school text could be determined. And to mitigate the unreliability due to subjectivity, the following criteria were established. Counted as conservation material were:

1. All pages devoted to conservation of natural resources—soil, water, forests, flowers, and wildlife

2. Indirect reference to such resource misuse as pollution, overshooting, erosion, and clear-cutting

3. Pictures with captions calling the attention of the reader to the need for or the desirability of conservation. (For example, an illustration showing
the egret counted as conservation material only if the caption with the picture indicated that the bird is rare due to lack of conservation-mindedness; it was not counted if it is shown as an example of a water-feeding bird.)

4. Fractions of pages largely devoted to conservation counted as whole pages, and where overlapping made it necessary to segregate the discussion on two resources, and their interrelationships, the material was counted as the topic heading or sub-topic indicated. For example, when soil erosion was discussed as a part of the uses of forests it counted as forest conservation.

From the table it will be seen that there has been a trend toward increased recognition of the importance of conservation as a topic in biology of the secondary schools. Some of the newer books have complete units on conservation instead of listing conservation incidentally as a sub-topic.
<table>
<thead>
<tr>
<th>Year</th>
<th>Percent on conservation</th>
<th>Pages on conservation</th>
<th>Total Seggs</th>
<th>General Conservation</th>
<th>Test of Seggs</th>
<th>Total Work</th>
<th>Pages on wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>1886</td>
<td>0.0</td>
<td>0</td>
<td>204</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1911</td>
<td>1.4</td>
<td>7</td>
<td>511</td>
<td>-</td>
<td>3</td>
<td>4</td>
<td>13</td>
</tr>
<tr>
<td>1911</td>
<td>2.0</td>
<td>9</td>
<td>436</td>
<td>1</td>
<td>-</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>1914</td>
<td>2.9</td>
<td>12</td>
<td>406</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>1919</td>
<td>2.6</td>
<td>13</td>
<td>514</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>1922</td>
<td>4.0</td>
<td>23</td>
<td>568</td>
<td>1</td>
<td>3</td>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td>1922</td>
<td>1.7</td>
<td>9</td>
<td>517</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>7</td>
</tr>
<tr>
<td>1923</td>
<td>1.3</td>
<td>9</td>
<td>496</td>
<td>-</td>
<td>1</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>1924</td>
<td>1.6</td>
<td>8</td>
<td>493</td>
<td>-</td>
<td>5</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>1925</td>
<td>2.0</td>
<td>12</td>
<td>592</td>
<td>2</td>
<td>2</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Year</td>
<td>Percent on Conservation</td>
<td>Pages on Conservation</td>
<td>Total Pages</td>
<td>General Conservation</td>
<td>Pages on Soil and Water</td>
<td>Pages on Wildlife</td>
<td></td>
</tr>
<tr>
<td>--------</td>
<td>-------------------------</td>
<td>-----------------------</td>
<td>-------------</td>
<td>----------------------</td>
<td>--------------------------</td>
<td>-------------------</td>
<td></td>
</tr>
<tr>
<td>1926</td>
<td>3.1</td>
<td>17</td>
<td>536</td>
<td>3</td>
<td>2</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>1926</td>
<td>3.8</td>
<td>25</td>
<td>647</td>
<td>2</td>
<td>1</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>1926</td>
<td>1.4</td>
<td>7</td>
<td>472</td>
<td>2</td>
<td>1</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>1929</td>
<td>2.7</td>
<td>9</td>
<td>328</td>
<td>2</td>
<td>1</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>1929</td>
<td>4.6</td>
<td>35</td>
<td>746</td>
<td>4</td>
<td>1</td>
<td>17</td>
<td></td>
</tr>
</tbody>
</table>

1930-1935

<table>
<thead>
<tr>
<th>Year</th>
<th>Percent on Conservation</th>
<th>Pages on Conservation</th>
<th>Total Pages</th>
<th>General Conservation</th>
<th>Pages on Soil and Water</th>
<th>Pages on Wildlife</th>
</tr>
</thead>
<tbody>
<tr>
<td>1931</td>
<td>4.2</td>
<td>22</td>
<td>517</td>
<td>-</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>1932</td>
<td>1.6</td>
<td>10</td>
<td>605</td>
<td>1</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>1933</td>
<td>1.2</td>
<td>17</td>
<td>693</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>1933</td>
<td>1.9</td>
<td>12</td>
<td>627</td>
<td>-</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>1935</td>
<td>4.4</td>
<td>27</td>
<td>605</td>
<td>-8</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>Year</td>
<td>Percent on conservation</td>
<td>Pages on conservation</td>
<td>Total pages</td>
<td>Pages on general vegetation and improvement of soil and water</td>
<td>Pages on forests</td>
<td>Pages on wildlife</td>
</tr>
<tr>
<td>------</td>
<td>-------------------------</td>
<td>----------------------</td>
<td>-------------</td>
<td>-------------------------------------------------------------</td>
<td>------------------</td>
<td>------------------</td>
</tr>
<tr>
<td>1936-1940</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Benedict, High School Biology</td>
<td>1938</td>
<td>2.3</td>
<td>16</td>
<td>698</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Smith, Exploring Biology</td>
<td>1939</td>
<td>3.2</td>
<td>20</td>
<td>698</td>
<td>7</td>
<td>5</td>
</tr>
<tr>
<td>Kinsey, Introduction to Biology</td>
<td>1938</td>
<td>4.7</td>
<td>39</td>
<td>820</td>
<td>10</td>
<td>11</td>
</tr>
<tr>
<td>Bush, Biology of Familiar Things</td>
<td>1939</td>
<td>15.8</td>
<td>105</td>
<td>673</td>
<td>3</td>
<td>44</td>
</tr>
<tr>
<td>Downing, Living Things &amp; You</td>
<td>1940</td>
<td>4.4</td>
<td>29</td>
<td>660</td>
<td>7</td>
<td>1</td>
</tr>
</tbody>
</table>
Though the trend towards greater emphasis on conservation in biology is not uniform, there is evidence from the preceding analysis that writers of high school textbooks in biology are aware of the increased interest in the subject of conservation. There is also a shift of emphasis from some single phase of conservation as forests and birds to a slightly more equal stress on the conservation of all natural resources.

Many of the best materials on conservation instruction are those prepared by the state departments of education and departments of conservation. For this reason a survey of the available literature issued and distributed by these departments was undertaken. This was done in connection with the questionnaire sent to the department of education of each state. The results of this are incorporated in the next chapter of the thesis; some of these materials are used in the formation of the unit proposed in this thesis.
CHAPTER III

A SURVEY OF CONSERVATION EDUCATION IN THE UNITED STATES AND IN SOME OF THE LARGE SCHOOLS IN OREGON

Procedure of the Survey

In order to prepare a conservation unit suitable for biology classes in the secondary schools of Oregon, it seemed desirable to make a survey of the present practices of teaching conservation. The larger schools in the state were contacted because ordinarily their teachers have more time and greater facilities for conservation instruction. All of the first class schools listed in the 1940-41 Oregon school directory were sent a questionnaire with a letter of explanation.* The same questionnaire and letter were also sent to one of the larger schools in each county in which there were no first class schools so that all counties in Oregon were contacted.

To ascertain how conservation instruction in Oregon compared with other states, a similar letter and questionnaire** were sent to the head of the education depart-

---

*See Appendix A
**See Appendix B
ment in each state and to the District of Columbia. An appended inquiry was made about the materials on conservation instruction available and used in the various states.

The following tables show that there is considerable interest in conservation education. Ninety of the ninety-six (93.74 per cent) questionnaires sent out were returned. Thirty-three of the thirty-six (91.66 per cent) county representatives responded; of the thirty-seven first class schools, thirty-three (89.18 per cent) responded and forty-eight of the forty-nine (97.95 per cent) federal divisions replied.

The tabulations and summary sheets on the following pages show the total response to all the questions and also the distribution of answers. There is considerable overlapping in the questionnaire results from the county and the first class schools as in all but ten counties the largest (or larger) schools were first class schools.
### Table II

Tabulation of Results of Questionnaire Sent to First Class Schools in Oregon

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a</td>
<td>b</td>
<td>c</td>
<td>a</td>
<td>b</td>
<td>c</td>
<td>a</td>
<td>b</td>
<td>c</td>
</tr>
<tr>
<td>Albany</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Ashland</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Astoria</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Baker</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Bend</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Corvallis</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Coquille</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Cottage Grove</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Dallas</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Eugene</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Grants Pass</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>------------------</td>
<td>---</td>
<td>---</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>---</td>
<td>---</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td></td>
<td>a</td>
<td>b</td>
<td>a</td>
<td>b</td>
<td>c</td>
<td>a</td>
<td>b</td>
<td>c</td>
<td>a</td>
</tr>
<tr>
<td>Hillsboro</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Hood River</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Klamath Falls</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>LaGrande</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Marshfield</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>McMinnville</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Medford</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Milwaukee</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Milton-Freewater</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Newberg</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>North Bend</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Ontario</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Oregon City</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>-------</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td></td>
<td>a</td>
<td>b</td>
<td>c</td>
<td>d</td>
<td>e</td>
<td>f</td>
<td>g</td>
<td>h</td>
<td>i</td>
</tr>
<tr>
<td>Parkrose</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Pendleton</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Portland</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Roseburg</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Salem</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Silverton</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Springfield</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>St. Helens</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>The Dalles</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Tillamook</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Toledo</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Vale</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>West Linn</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>----------------</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td><strong>Baker</strong></td>
<td>x</td>
<td>xx</td>
<td>xx</td>
<td>xx</td>
<td>xx</td>
<td>xx</td>
<td>xx</td>
<td>xx</td>
<td>xx</td>
</tr>
<tr>
<td><strong>(Baker)</strong></td>
<td>x</td>
<td>xx</td>
<td>xx</td>
<td>xx</td>
<td>xx</td>
<td>xx</td>
<td>xx</td>
<td>xx</td>
<td>xx</td>
</tr>
<tr>
<td><strong>Benton</strong></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td><strong>(Corvallis)</strong></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td><strong>Clackamas</strong></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>**(Oregon City)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td><strong>Clatsop</strong></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td><strong>(Astoria)</strong></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td><strong>Columbia</strong></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>**(St. Helens)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td><strong>Coos</strong></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>**(Marshfield)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td><strong>Crook</strong></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>**(Prineville)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td><strong>Curry</strong></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>**(Gold Beach)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td><strong>Deschutes</strong></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td><strong>(Bend)</strong></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td><strong>Douglas</strong></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td><strong>(Roseburg)</strong></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td><strong>Gilliam</strong></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>**(Arlington)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Grant</td>
<td>a</td>
<td>b</td>
<td>c</td>
<td>a</td>
<td>b</td>
<td>a</td>
<td>b</td>
<td>c</td>
<td>a</td>
</tr>
<tr>
<td>(Grant Union)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harney</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>(Burns)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hood River</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>(Hood River)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jackson</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>(Ashland)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jefferson</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>(Madras)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Josephine</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>(Grants Pass)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Klamath</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>(Klamath Falls)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lake</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>(Paisley)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lane</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>(Eugene)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lincoln</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>(Toledo)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Linn</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>(Albany)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malheur</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>(Ontario)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marion</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>(Salem)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>County</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>-----------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Morrow (Heppner)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Multnomah (Portland)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Polk (Dallas)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Sherman (Wasco)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Tillamook (Tillamook)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Umatilla (Pendleton)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Union (LaGrande)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Wallowa (Enterprise)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Wasco (The Dalles)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Washington (Hillsboro)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Wheeler (Fossil)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Yamhill (McMinnville)</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>
Totaled Tabulations from Tables II and III

The figures on this questionnaire form represent the totals from Tables II and III, comparing the results obtained from the county and first class schools. The first figure is the total from the first class school and the second figure in parentheses is that of the count by county. Thirty-three of each group replied.

1. The conservation of natural resources is being taught in our schools at present, directly or indirectly. (a) yes 31 (32) (b) no 0 (0)

2. The greatest emphasis in conservation instruction takes place in our school system during:
   a. 8 (6) the elementary grades
   b. 14 (18) the secondary school
   c. 16 (15) equal emphasis in both

3. The teaching of conservation of natural resources in our secondary school is:
   a. 26 (25) in connection with social studies
   b. 18 (16) in connection with the science classes 1. 7 (6) biology 2. 6 (7) general science 3. 16 (14) both
   c. 1 (4) some other way

4. Whether conservation is taught in our school depends upon:
   a. 23 (23) the personal desire of the individual teacher
   b. 18 (19) the superintendent
   c. 1 (0) the school board
5. In those classes where conservation is taught, check the type of materials that are used:

   a. 7 (6) references as made in the textbook only  
   b. 29 (29) anything the teacher wishes to use  
   c. 18 (21) special aids prepared for conservation instruction

Questions of opinion

1. Teaching of conservation can be brought about in several ways. Please check the method you think would be most effective.

   a. 9 (9) by a state law requiring it  
   b. 10 (10) leave it up to the school board and superintendent  
   c. 18 (21) leave it up to the individual teacher but require as a part of teacher training some conservation instruction  
   d. 1 (3) any other way

2. Conservation could best be introduced into the curriculum:

   a. 0 (1) as a separate subject  
   b. 22 (18) as a part of an integrated program  
   c. 4 (6) incidentally as the teacher desires in any subject  
   d. 16 (21) in connection with the social studies  
   e. 13 (16) in connection with the science courses  
   f. 0 (0) any other way

3. Which of the following phases of conservation should be stressed the most in Oregon schools:

   a. 11 (13) land and water resources  
   b. 17 (17) forest resources  
   c. 13 (16) wildlife and recreational resources
d. 10 (9) mineral resources
e. 19 (17) all equally important

4. At what age do you think conservation would be most effective in building proper attitudes:
   a. 2 (3) pre-school
   b. 8 (8) elementary school
   c. 9 (10) secondary school
   d. 20 (18) in all the grades

The totals in the tabulation are not intended to cross-check as in many instances the person answering the questionnaire checked all possible choices and in other cases complete questions remained unanswered. The totals represent the actual checking though implied results often were apparent. However, the trends indicated would differ little if any had the implied rather than the actual results been used. This also applies to the following questionnaire tabulation from the state departments of education.

Summary of Tables II and III

As shown by the tabulated results, thirty-three of the thirty-seven first class schools as listed in the 1940-41 school directory (22:8) responded. Of these thirty-one indicated that conservation was taught in their schools. Thirty-two of the county representatives indicated that conservation was being taught in
their schools. These were the larger schools in the counties, and therefore included many first class schools. No school of either group marked "no" to the question of the presence of conservation instruction in their curriculum. A few failed to mark either "yes" or "no".

(2) As to the place greatest emphasis is given to teaching conservation, fourteen first class schools (eighteen by county count) checked it to be the secondary school, sixteen (fifteen by county count) designated both elementary and secondary schools while only eight (six by county count) indicated that the elementary grades were the place greatest emphasis is made on conservation.

(3) The place in the curriculum where conservation in the secondary schools receives most emphasis was the social studies in twenty-six first class schools (twenty-five by county count). The science subjects were second with eighteen first class schools (sixteen by county count). Only one first class school and four by county indicated that conservation was taught some other way. Of the sciences, seven first class schools (six by county count) favored biology while six first class schools (seven by county count) indicated a preference to general
science. A majority, sixteen schools (fourteen by county count) indicated that conservation was taught in both general science and biology.

(4) Whether conservation is taught depended upon the individual teacher in twenty-three schools (an equal number by county) of the first class. In eighteen schools (nineteen by county) it depended upon the superintendent, and in only one first class school did the school board have anything to do with it.

(5) In regard to the types of materials used in teaching conservation, twenty-nine of each grouping checked it as anything the teacher wishes to use. Eighteen first class schools (twenty-one by county count) used special aids prepared for conservation instruction, and seven (six by county) had been using references made in the textbook only.

(1) On the questions of opinion, nine of each group favored a state law requiring conservation education, eighteen (twenty-one by county) would leave it up the the individual teacher but require some teacher training courses in conservation education and ten in each grouping would leave it up to the school board and superintendent. Only one first class school (three by county) would have it some other way.
(2) Regarding the subject in the curriculum in which conservation could be best introduced, twenty-two (eighteen by county) favored making it a part of an integrated program. Only one non-first-class school favored a separate course on conservation and four (six by county) suggested introducing it incidentally in any subject. Sixteen (twenty-one by county) favored introducing conservation in connection with the science courses.

(3) The phase of conservation that should be most stressed in Oregon schools was listed as forest resources by seventeen schools in both groups with wildlife receiving preference in thirteen (sixteen by county) first class schools. Land and water resources was indicated by eleven (thirteen by county) as the most important resource, while ten (nine by county) indicated mineral resources. That all resources were equally important was checked by nineteen first class schools (seventeen by county). Many schools in both groups marked all four different phases indicating further that no single resource should be stressed to the exclusion of others.

(4) The age at which conservation teaching would be most effective in building proper attitudes was given
as "through all the grades" according to twenty (eighteen by county) schools; nine (ten by county) thought it should be in the secondary school and eight in each group indicated the elementary school while two (three by county) marked it to be pre-school.
<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a</td>
<td>b</td>
<td>c</td>
<td>d</td>
<td>e</td>
<td>a</td>
<td>b</td>
</tr>
<tr>
<td>Alabama</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Arizona</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Arkansas</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>California</td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Colorado</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Connecticut</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Delaware</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>District of Columbia</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Florida</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Georgia</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Idaho</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>------</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>----</td>
<td>-----</td>
</tr>
<tr>
<td></td>
<td>ab</td>
<td>abc</td>
<td>cde</td>
<td>abc</td>
<td>dabc</td>
<td>abc</td>
<td>cde</td>
</tr>
<tr>
<td>Illinois</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Indiana</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xx</td>
<td>x</td>
<td>xx</td>
<td>x</td>
</tr>
<tr>
<td>Iowa</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xx</td>
<td>x</td>
<td>xx</td>
<td>x</td>
</tr>
<tr>
<td>Kansas</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Kentucky</td>
<td>x</td>
<td>x</td>
<td>xxx</td>
<td>x</td>
<td>xx</td>
<td>x</td>
<td>xxx</td>
</tr>
<tr>
<td>Louisiana</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xxx</td>
<td>xxx</td>
</tr>
<tr>
<td>Maine</td>
<td>x</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Maryland</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Massachusetts</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xx</td>
<td>x</td>
<td>xx</td>
<td>x</td>
</tr>
<tr>
<td>Michigan</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Minnesota</td>
<td>x</td>
<td>x</td>
<td>xx</td>
<td>x</td>
<td>xx</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Mississippi</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>xx</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Missouri</td>
<td>x</td>
<td>x</td>
<td>xx</td>
<td>x</td>
<td>xx</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>----------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td></td>
<td>a</td>
<td>b</td>
<td>c</td>
<td>d</td>
<td>e</td>
<td>f</td>
<td>a</td>
</tr>
<tr>
<td>Montana</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nebraska</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nevada</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>New Jersey</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>New Mexico</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>New York</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>North Carolina</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>North Dakota</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ohio</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Oklahoma</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>OREGON</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>----------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>Rhode Island</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
<td>xxx</td>
<td></td>
</tr>
<tr>
<td>South Carolina</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>South Dakota</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Tennessee</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Texas</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Utah</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x xxx</td>
<td></td>
</tr>
<tr>
<td>Vermont</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Virginia</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Washington</td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x xxx</td>
<td>x</td>
</tr>
<tr>
<td>West Virginia</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wyoming</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>
Totals of the Tabulation from Table IV

On the following questionnaire form sent to the departments of education in the forty-eight states and the District of Columbia, the totals from Table IV are given.

1. The teaching of conservation of natural resources should have a place in the secondary school curriculum. Yes 45 No 0

2. Whether or not conservation instruction takes place in our state

- 10 depends upon the individual teacher
- 31 is left up to each school system
- 12 depends upon the recommendation of the school department
- 5 is required by state law
- 4 is carried out some other way (if so, how)

3. The greatest emphasis in teaching conservation in our state takes place:

- 20 in the elementary schools
- 9 in the junior high school
- 10 in the secondary school
- 17 considered equally important in all twelve grades

4. Some states have printed materials on conservation prepared for schools. Check the type provided and available in your state.

- 30 bulletins serving as teacher aids
- 12 printed materials that can be used by students
- 8 nothing provided by any state department or agency
5. Two types of materials can be used. Check that which you think would be most suitable for the schools in your state.

- 18 separate organized units that can be given to the teacher so that conservation is taught directly
- 37 materials that can be incorporated into the existing units already established; that is, indirectly

6. Conservation instruction may be introduced into the curriculum in several ways. Please check the way you consider best.

- 1 as a separate subject
- 31 as a part of an integrated program
- 4 incidentally as the teacher desires in any subject
- 18 in connection with the social studies
- 24 in connection with the sciences
  - 7 biology
  - 7 general science
- 17 both
- 4 some other way (if so, please indicate what)

7. At what age do you think conservation instruction would be most effective in building proper attitudes:

- 3 pre-school
- 14 elementary school
- 5 secondary school
- 34 to be effective should be taught in all 12 grades

Summary of the Results of Questionnaires to the State Departments of Education

As Table IV shows, forty-eight of the forty-nine questionnaires were returned. All implied that conservation should have a place in the secondary school
curriculum, though only forty-five actually checked it.

(2) Whether or not conservation instruction takes place depended upon the recommendation of the school department in twelve states, five require it by state law, and four used some other way, while ten said it depended upon the individual teacher. Most of them, thirty-one, indicated it was left up to each school system. Oregon was in this last classification.

(3) As to the grade in which conservation is most emphasized, twenty indicated the elementary school, ten marked the secondary school and nine said it was most emphasized in the junior high school. Seventeen states held it was equally important in all grades. Oregon indicated it was emphasized most in the secondary school.

(4) Thirty states including Oregon have bulletins available which serve as teacher aids, twelve have materials prepared for the students, and eight indicated they provided nothing. Some states indicated that they had both teacher and student aids on conservation.

(5) Thirty-seven states favored materials that could be incorporated into existing units, while eighteen favored separate units which could be given to the teacher and taught directly. Oregon favored both.
(6) As to the way which conservation could be best introduced into the curriculum, thirty-one states favored it as a part of an integrated program, with twenty-four states, including Oregon, favoring the secondary school sciences. Seven states each checked biology and general science and seventeen checked both of these sciences. Eighteen indicated that they preferred the social studies as the course in which conservation should be introduced. Four states held that it would be best to introduce it in any subject which the teacher desires. An equal number favored some other way, but only one state superintendent thought it should be introduced as a separate subject.

(7) The age at which conservation instruction would be most effective in building proper attitudes was marked in thirty-four instances, including Oregon, as "to be effective should be taught in all twelve grades." Fourteen indicated it should be in the elementary school, five in the secondary school, and three at the pre-school age.
Comments from the Survey

The following statements were made by school superintendents in Oregon either as comments on the returned questionnaire or in letters accompanying it.

Arlington--(letter from Franklin Evenson, Curriculum Supervisor)

In high school the subject is taught in the Social-Economics class, and in the Agriculture program. We do not believe it should be in a separate course by itself. We do believe it would be desirable for all teachers to have some training in conservation. We strongly urge that you do not overlook the fact that wisely using our natural resources is the main part of any conservation program.

Bend--(excerpt from comment on questionnaire)

No more required subjects.

Cottage Grove--

There should be more specific suggestions and recommendations by the State Department of Education through its curriculum pamphlets on this important subject of conservation. We cannot depend on incidental teaching for it.

Eugene--(comment on questionnaire)

Favor a continuous 12-year program for social studies and science.
Hillsboro—(letter from J. W. Poyntor, Superintendent)

I have a feeling that any good teacher is today teaching conservation. Certainly the subject has been borne down upon heavily enough in recent years to cause any teacher to take advantage of many opportunities to teach conservation.

I doubt if any State law would be particularly effective. Two suggestions I can offer, one, include it in courses of study, and second, cause teachers to have an awareness of its importance so that it is the natural thing for them to teach it when the opportunities are presented.

Certainly you would not advocate making conservation teaching a separate subject. For years the public schools have been teaching important facts and data in isolation of their important relationships, so why take a matter as important as conservation and repeat an old offense? Children could be adequately conservation minded long before they arrive at high school.

Hood River—(comment on questionnaire)

Required course by law—never effective.

LaGrande—(comment on questionnaire)

(All resources are) perhaps not equally but very important.

North Bend—(comment on questionnaire)

State course of study could give more importance to it. (conservation)
Oregon City--(comments on questionnaire)

Both social studies and science courses are necessary for introduction of conservation into the schools.

Pendleton--(comments on questionnaire)

The important point is to understand the need.

Salem--(comments on questionnaire)

Our present offering in elementary grades is slight. Courses are now being revised with great added emphasis on conservation.

Teacher training in social studies and science must emphasize it. It (conservation education) must be a continuous program.

Comments from State Departments of Education, through letter or by comment on the questionnaire, expressed their views as follows:

Alabama--(excerpt from a letter by A. H. Collins, State Superintendent of Education)

Conservation should come naturally in connection with the socializing program. At each level it should be suited to maturity, background needs, and opportunities of the group. We have undertaken to encourage such a program throughout our twelve-year program.

We have our program set up so that conservation and other problems that are
Immediate and important will be dealt with at any grade level.

Conservation is a matter of social attitudes and social intelligence. Only when the teacher is sensitive to the need and opportunities can the desired attitudes and intelligence be developed. This requires that the teacher understand both the pupil and the social needs, and this is more important than anything that can be accomplished by courses, etc.

Connecticut--(excerpt from a letter from Alonzo G. Grace, Commissioner of Education)

We are making a study of public education in this state and little material is available at the moment, and so far as I know no particular emphasis is placed upon the conservation of natural resources in our curriculum.

Washington, D.C.--(comment on questionnaire)

Science Department does most of it (conservation education). It correlates very well with the sciences.

Idaho--(comments on the questionnaire)

If (conservation is) taught indirectly it should be quite effective after having been brought into the course of study through all grades.

Louisiana--(excerpt of letter from John Robson, Supervisor of Science)

It is my studied opinion that conservation is not and should not be considered as a separate subject. I feel that conservation is an attitude or a condition of mind which can and should be developed in every individual to such extent that it
would color one's use of all resources, whether of the so-called natural variety or human resources.... This is one man's opinion only, but it is the idea that I am conveying to the teachers of the State in my discussions of the various science programs with them.

Minnesota--(letter from Dorothy Houston, Curricula Research Analyst)

There are in Minnesota no prescribed books or courses specifically on the subject of conservation. There is, however, a bulletin which this department has recently issued, in cooperation with the Department of Conservation, which has been distributed to all schools—the use of the material in this bulletin is voluntary. It is intended that it should be used in both science and social studies where such material would fit in.

Montana--(letter from J. A. Woodard, High School Supervisor)

In general, I would say conservation should have a more definite place in the high school program, through the grades and in the high school. Conservation is emphasized as a unit study in many of the high school courses.... We are soon to begin a revision of Montana high school courses of study and it is my plan to give conservation more emphasis.

New York--(comment from questionnaire)

The state syllabuses include conservation materials particularly the science and social studies syllabuses.

North Carolina--(comment from questionnaire)

Our Department of Conservation has prepared a printed bulletin for use in the
upper elementary school. Emphasis on conservation education should come in the secondary school.

North Dakota--(comment on questionnaire)

Conservation Education is recommended by the state department but is left up to each system to work out.

Ohio--(comment on questionnaire)

Our elementary science units are mostly conservation.

Pennsylvania--(comment on questionnaire)

Teach at every possible point.

Rhode Island--(comment on questionnaire)

We have always taught certain fundamentals of conservation throughout the Grades in our Nature Work, Geography, Elementary Sciences, General Science, etc.

Utah--(comment on questionnaire)

When Conservation is taught depends upon many factors, the pupil, his breadth of experience, his teacher, and methods.

Washington--(letter from Marcella R. Lawler, High School Supervisor)

In our ninth grade classes, we are next year establishing a course known as, 'Washington, Its History, Government, Industries, and Resources'.... (on commenting on type of units to be used) not 'yardstick' units that must be done just as presented.
Wisconsin—(letter from R. S. Ihlenfeldt, Supervisor of Instruction in Conservation)

We feel that work should be offered whenever and wherever possible, but that organization units, or an organization course should be given about the tenth or eleventh year. In this various elements are brought together in a well organized unified whole.

Summary of the Results of the Survey

The following general trends taken from the preceding tabulations might be summarized briefly as:

1. Conservation education is generally recognized as important in both the schools of Oregon and by the State Departments of Education in the United States.

2. Conservation education is in most cases left up to the individual teacher who uses whatever she or he wishes to use. Many state departments of education recommend the teaching of conservation and often furnish materials for use in the classroom. Both materials which can be incorporated into the existing curriculum and those which are to be used for the direct teaching of conservation are issued. Materials which can be used indirectly by the teacher are favored.

3. Conservation education is thought to succeed best if taught in both the secondary and elementary schools. In Oregon the secondary school is indicated as the most desirable place to teach
conservation, but in both the results of the survey of the nation and the state it was considered best to teach conservation all twelve years.

4. According to the survey there is a strong sentiment favoring teacher-training courses of which conservation education is a part according to the survey of Oregon schools. Teachers are permitted great freedom in regard to the type of materials they use for conservation instruction.

5. Both the social studies and the science courses were designed as courses in which conservation could be introduced into the curriculum. Between the two there is not a great deal of preference; the choice between general science and biology is also fairly evenly divided. Most educators seem to be of the opinion that conservation should be taught wherever appropriate and not limit it to any particular course. Integration into the existing curriculum is favored in the majority of cases.

6. In Oregon all phases of conservation are recognized to be important; a slight emphasis was made in favor of forest conservation.

7. There is considerable work being done in many of the states in the preparation of materials on conservation education as the need is generally recognized. In Oregon less has been done in this line than is true of many of the Eastern states.

From these trends, a unit in biology on conservation education has been prepared. This should not only meet the need shown in the preceding study but will
serve as a summarization for parts of the thesis. A unit such as the one prepared in the following chapter might become a definite contribution if incorporated into the Oregon state course of study in science.
CHAPTER IV

A PROPOSED UNIT FOR HIGH SCHOOL BIOLOGY IN OREGON

Suggestions for the Use of the Proposed Unit

The need for conservation materials, prepared units and bibliographies is evident. Applying specifically is the statement made by the Northwest Regional Council:

If our public schools are to grapple successfully with these knotty problems they must find ways and means of realizing the vast store of technical knowledge which has been developed.... This does not mean that all publications...are worthless as a source of information in the classroom. It simply stresses the urgency of the need for providing teachers with clues, guides, outlines, bibliographies, personnel, and the like, to assist them in enriching the school program.

(20:i-iv-v)

Statements of this type and the results of the study justify the formation of a source unit on conservation. While incidental teaching has its merits, many who have studied the problem of conservation education feel as does E. M. Dahlberg, a Wisconsin biology teacher. He writes:
It is the feeling of the author, however, after many years of conservation teaching, that the most effective manner of presenting conservation lessons in high schools is to offer a special semester course in conservation and devote it wholly to the subject. (7:4-5)

The proposed unit is not intended to require a whole term to complete, though if all parts of it are used, a period of four weeks will be about the minimum time needed. Whether the unit is used in part or in its entirety depends upon the previous conservation instruction of the class, the location of the school, the time of year, and other factors which vary. The lists of activities will seldom be the same in any two schools as the unit is designed for flexible usage permitting additions and substitution of activities. The suggested activities may be carried out by individuals in the class or as a class project, and will be determined in part by the time of year in which the unit is used.

In most localities the time of year best suited for this type of unit is likely to be in the spring or fall. In a text-free unit which relies to a considerable extent on the out-of-doors as reference, these seasons would be most appropriate. It might be used
to greatest advantage in the spring at the close of the term and thus serve as a summarization unit.

Throughout the unit the stress is on activities; learning by observation and by doing is the hinge on which the unit swings. The necessity of developing attitudes by objective experience has been mentioned in this study. To as large an extent as feasible, the teacher should aid the students in acquiring such experience. Some book learning of course is necessary. Vocabulary building is accomplished in part this way but unless the new words acquired can be applied concretely their permanence may be relatively short.

If objective tests are desired by the teacher vocabulary work might be incorporated into them. Where feasible, however, local situations should be referred to rather than some instances remote from the experience of the student. The best way to test an attitude according to Morgan (18:43) is to place the person in a position in which his conduct will demonstrate what attitude he actually has adopted.

An attitude of conservation-mindedness toward the whole conservation problem is desired rather than toward some specific resource as flowers and birds.
For secondary school pupils this approach is more adaptable than in the elementary grades where the emotional approach of reference to "furry and feathered friends" is of greater appeal.

The chief sources for the preparation of the suggested unit were the publications of various state departments of education and departments of conservation. Most of these had selected bibliographies on conservation education. Materials that they suggested were examined when available and if appropriate for Oregon were added to either of the two reference lists found at the close of the unit.

The annotated list of references following the proposed unit is included as a practical aid to any teacher interested in sources of free and inexpensive materials on conservation education. Those suggested were found to be most useful and up-to-date.

The source unit on conservation proposed for secondary school science (biology) has the following parts:

A. Introduction
B. Objectives
C. Approaches
D. Outline of Content and Suggested Activities

1. General Introduction (An Overview)

2. Soil Resource and Its Relation to Wildlife

3. The Grasslands and Their Relation to Wildlife

4. Water Resources and Its Relation to Wildlife

5. Forest Resource and Its Relation to Wildlife

6. The Marshlands and Their Relation to Wildlife

7. Wildlife as a Crop

E. Evaluation

1. Of Understanding and Factual Knowledge

2. Of Appreciations, Skills, and Attitudes

F. References

1. Selected References for Student Use in Oregon

2. Selected References for Teacher Use
Today we are all more or less peppe up on the matter of national defense. But it must be remembered our land must be defended not only from possible foreign foe but from those destructive forces at work all about us—erosion, stream pollution, extermination of wildlife, and unusual removal of resources without provision for the future wellbeing of the nation. Conservation through education or some other agencies becomes all the more important in light of the greater use of our natural wealth in the defense program.

In Oregon and the Northwest the forest resource is tremendously important though the soil and water ever remain as the basic resources for any civilization. With these resources the wildlife resource is inseparably intertwined, and the wise use of all is of great importance. A sustained yield basis for both forest and wildlife is most necessary for to treat them as a crop is more desirable than to attempt to maintain these resources in a primitive state.

The ecology of man is the crux of the whole matter of conservation for in most parts of America man is the climax specie. Conservation is a basic aspect of
biology; it means the use of living things on the part of man in such a way as not to disturb seriously the balance of nature. Any intelligent utilization of our resources implies knowledge of the biologic pattern to which all contribute directly or indirectly.

In this unit the wildlife resource is given chief emphasis with the stress on its relationships to other phases of the conservation problem. The scientific practical approach rather than the emotional appeal to sentiment is used. Designed as a unit for Oregon, the examples are drawn from that state though the desirability for a regional rather than a state planned program must be recognized.

An extensive study of Oregon's wildlife has been made by the advisory committee on wildlife of the State Planning Board in 1936. This committee reported:

Oregon's wildlife resource is an asset of great economic and social importance to the state.... The annual income from money spent by residents, tourists, and others attracted to Oregon...is a very large sum.

Wildlife is diminishing in Oregon in spite of the fact that the natural habitat... is capable of sustaining many times the present wildlife population. ...pressure on wildlife has been increasing during the past twenty years and the result, in spite of our restocking program, has been a downward trend of the resource.
However great the economic value of wildlife may be, the social value is much greater. The recreational, educational, and aesthetic importance of wildlife is more intangible than the economic value, it is therefore more difficult to measure. It is nevertheless real.... To cultivate the proper attitude toward such things (wildlife) is of immeasurable value to us.

Objectives

1. To develop an appreciation of the importance of our natural resources, their interrelationships, and the need for their utilization in an intelligent manner.

2. To present some of the more important problems in connection with conservation of the wildlife resource particularly, and some of the suggested solutions to these problems.

3. To help maintain the natural beauty of Oregon by presenting to the future citizens some of the important biological bases of conservation.

4. To aid in creating intelligent attitudes toward the biotic resources of our country through an understanding of man's responsibility in the wildlife balance by changing the natural ecology.

Approaches to the Problem

Any of the following approaches may be used or others more pertinent to the local situation may be used.
1. Take some local problem as grasshopper control and the question of shooting crows and hawks. Examine the stomach contents of these birds...particularly if shot by some well meaning conservationist. From this point out whether there is not some good in the worst of animals, and that we should not be blind to the interrelationships between wildlife forms.

2. Invite a speaker from some conservation agency to address the class or school--indicating to him beforehand that a unit on wildlife is to be studied by the class.

3. Take a field trip to the zoo or park where some Oregon wild animals are kept in an effort to point out factors to be considered in the management of these forms--feed for deer and elk, proper habitat for fur bearers. A visit to the fur farm or some conservation game farm are further suggestions.

4. (Taken from p. 117 in Forest Conservation, a series of units prepared by the USDA Forest Service Division of Information and Education)

"Tell the story of wildlife abundance in this country within the last century. ...squirrels were so numerous and destructive to the corn and wheat of the pioneers that a law was passed in Ohio requiring every white man to deliver one hundred squirrel scalps each year or pay the penalty of §5. Elk were hunted for their teeth alone, the rest of the animal being wasted. The passenger pigeon is said to have existed in such numbers that their flight obscured the sun. The abundance of fish in the Northwest streams is already declining."
General Introduction to Concepts of Conservation

Core Ideas

I. Natural resources
   A. Non-renewable resources
      1. Mineral
      2. Certain soils and waters
   B. Renewable resources
      1. Wild plants and forests
      2. Wild animal life
      3. Water resources
      4. Soil resources
   C. Interrelationships
      1. Ecology of wildlife
      2. Relations with man
      3. Resource interrelationships

II. Conservation
   A. Concepts of conservation

Activities Which Can Be Done During the Entire Unit

Make an individual or a group map of the United States, Oregon, or your county, to be used in showing the location of natural resources as studied.

Sponsor a photography contest for the best snapshots of some resource in the community showing its interrelationships with other resources or showing an example of wise use or misuse.

Talk to an oldtimer on resource use; have him tell of the resources of the community as he knew them.

Form a conservation club; write to the state department of education in West Virginia or Ohio to find out about the details of such organizations.
1. Hoarding
2. Using
   a. Misuse (wasting)
   b. Wise use

B. Methods of conservation
   1. Protection
   2. Limiting use
   3. Substitution
   4. Reclamation
   5. Restoration
   6. Preservation

C. Importance of a policy of conservation
   1. To the nation
   2. To Oregon
   3. To citizens today
   4. To future citizens

III. Common attitudes to resource use

A. Policy of laissez faire

B. Expediency and inexhaustibility

Bring in magazine articles, clippings, cartoons and pictures which have conservation content. File these or prepare a scrapbook of them.

Observe instances of interrelationships between various resources as deer damaging young trees when natural predators are removed.

Look for places to which a conservation tour might be made in your community.

Find and list some misconceptions held regarding conservation and resource use.

Write to various federal or state departments for materials on conservation, and resource use. Study these and build a conservation library.

Send for wildlife stamps from National Wildlife Federation.
C. Excessive emotionalism
D. Short-sightedness
E. Apathy

IV. Some problems in conservation

A. Regionalism
   1. Political divisions a handicap

B. Complex interrelationships between different resources in and among themselves

C. Lack of information
   1. On part of public
   2. On part of authorities
   3. Disagreement among conservation experts

D. The stress of control rather than prevention

E. Planning and management--long-time planning

---

Things to Do and Think About

Divide the United States into what might be thought of as more desirable divisions than states from the conservationist standpoint.

Study game laws which show the inconsistency of practices in adjoining territories of similar outline and environment.

To what extent is conservation a governmental rather than an individual problem? What is something that we as students can be doing to help solve these problems?

List examples of the following in Oregon, checking those with which you are familiar:

a. Birds
   b. Mammals
      1. Upland or big game
      2. Fur animals
      3. Rodents
F. Overcoming public prejudice and ignorance

G. Vested interests

c. Reptiles and amphibians
d. Game and food fish
e. Important trees
f. Plants which serve as water and soil protectors

Try to become familiar with those you are not acquainted with.

Suggested Films: Conservation of Natural Resources

(1 reel sound, rental $1.50)

Motion pictures which are appropriate to each section are listed at the close of each. They are all obtainable at the Department of Visual Instruction, Extension Service, for a service fee of fifty cents. All are 16 mm and designed for classroom use; both silent and sound films are suggested.
SOIL, ITS RELATION TO WILDLIFE
(Soil: The Mother of All)

Core Ideas

I. Oregon's soil resource
   A. Types of soil
   B. Extent and location of soil-classes
   C. Condition in comparison with other states

II. Soil formation
   A. Time element
   B. Role of plants
      1. Humus forming
      2. Nitrogen supplying

Things to Do and Think About

Gather soil samples for study.
Note the difference between the sub-soil and the top-soil due to organic matter. On your resource map locate general areas in which various kinds of soil are found.

Bring in pieces of sod for study.
Study the roots of alfalfa or some other legume in contrast to the grasses.

What is the effect of stubble burning--contrast fields in which it has been done with those in which the practice has not been followed.
C. Role of Animals

1. Bacteria and insects in decay
2. Angleworms
3. Borrowing rodents
   a. Value of mice, gophers, moles
   b. Destructive aspects of these animals

III. Soil use

A. Wise use

1. Crop rotation
2. Fertilization
   a. Returning crops as manure
   b. By commercial fertilizer

B. Unwise use

1. Use of submarginal land
   a. Rocky, hilly
   b. Hillsides
   c. Drained swamps

Note the importance of decay-producing organisms in the cycle of life.

Study some rodents' borrows. Study adaptations of animals for life underground.

Raise snakes

Consult a farmer on his plans of crop rotation. In school plot study experiments with the idea of rotation and use of land for one crop only.

Observe advantages and disadvantages of using commercial fertilizer over manure.

Spot examples in your community of both wise and unwise use of lands and note effect on wildlife—plant and animal.

Cite examples in which reclamation proved to be unwise. Read about Malheur Lake and reclamation attempts.
C. Reclamation

1. By irrigation
2. By drainage

IV. Erosion

A. Types

1. Wind on level land
2. Water--gulley, sheet

B. Causes

1. Natural--slope, soil type, cover on soil
2. Induced by man--tilling, clean cropping, cutting hillsides

C. Effects of erosion

1. On streams--effect on fish
2. On the soil--loss of rich top soil
3. On plants--removal of food and anchorage base
4. On animals--destroys habitat
5. On man--silting of gulleys

Why are dust bowls and blow spots called "nature's cancers"?

Build an erosion model. Vary the slope and also the type of soil and cover.

Visit a stream after a flood and from sample of water determine amount of soil carried by the stream.

Measure size of plants in eroded and non-eroded areas.

Look for examples of erosion and show how it could be prevented.

List some animals which are affected by erosion and some which help prevent it.

Preserve fallen leaves for compost
D. Erosion control and prevention

1. Ground cover
2. Contour plowing
3. Terracing
4. Dams
5. Value of grass and shrub-bery

Observe example of practices in your community which make for accelerated erosion and some good examples of prevention and control. Report on these, and if needed apply to school grounds.

V. Problems in soil conservation

A. Management

1. Magnitude of problem

Write to the Regional Office of Soil Conservation Service for literature on topics of interest on soil.

B. Relationship to other resources

Look for examples in your reading of cases in which by practicing soil erosion control, animal habitats have been destroyed.

C. Opportunities to help

1. As a citizen
2. As a student

Select an unprotected roadside grade near the school and plant shrubs, vines or grass on it, or get permission from owner to fill a gulley.

List some projects in your community that the government has started on soil conservation.

List things which you, a student, might be doing to help in soil conservation.
Suggested films:  
Save the Soil  
(2 reels silent)  
Old Land--New Uses  
(1 reel silent)  

Test samples of soil from your home lawn, field, or garden. Apply lime or fertilizer where needed.
# The Grasslands—Their Relation to Wildlife

(When have died because sheep have cloven lips)

## Core Ideas

<table>
<thead>
<tr>
<th>Core Ideas</th>
<th>Things to Do and Think About</th>
</tr>
</thead>
<tbody>
<tr>
<td>I. Nature and extent of the grasslands</td>
<td>Mark on your resource map sections known as the grasslands.</td>
</tr>
<tr>
<td>A. In the United States</td>
<td>Read article in November, 1935, Fortune Magazine on &quot;The Grasslands&quot; or Webb's &quot;The Great Plains&quot; paying particular attention to animal and plant life.</td>
</tr>
<tr>
<td>B. In Oregon</td>
<td></td>
</tr>
<tr>
<td>C. General character</td>
<td></td>
</tr>
<tr>
<td>1. Climate</td>
<td></td>
</tr>
<tr>
<td>2. Topography</td>
<td></td>
</tr>
<tr>
<td>II. Character of the wildlife</td>
<td></td>
</tr>
<tr>
<td>A. Plant life</td>
<td></td>
</tr>
<tr>
<td>1. Adaptations</td>
<td></td>
</tr>
<tr>
<td>a. Stem</td>
<td></td>
</tr>
<tr>
<td>b. Roots--value to soil</td>
<td></td>
</tr>
<tr>
<td>c. Leaves</td>
<td></td>
</tr>
<tr>
<td>2. Types and shrubs</td>
<td></td>
</tr>
<tr>
<td>Why didn't overgrazing take place when buffalo roamed the plains?</td>
<td></td>
</tr>
</tbody>
</table>

## Things to Do and Think About

- Mark on your resource map sections known as the grasslands.
- Read article in November, 1935, Fortune Magazine on "The Grasslands" or Webb's "The Great Plains" paying particular attention to animal and plant life.
- Start a collection of dried grasses, or on school plot set out different types of grasses, noting their differences, especially the roots.
- Consider the value of fence corners and woodlots for shelter of wildlife.
- Why didn't overgrazing take place when buffalo roamed the plains?
a. Shrubs
b. Grasses
c. Weeds and plants with no economic value

B. Animal life

1. Upland game birds--grouse, quail, sage hen, partridge
2. Big game
   a. Types of deer, elk, antelope, and sheep
   b. Buffalo
3. The rodents
   a. Characteristics
   b. Value as soil builders
   c. Types in Oregon

III. Range use

A. Wildlife refuge

B. Grazing--brief survey and history, cycle of destruction--bison, cattle, sheep, and the plow.

C. Misuse

Mark nests for protection--or tell how you would do this.

From pictures or stuffed specimen consider the adaptations of the grazing animals for life on the plain.

Debate on the subject of the desirability of the rodents--their value and destruction.

List some factors causing the destruction of the range.

Visit loading points and note the destination of cattle and where they came from.
IV. Problems in range resource use

A. Regulation

B. Grazing in forest lands

C. Opportunities to help

D. Management

Write to the Department of the Interior for literature on the range—"The Grazing Bulletin".

List things which can be done by you as a student to help in conservation of the grasslands.

Make and obey "Keep off the grass" sign.

Suggested films:  Blessing of Grass  
(2 reels sound)  
Why Save the Elk  
(1 reel silent)
THE MARSHLANDS--THEIR RELATION TO WILDLIFE
(The Beaver--Nature's Original Conservationist)

Core Ideas

I. Oregon's marshland
   A. Extent of land bordering water
   B. Contrasted to other states
   C. Use as habitat to wildlife
   D. Value of fur and game

II. Wildlife of the swamp
   A. Characteristics
      1. Waders, fish-eaters, dabblers
   B. Bird life
      1. Water fowl
      2. Shore birds
      3. Non-game birds

Things to Do and Think About

Mark on your resource map of Oregon regions which might be classed as marshlands.

Bell cats. If ground squirrels are too abundant start a rodent extermination campaign.

Read article on "Wildlife for Marshes" in the Nature Magazine, April, 1941. Look for other articles.

Plot flyways through Oregon of migratory birds.
C. Fur bearers

1. Types of fur bearers
2. The beaver
   a. Uses other than fur
   b. History in story of fur trade

D. The Amphibians

1. Frogs and toads
2. Snakes
3. Turtles
4. Value of these less known forms

III. Cause for depletion

A. Drainage—disturbs nesting areas.
B. Drought
C. Excessive hunting and shooting

Give topic on the sea otter and fur-seal.

Make a model of a beaver dam.


Visit a fur farm.

Investigate types of sporting goods and traps at a hardware store.

Give wildlife survey in your community and determine which animals are under-populated, and which are over-populated.

Elaborate on "Birds and Fishes can't read boundary signs."

List things which could be done by students to perpetuate wildlife as a crop on a profitable basis.
IV. Management and problems

A. Legal restrictions--enforcement

B. Wintering grounds

C. Nesting and breeding problems

D. Fur Farms

E. Opportunities for the student

Suggested films: Beavers at Home
(2 reels silent)

Game Bird Farming
(1 reel sound)

Visit a beaver dam; look for not only the interesting life habits of these creatures but note in particular the value that these animals have in maintaining an even flow of water, and in the prevention of floods and erosion. (The stress on conservation should be a distinguishing characteristic of all conservation excursions.)
WATER RESOURCE, ITS RELATION TO WILDLIFE

(Good fishing requires good water)

Core Ideas

I. Oregon's water resources
   A. Types
      1. Surface
         a. Rivers and lakes
      2. Ground water
      3. Precipitation
      4. Ocean
   B. Factors influencing the water table
      1. Use by man
      2. Climate

II. Uses of water as a resource
   A. Drinking

Things to Do and Think About

Plot on your resource map some famous rivers known for fishing, power sites, etc.

Compare rainfall map of the state with the vegetation areas and areas of population.

Dig in soil to determine the moisture level. What causes it to vary?

Urge your city to dispose of sewage in other manners than dumping in the river.

Send some samples of drinking water to have them checked at the experiment station, or check them yourself.
B. Water power
C. Navigation
D. Recreation
E. Irrigation and agriculture
F. Wildlife habitat

III. Water as an animal habitat
A. Fishes
   1. Commercial
      a. Salmon
      b. Pilchard
      c. Halibut
   2. Sport fishing
      a. Marine
      b. Freshwater
   3. Shellfish
      a. Kinds
      b. Problems in farming

IV. Water-use and its relation to abundance of wildlife

Pick out some specific stream or lake and see how many uses it is put to, or could be used for.

Aid in the stocking of streams; test water beforehand to be sure proper conditions exist for fish life.

Visit fish market or cannery noting where fish come from and how used—especially by-products.

Draw a sportsman's code.

Study some fingerlings in an aquarium.

Study some specimens of clams and oysters, noting how their characteristics make for difficulty in raising.
A. Pollution

1. Source

2. Consequences
   a. To man
   b. To wildlife

3. Prevention and control
   a. Erosion control
   b. Eliminating industrial waste disposal in streams
   c. Sewage disposal plants

B. Floods

1. Causes

2. Effect on life in and along stream

3. Prevention and control of damage done by them

C. Power and Industry

1. Industrial wastes

2. Blocking streams

3. Disturbing influences

4. Oil wastes from ships

Study sample of polluted stream, as the Willamette, as to acidity, presence of foreign matter, etc.

Look for instances of stream pollution in your community and note what could be done about it.

Make signs that could be posted by streams indicating "no dumping."

Visit area after a flood and look for evidence of damage that you think was unnecessary.

Read articles on some Eastern floods; observe effect of building too near stream's edge.

Visit logging splash dam and try to determine whether this is as detrimental as some conservationists would have one believe.
E. Regularity of flow
   1. Factors changing this
      a. Natural
      b. Man-made

V. Problems of management of the water resources

A. Management
   1. Extent and cost
   2. Conflict of interest
      a. Obstruction of streams
      b. Fingerlings straying into irrigation ditches
   3. Need for stream survey in Oregon
   4. Fish propagation
   5. International treaties

B. Opportunities to help
   1. As a student
   2. As a citizen

Visit or send for bulletin on Bonneville Fish Ladders. Watch for clippings on success or failure of method.

Note effect of burning woods at the headwaters.

Write to the Bureau of Fisheries for some literature on items of special interest to you.

Make screens that could be used in irrigation ditches.

Visit a fish hatchery.

Read articles of Japanese fisherman in Alaska and Americans in Mexican waters.

List things which you as a student could be doing to help in use of water conservation--Why is the Willamette called a wet desert? What could be done about this?
Suggested films: Alaska's Silver Millions
(3 reels sound)

Forest and Water
(1 reel sound)
<table>
<thead>
<tr>
<th>Core Ideas</th>
<th>Things to Do and Think About</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I. Oregon's forest resource</strong></td>
<td>On your resource map indicate the national and state forests.</td>
</tr>
<tr>
<td></td>
<td>What lessons can the Northwest learn from the Lake States?</td>
</tr>
<tr>
<td>A. Value and Extent</td>
<td>Visit lumberyard or logging operation, watching for conservation practices and for evidences of wasteful practices.</td>
</tr>
<tr>
<td>B. Compare the present with past stands and with future demands</td>
<td>Report on or visit some recreational area as the Mount Hood area.</td>
</tr>
<tr>
<td>C. Comparison with other states</td>
<td>List the different kinds of animals and birds in the woods near your community.</td>
</tr>
<tr>
<td><strong>II. Wise use of forest resource</strong></td>
<td></td>
</tr>
<tr>
<td>A. Forest Values</td>
<td></td>
</tr>
<tr>
<td>1. Lumbering</td>
<td></td>
</tr>
<tr>
<td>2. Soil and water</td>
<td></td>
</tr>
<tr>
<td>3. Recreation</td>
<td></td>
</tr>
<tr>
<td>4. Grazing areas</td>
<td></td>
</tr>
<tr>
<td>5. Wildlife habitat</td>
<td></td>
</tr>
<tr>
<td>a. Shelter</td>
<td></td>
</tr>
<tr>
<td>b. Feed and forage</td>
<td></td>
</tr>
</tbody>
</table>
B. Multiple-use (planned use)
   1. Sustained yield
   2. Selective logging
   3. Effect on wildlife
      a. Animals of the woods
      b. Fish in streams
      c. Bird life

III. Unwise use and cause of waste
   A. Unwise logging—cut-off and get off
   B. Fires
      1. Effect on game
      2. Effect on fishing
   C. Insects
      1. Types
         a. Cambium miners, as the bark beetle
         b. Defoliators, as the gypsy moth
         c. Cambium wood borers, as flat-headed borers and locust borer

Explain that to have good fishing we must keep "Oregon green."

Protect trees from birds and small rodents by wrapping burlap around the exposed portions of the trunk near the ground.

Visit some (or study pictures) burned-over areas as the Tillamook area noting the effect on both plant and animal life.

Select Christmas trees from stands of young growth which need thinning.

Make collections of some of the insects harmful to forests. Note their adaptations and how they damage the trees.

Bring in specimens of twigs or branches that have been damaged by insects or disease.

Make insect collections of useful insects.
d. Pinhole borers, as the ambrosia beetle

e. Borers in seasoned wood, as the termites

2. Control and prevention

a. Quarantine

b. Indirect control by birds and fungus
c. Direct control

3. Other insect pests in Oregon

4. Birds as a very effective means of control.

D. Disease

1. Kinds in Oregon

a. White pine blister rust

b. Decay fungi

2. Control and symptoms

E. Interrelationships between fire and insect devastation and disease

Gather waste wood for fuel rather than cut down young trees in woodlot.

Study the different means for controlling insect pests. Which is most practical in your region?

Make a bird calendar or list of birds in a Hall of Fame for those of benefit to man.

Visit an orchard. Observe the amount of fruit taken by birds. Try to decide if these birds are more harmful than useful.

Bring in twigs which have evidence of disease; report such to proper authorities.
F. Depredations by the public
   1. Pulling up shrubs
   2. Looting lots for Christmas trees

IV. Other values of trees
   A. Beauty and shade
      1. Common enemies to these
   B. Factors to consider in planting trees
      1. Root systems
      2. Type of soil
      3. Location
   C. Types of rare trees and some not common to Oregon

V. Forests and flowers
   A. Flowers as wildlife
   B. Reasons for protecting flowers
      1. Aesthetic
      2. Extermination a crime in the eyes of the biologist

Elaborate on the idea that if a resource is natural it is free to all.

Start a Christmas tree plantation.

What is meant by air-pollution, and what is its effect on trees?

Plant a school forest, or set out some shade trees in school yard or along roadside. Use the idea of a class tree. Shrubs and vines also have value in landscaping.

Give report on the Joshua trees of the Southwest or some other unusual trees.

Make a list of flowers in your community:
   a. Which should never be picked
   b. Which should seldom if ever be picked
   c. Can be picked in moderation
   d. Those that can be picked indiscriminately.
C. Cause of destruction
   1. Destruction of habitat
   2. Excessive picking
   3. Invador plants

D. Undesirable plants
   1. Poison oak
   2. Parasite hosts—gooseberry bushes

VI. Management and problems
   A. Government problems in management
   B. Individual opportunities to help
      1. As a citizen
      2. As a student

Suggested films: Big Game and the National Forests
                (1 reel silent)

                Forest and Streams
                (1 reel silent)

                What the Forest Means to You
                (2 reels silent)

Write to some flower conservation club and send for literature.

Read article on poison ivy in the Readers Digest, June, 1941.

List things which can be done in and out of the classroom to keep Oregon green.

Improve the school lawn or that of your home.
WILDLIFE AS A CROP

Core Ideas

I. Oregon's wild animal resource
   A. Value and extent
      1. Contrasted with past
         a. Future outlook
      2. Contrasted with the other states
   B. Value or use (forms of benefit)
      1. Fur, meat, and feather
      2. Recreation
         a. Sport
         b. Aesthetic
      3. Conservation of soil
         a. Dam and borrow building

Things to Do and Think About

On your resource map check location of the wildlife as to kind—general classification.

Report to proper officials instances of violations of game laws and unfair hunting practices.

Get and become familiar with the state game laws.

Visit some cold storage lockers where elk carcasses are stored.

Visit or read up on the state and national park system.
C. Factors determining population

1. Habitat—food, cover, shelter
2. Freedom of molestation—breeding
3. Regulation by man
4. Biological factors
   a. Animal interrelationships—predators, enemies
   b. Disease and parasites
5. Climate—drought, wet spells

II. How man upsets the natural ecology

A. Introduction of exotic species
B. Rare and vanishing species
   1. Due to overshooting
   2. Limiting habitat
   3. Hunting for fur and feathers
C. By providing bounties
   1. Fallacies of bounty system
D. By removing natural foes

Observe use made of fence corners by resident game.
Provide shelters for wildlife.
Look up some life chain of inter-predation.
Determine effects of weather on wildlife.
Build bird shelters; provide feed in winter.

Investigate California border patrol.
Find out what they bar. Should Oregon have some plan?
Visit millinery shop or study old hats to find out which birds have suffered in the past from styles in fads and feathers.

Explain—"There is some good in the worst." Apply to coyote, cougar, and carp.
E. Raising domesticated animals and plants that require cultivation.

III. What the state and national government have done to help our wildlife
   A. Established restoration areas
   B. Limiting season and take
   C. Provides winter feed
   D. What you can do to help
      1. As a citizen
      2. As a student

Investigate game laws for some particular area.
Plot on your map the restoration areas and refuges.
List things you can do to help keep and increase the wildlife population and resource of Oregon.

Suggested films: Recreation
(3 reels sound)
Our Wildlife Resource
(2 reels silent)
Evaluation:

I. Of an understanding of factual knowledge

The usual objective and essay type examination could be used in the proposed unit. Questions like "what is the truth about hawks" and "discuss the stream pollution problem of the Willamette River" are examples of the latter. If they are used it might be well to make reference to local situations with which the student is familiar. Objective tests too might be more worthwhile if where feasible the same practice is followed. The construction of the usual true and false, completion, multiple choice, and matching tests is a matter concerning each individual teacher. Vocabulary building is important and objective tests are one means by which a conservation vocabulary could be taught.

II. Of appreciations, attitudes and skills

A "What We Have Been Doing" chart is a suggestion which can be revised as the situation warrants. Evaluation of each pupil's efforts from participation in the suggested activities can be made, remembering the quality and quantity of activities done by the student must be judged in respect to the opportunity
available. Particular attention should be given to display of initiative, not only for suggestions but as to activities actually completed.

An evaluation devise that may be used in grading other than test results is an evaluation of efforts in respect to such items as interest, initiative, tolerance, cooperation, respect for others, willingness to withhold judgment, and others as they pertain to conservation.

An evaluation devise that might be used to grade the activities and student effort is to make the evaluation in respect to interest, initiative displayed, tolerance, work completed, cooperation, observation, willingness to withhold judgment, and other traits as they pertain to conservation. This might be done in two ways; chronologically, recording the activities as they occur; and an evaluation of each student as to the characteristics mentioned.

An example of the chronological record which might be posted for class display is:

May 1--Anne brought to class pictures of the Bonneville fish ladders.

May 1--Bert completed building a bird bath and feed rack.
May 3--Clyde brought to class a sample of twigs he thought had evidence of decay fungi.

May 4--Doris called attention of the class to a clipping on the successful use of screens in irrigation ditches.

An example of student evaluation is:

<table>
<thead>
<tr>
<th></th>
<th>Interest</th>
<th>Initiative</th>
<th>Work Started</th>
<th>Work Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anne</td>
<td>B</td>
<td>A</td>
<td>B</td>
<td>A</td>
</tr>
<tr>
<td>Bert</td>
<td>C</td>
<td>C</td>
<td>B</td>
<td>A</td>
</tr>
<tr>
<td>Clyde</td>
<td>A</td>
<td>B</td>
<td>A</td>
<td>C</td>
</tr>
<tr>
<td>Doris</td>
<td>A</td>
<td>A</td>
<td>C</td>
<td>C</td>
</tr>
</tbody>
</table>
SELECTED REFERENCES FOR STUDENT-USE

(Taken from several sources of selected bibliographies)

After examination of available materials, the following books are suggested not necessarily as a complete list but as a group of materials as to date. In most instances they should prove helpful to the student of high school age in Oregon.

Baer, Marian E. Pandora's box: the story of conservation. New York, Farrar and Rinehart, 1939. (§2)


Lord, Russel. To hold this soil. 1938. (Miscellaneous publication of the United States Department of Agriculture, U. S. Gov't. Printing Office. (45%)

Oregon State Board of Higher Education. Physical and economic geography of Oregon. Corvallis, Oregon, Oregon State College Press, 1940. (§2)

Pearson, Harlow S., and others. Little waters. U. S. Gov't Printing Office, 1936. (75%)

Sears, Paul B. Deserts on the march. Norman, Oklahoma, University of Oklahoma Press, 1935. ($2.50)

Sears, Paul B. This is our world. Norman, Oklahoma, University of Oklahoma Press, 1938. ($2.50)

Some magazines—send for sample copies.


News on the Wing, newspaper of the Junior Audubon Clubs, (club membership 10¢ per year per child)

Outdoor America, Izaak Walton League of America, 1157 Merchandise Mart, Chicago, Ill.
A SELECTED LIST OF REFERENCES FOR TEACHERS AND MORE MATURE STUDENTS

(To be used in connection with the proposed unit)


Gabrielson, Ira, and Jewett, Stanley F. Birds of Oregon. Corvallis, Oregon, Oregon State College, 1940. ($5)


Leopold, Aldo. Game management. New York, Charles Scribners, 1933. ($5)

Oregon State Planning Board. Oregon's wild life resource. The State Planning Board in cooperation with the Works Progress Administration, 1936. (out of print) (free)

Peavy, George W. Oregon's commercial forests. Oregon State Board of Forestry, Bulletin No. 2, 1929.


The following annotated references constitute some of the best practical source materials on conservation education available for the Northwest. The use of these should be of help to anyone interested in teaching conservation; as a further suggestion mention is made of the many free and inexpensive materials issued by both state and federal agencies. These are usually free from bias, which is not true of all publications issued by some private organizations.

Annotated List of Sources of Information on Conservation

I. "Good references for conservation education in the secondary schools"

"Good references for conservation education in the elementary schools"

Both are bulletins put out by the Office of Education, U. S. Department of Interior, Washington, D. C.; they have annotated bibliographies, sources of supplementary materials and good references. 1938. Free.

II. "Conservation excursions"


A practical handbook listing places to visit and things to do for teaching conserva-
tion; has a selective bibliography but is largely devoted to purposes and uses of excursions with ideas on preparation, things to do on the trip, and follow-up activities. 106 pages. (15c) For sale at the Superintendent of Documents, Washington, D. C.

III. "Pacific Northwest Resources in Outline"

Prepared by the Northwest Regional Council, 606 Bedall Building, Portland, Oregon. Prepared as a concise guide to the study of the natural and economic resources of the Pacific Northwest. Aims to provide educators with a tool to aid them in developing curriculum and instructional materials as well as source units. Lists an extensive bibliography after each resource outlined. 56 pages. (25c)

IV. "Conservation Education in the Northwest"

A syllabus prepared by W. F. McCulloch and used in a course on Conservation Education at Oregon State College. Obtainable at the Forestry Building at Oregon State College, Corvallis, Oregon.

A comprehensive treatment of the problem of conservation and conservation education with many practical aids, including lists of materials and where they are obtained. Selected bibliographies for both students and teacher on each phase of conservation. Part of the syllabus is devoted to lists of activities for teachers, background references, bibliographies, teaching aids, audio-visual aids, and sources of free and inexpensive materials. A very complete and up-to-date reference on conservation education. 120 pages. (51)
CHAPTER V

SUMMARY AND CONCLUSION

This thesis on conservation education consists of two major divisions: (1) the study which includes the questionnaire, correspondence, and an analysis of library materials, and (2) a suggested source unit on wildlife conservation which is intended as a practical aid to teachers interested in conservation. The unit was constructed in light of the trends indicated by the study and special stress is made of its application to Oregon.

Implications of the Study

Conservation is coming into its own. Though many problems in conservation instruction are not settled, the importance of the problem is quite apparent to anyone who has investigated it. Building an attitude of conservation consciousness toward all of the nation's natural resources is the essence of conservation education. To a state blessed with the natural resources which still are Oregon's, it is even more important lest it become too late to learn from the lessons taught in the Lake States.
The school is only one among several channels through which conservation can be taught, but it is one of the most important. Not only the future citizens can be taught the necessity of conservation of our natural resources, but the parents of these children can be taught indirectly through a good program of conservation education in the schools.

It does not suffice to have a teacher in one course to be assigned the responsibility for all the conservation instruction in the school. While it could be taught in almost any course, some courses in the present curriculum lend themselves better than do others to the inclusion of conservation materials.

To teach conservation at every appropriate time in any course has its merits, but some direct teaching on the principles of conservation is generally agreed necessary and desirable. In the secondary schools this is usually done in the social studies or in a science course. As the biological basis for conservation can most appropriately be presented in biology, it is suggested that biology is the most logical course in which to acquaint the student with the principles of conservation. In such a course the scientific rather than an emotional approach is more likely to be taken. Furthermore, any ecological study
demands that interrelationships be stressed rather than some single phase of the conservation problem.

This thesis is intended to show that conservation education is a recognized need and that it can be brought about in different ways. The suggestions proposed from the study are in no sense intended to constitute an ultimate answer. It is hoped, however, that it will answer to a degree the generally acknowledged need (for Oregon particularly) for prepared materials--units, bibliographies, and references. In a field as comprehensive and increasing rapidly as conservation education, no unit can be expected to remain up-to-date without revision.

If the study serves to stimulate interest in conservation education and in a measure helps those who are willing to "put their shoulder to the wheel" then the time and effort spent in the preparation of this thesis will have been to some avail.
Conclusions

The data presented in this study are believed to warrant the following conclusions:

1. Conservation instruction is necessary and is important enough to be considered an important part of the curriculum in the public schools of the United States today.

2. Conservation instruction to be effective should be integrated into subjects in both the elementary and secondary schools.

3. Secondary school science, and especially biology, is one of the most appropriate places in the curriculum where conservation education principles can be taught.

4. The need for conservation materials which can be used in the schools is being met by both governmental and private agencies.

5. Conservation education is concerned with attitude building but as yet there is much to be learned of just how conservation-consciousness can best be brought about.
Suggestions for Further Study

1. A detailed history of conservation in Oregon.


3. Teacher training in the United States on Conservation Education.

4. Our non-renewable resources and their conservation as taught in the public schools.

5. Clubs and conservation activities.

6. A study of some common misconceptions held regarding resources and resource use.


8. A measurement by means of attitude tests of the changes brought about in children and adults through educational devices: lectures, visual aids, reading.
BIBLIOGRAPHY
BIBLIOGRAPHY

Note: Materials mentioned in the previous unit are not included in this bibliography, which consists of all reference material. The complete list of textbooks analyzed appears in the Appendix.


14. Ketchum, C. D. Teaching aids in conservation for the senior high school; unpublished unit used by the Appleton Wisconsin High School, Appleton, Wisconsin, 1938.


17. McCulloch, W. F. Conservation education in the northwest, a syllabus used at Oregon State College, Corvallis, Oregon, 1941.


21. Oregon Department of Public Instruction. Planning for permanent benefits from the land. (Reprint issued by Rex Putnam of unit on conservation from the high school social studies course of study) Salem, 1939.


24. Oregon State Planning Board. Oregon's wild life resource, a report by the advisory committee on wildlife and research staff submitted to the governor of Oregon and the legislative assembly December 1936. The State Planning Board in cooperation with the Works Progress Administration. 1938.


27. The Reporter, a four page publication put out by the National Wildlife Federation, Washington, D. C. First issue Jan. 1, 1940 and bimonthly since then.


29. United States Department of Agriculture, Division of Information and Education, Forest Service. A series of units for high school teachers of social studies and science. 1940.


APPENDIX
Enclosed you will find a brief questionnaire which I am sending to the Superintendents of many Oregon high schools to ascertain what is being done, and what schoolmen think should be done in respect to teaching Conservation of Natural Resources in Oregon schools.

The results of this survey will be used by the Oregon State Department of Education as well as serve as a part of a Master's thesis on which I am working. Should you desire a copy of the summarized results, please send me a stamped, self-addressed envelope.

The questionnaire can be answered with checkmarks; no writing is necessary. However, I will be glad to receive any comments or expressions of opinion you might have to make about teaching Conservation.

Your cooperation will be greatly appreciated; a self-addressed, stamped envelope has been enclosed for your convenience.

Sincerely,

Professor of Science Education at Oregon State College

Stanley A. Sprecher
TEACHING CONSERVATION OF NATURAL RESOURCES
IN THE SECONDARY SCHOOLS OF OREGON

Please check as directed:

1. The Conservation of Natural Resources is being taught in our schools at present...directly or indirectly.       Yes ___ No ___

2. If so, the greatest emphasis in Conservation Instruction takes place in our school system during:

   ___ the elementary grades
   ___ in the secondary school
   ___ equal emphasis in both

3. The teaching of Conservation of Natural Resources in our secondary school is:

   ___ in connection with the social studies
   ___ in connection with the science classes
   ___ biology
   ___ general science
   ___ both
   ___ some other way (if so, indicate method used)

4. Whether Conservation is taught in our school depends upon:

   ___ the personal desire of the individual teacher
   ___ the superintendent
   ___ the school board

5. In those classes where Conservation is taught, check the type of materials that are used:

   ___ references as made in the textbook only
   ___ anything the teacher wishes to use
   ___ special aids prepared for Conservation Instruction

Questions of opinion--

1. Teaching of Conservation can be brought about in several ways. Please check the method you think would be most effective.
by a state law requiring it
leave it up to the school board and superintendent
leave it up to the individual teacher but require as a part of teacher-training some Conservation Instruction
any other ways (if so, please make suggestions)

2. Conservation could be best introduced into the curriculum:

as a separate subject
as a part of an integrated program
in connection with the social studies
in connection with the science courses
any other way (if so, please make suggestions)

3. Which of the following phases of Conservation should be stressed the most in Oregon schools:

land and water resources
forest resources
wildlife and recreational resources
mineral resources
all equally important

4. At what age do you think Conservation would be most effective in building proper attitudes:

pre-school
elementary school
secondary school
in all the grades
APPENDIX
B
Enclosed you will find a short questionnaire which I am sending to the State Departments of Education in the forty-eight states. The purpose of the survey is to ascertain what is being done in teaching Conservation in the secondary schools of the United States.

The results of this will be used by the Oregon State Department of Education and will also be used as a part of my Master's thesis. Should you desire a copy of the summarized results, please send me a stamped self-addressed envelope.

The questionnaire is so designed that it can be answered in a very short time by using checkmarks; no writing is necessary. However, I will welcome any comments and suggestions you might care to make relative to the teaching of Conservation. If your department has prepared any materials on Conservation Education, I would appreciate receiving whatever you have available. In answering the questionnaire, please omit any items on which you are not certain--this refers to the questions of fact rather than the questions of opinion.

Your cooperation is appreciated; a self-addressed, stamped envelope has been enclosed for your convenience.

Sincerely,

Professor of Science  
Education at Oregon State College  

Stanley A. Sprecher
TEACHING CONSERVATION OF NATURAL RESOURCES IN THE SECONDARY SCHOOLS

Please check as directed:

1. The teaching of Conservation of Natural Resources should have a place in the secondary school curriculum. Yes ___ No ___

2. Whether or not Conservation Instruction takes place in our state
   ___ depends upon the individual teacher
   ___ is left up to each school system
   ___ is dependent upon the recommendation of the school department
   ___ is required by state law
   ___ is carried out some other way (if so, how)

3. The greatest emphasis in teaching Conservation in our state takes place:
   ___ in the elementary schools
   ___ in the junior high school
   ___ in secondary school
   ___ considered equally important in all 12 grades

4. Some states have printed materials on Conservation prepared for schools. Check the type provided and available in your state.
   ___ bulletins serving as teacher aids
   ___ printed materials that can be used by students
   ___ nothing provided by any state department or agency

5. Two types of materials can be used. Check that which you think would be most suitable for the schools in your state.
   ___ separate organized units that can be given to the teacher so that Conservation is taught directly.
   ___ materials that can be incorporated into the existing units already established, that is indirectly.
6. Conservation Instruction may be introduced into the curriculum in several ways. Please check the way you consider best.

- as a separate subject
- as a part of an integrated program
- incidentally as the teacher desires in any subject
- in connection with the social studies
- in connection with the sciences
  - biology
  - general science
  - both
- some other way (if so, please indicate what)

7. At what age do you think Conservation Instruction would be most effective in building proper attitudes:

- pre-school
- elementary school
- secondary school
- to be effective should be taught in all 12 grades
APPENDIX C


