

A COMPREHENSIVE EVALUATION OF
VIRGINIA'S HUNTER EDUCATION PROGRAM

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(ABSTRACT)

Hunter education began in the 1930's and 1940's in response to an increasing number of hunting accidents. Early programs focused on gun safety. Later, emphasis shifted to a balance between gun safety and hunter ethics.

Virginia's Hunter Education Program in 1980 had been operating on a voluntary basis for 20 years and had more than 250,000 graduates. The program was six hours in duration and was taught by game wardens and volunteer instructors. Classes were given to anyone 12 years of age or older, but students in public schools were the primary targets.

Though Virginia's program had been in effect for many years, no formal evaluation as to the effectiveness of hunter education had been conducted. The present study was designed to provide a comprehensive evaluation of Virginia's Hunter Education Program. The study was conducted in three phases.

Phase one involved development of a new student examination for use in pre- and post-test knowledge assessment. Seven typical hunter education classes and one class of game warden recruits were tested in 1982. Test scores improved approximately 16 percent. The

hunter education program seemed to be increasing students' knowledge of safe and ethical hunting. However, due to design and measurement weaknesses, no strong conclusions about the effectiveness of the hunter education program in improving students' knowledge can be made.

Phase two was a participant observational study of dove hunters at two wildlife management areas in Virginia. The purpose of this phase was to compare hunting behavior of hunter education graduates versus those hunters who had not taken the course. The 112 hunters observed during the 1981 and 1982 season were later mailed a questionnaire designed to gather information on the individual hunter's experience, interest in, commitment to, and knowledge of hunting as well as some demographic characteristics. Observational and questionnaire data were combined into 32 variables and correlated with the hunter education variable. No meaningful correlations were found. Therefore, hunter education seemed to have little effect on hunters' behavior in the field.

Phase three was a naturalistic inquiry evaluation of how the program was being implemented and received throughout Virginia. In-depth interviews were conducted with 57 people closely involved with hunter education. The primary purpose of this phase was to discover problems in the program and recommend solutions. The primary problems were lack of effective leadership and lack of internal agency support. Major recommendations included moving the

entire program into the Education Division and creating a strong hunter safety coordinator position.

Overall, the three-phased evaluation revealed that Virginia's Hunter Education Program lacked effective leadership, was being poorly implemented, and seemed to have little effect on hunters' behavior in the field. Though these results were obtained in Virginia, the investigator believes that the same results might apply to most other hunter education programs across the country.

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CHAPTER I

INTRODUCTION

The future of sport hunting in America has been threatened from within by "slob" hunters and others who fail to approach the sport of hunting from a safe, ethical, and lawful standpoint. Although hunter education has been taught for more than 30 years in many states, depreciative hunting acts continue to be committed.

The need for effective hunter education programs is growing. Not only are the anti-hunting forces continuing to use well funded propaganda, legislative and judicial campaigns, but also fewer and fewer Americans are growing up with the tradition of hunting. The 80 percent of the public that neither hunts nor is strongly against hunting suspects that hunters are liable to shoot one another, leave animals suffering in the woods and fields, and that hunters are generally inept (Rohlfing, 1979). In a recent study of landowner-sportsman relations in central Virginia, which is about as rural an area as can be found in the eastern United States, a fourth of the landowners claimed hunters damaged fences and gates, nearly half reported damage to farm roads and fields, and over half had experienced trespass (Bromley and Hauser 1984). Without doubt, unsafe, illegal, and unethical behavior by sportsmen threatens the tradition of public hunting in this country. The seriousness of this threat has been recognized by the International Association of

Fish and Wildlife Agencies (IAFWA). Their report "Hunter Education in the United States and Canada with Recommendations for Improvement", published in September 1981, contained important suggestions for existing hunter education programs, including a call for evaluating program effectiveness. Before changing an existing hunter education program or implementing a new program component, a thorough evaluation should be conducted.

Although hunter education programs have been in effect in the United States for more than 30 years, attempts to evaluate these programs have been initiated only recently. Since specialized evaluation of hunter education is such a recent phenomenon, many administrators may not be aware of the purposes and limitations of evaluation efforts. In fact, many administrators might raise the question of why hunter education programs should be evaluated at all. Since evaluation of nearly all government programs is becoming increasingly important, there must be some valid reasons behind evaluation. Some of the commonly espoused reasons for evaluation are: (1) to insure accountability; (2) to increase support for programs within an agency; (3) to determine the appropriateness of program objectives; (4) to determine whether objectives are being met; (5) to ascertain why objectives are or are not being met; (6) to suggest changes in program direction and management in order to accomplish goals and objectives (Brown 1971, Cooley and Lohnes 1976, Fitz-Gibbon and Morris 1978, House 1978, Morsund 1973, Patton 1980, Wentling 1980, Worthen and Sanders 1973).

After 20 years in operation, the Virginia Commission of Game and Inland Fisheries decided to seek answers to questions regarding program effectiveness through an evaluation of the Virginia Hunter Education Program. If the program was found to be deficient, recommendations for improvement could be developed and implemented. If the program was achieving its goals, both agency and external support would have been increased.

The basic approach to evaluation entailed assessment of hunter education program students' knowledge (via pre- and post-tests), systematic observation of the hunting behavior of hunter education graduates compared to hunters who had not participated in the hunter education program, and a naturalistic inquiry evaluation of the entire program.

OBJECTIVES

The evaluation of the Virginia Hunter Education Program was formative, meaning that the goal was to develop recommendations for improvements. A summative evaluation, where a decision is made to either continue a program or end it, was deemed inappropriate.

The objectives of the Virginia Hunter Education Program evaluation were:

1. To determine the effectiveness of the hunter education program in increasing the hunting and safety knowledge of students who participated in the program.
2. To determine if hunting behavior in the field was different for hunter education graduates than for hunters who had not participated in the program.
3. To conduct an overall Naturalistic Inquiry Evaluation of the Virginia Hunter Education Program in order to locate program strengths and deficiencies and make recommendations for improvement.

BACKGROUND

In order to place the current research effort into proper context, a brief outline of hunter education in the United States and Virginia's Hunter Education Program will be presented. In addition, an overview of evaluation and the complexities of evaluation will also be outlined. Also, the need to use more than one research strategy in evaluation will be stressed. Finally, the necessity of using unobtrusive measures in the field observational phase of the evaluation will be discussed.

History of Hunter Education in America

The following is a highly condensed history of hunter education in America. A more detailed history of hunter education was presented by Smith (1981). Therefore, a detailed description will not be presented in this study.

The history of hunter education in America is a relatively brief one. Evenden et al. (1981) cited some early concerns of the International Association of Fish and Wildlife Agencies such as a report at the third annual meeting in 1906 that some hunters were shooting as many as 150 ducks per day. Also, in 1928, the Izaak Walton League published their "Outdoor Ethics Code" which stressed safety and respect for others, property, and wildlife.

The National Rifle Association first considered a hunter safety course in 1938, but deferred action until after WWII (Even-den et al., 1981). Officially, hunter education started in the 1940's with voluntary programs in Kentucky and New Hampshire and with mandatory programs in New York (1949) and California (1954). The National Rifle Association, in coordination with the National Education Association, developed student and instructor training manuals in the late 1940's.

The North American Association of Hunter Safety Coordinators was formed in 1972 and became affiliated with the International Association of Fish and Wildlife Agencies in 1975. U.S. Federal Aid funds were made available for hunter education in 1971, and in 1973, USFAID regulations set a minimum course length of six hours for hunter education programs. This minimum course length was expanded to 10 hours in the early 1980's.

Throughout the history of hunter education, the National Rifle Association has worked with the states to develop and expand hunter education programs. The trend has been to shift emphasis from hunter safety to hunter ethics and hunter responsibilities to landowners, wildlife, and other hunters. As hunting opportunities continue to decline, this shift in emphasis will continue to occur.

The Virginia Hunter Education Program's Status in 1980

In 1980, the Virginia Hunter Education Program was voluntary,

had been in place 20 years, and had more than 250,000 graduates. The basic program consisted of six hours of classroom instruction covering: (1) Hunters and Hunting; (2) Safety Basics; (3) Guns and Ammunition; (4) Shooting Basics; (5) Gun Handling; (6) Muzzle Loading; (7) Bowhunting; and (8) Outdoor Skills. Normally, a 50-question examination was given to each participant and those passing with an overall score of 70 percent received a certificate of completion from the Virginia Commission of Game and Inland Fisheries.

Classes were given to anyone 12 years of age or older. Great emphasis was placed on conducting classes in the public school system, usually through physical education courses. However, other classes were offered to private hunting and fishing clubs or any group of any size interested in becoming certified hunter education graduates. Responsibility for administering the course at the county-level was shared by the local game warden and a volunteer coordinator. Educational materials, slides and projectors were available to certified instructors from the coordinator.

The hunter education instructors consisted of Commission game wardens and citizen volunteers. To become a volunteer instructor, a person must have been a resident of Virginia and 21 years of age. Potential instructors underwent an eight-hour training session covering the same material as the basic course plus an additional two hours of instruction on teaching and teaching methods. At the conclusion of the instruction, an examination was given and those

passing with a score of 70 percent received certification as hunter education instructors. These instructors were listed on a national roll of the National Rifle Association. To retain their certification, instructors had to conduct at least one basic class during the year following certification.

As stated by the Virginia Commission of Game and Inland Fisheries (Project W-64-S 1980), the goals of Virginia's Hunter Education Program were: (1) to increase the number of ethical and responsible hunters in the field; (2) to minimize the number of hunting accidents; (3) to upgrade the skill of Virginia's hunters; (4) to provide Virginia hunters with a better understanding and appreciation of the principles of wildlife management and wildlife identification; and (5) to develop a corps of volunteer hunter education instructors. These goals and objectives provided an overall basis for evaluating the effectiveness of Virginia's Hunter Education Program.

DISSERTATION ORGANIZATION

The dissertation is presented in six chapters. Chapter I outlines the need for evaluation of Virginia's Hunter Education Program, and provides a brief history of hunter education in Virginia and the United States.

Chapter II details the concept of evaluation, evaluation design, validity, threats to validity, the need for triangulation of research methods, and, finally, the use of unobtrusive measures in social research.

Chapter III presents the first phase of the evaluation; assessment of hunter education student knowledge gain using pre- and post-tests. As part of Phase One, a new student examination was developed in conjunction with hunter education personnel.

Chapter IV presents the second evaluation phase involving participant observation of Virginia dove hunters. This phase of the research was designed to compare hunting behavior of untrained hunters versus graduates of the hunter education program.

Chapter V, the third phase of the study, presents the findings of the naturalistic inquiry evaluation. This portion of the evaluation was designed to assess the quality of Virginia's Hunter Education Program and how well it was being implemented throughout the Commonwealth.

Finally, Chapter VI presents an overall summary of the comprehensive evaluation findings and conclusions. In addition, some suggestions for future evaluation research in hunter education are presented.

CHAPTER II

EVALUATION

Evaluation is a broad undertaking and can be approached from many different perspectives. The following is a general, but not exhaustive, discussion of evaluation and evaluation issues.

Evaluation Defined

One of the most important considerations is deciding exactly what is meant by the term "evaluation." There are many definitions in the educational evaluation literature. Cooley and Lohnes (1976) defined evaluation as the process by which relevant data are collected and transformed into information for decision making. House (1977) defined evaluation as an act of persuasion. Worthen and Sanders (1973) defined evaluation as the determination of the worth of a thing. This list could go on indefinitely. However, the important point is that different evaluators using different definitions of evaluation can come up with highly varied results. How an evaluator defines evaluation will determine the approach taken toward the evaluation process.

Object of Evaluation

It is extremely important to determine exactly what is to be evaluated at the outset of any evaluation. Wentling (1980) listed four major components to consider: (1) context; (2) input; (3) process; and (4) product. Context evaluation is utilized when a program or course is first being planned and is used to define the environment in which a program will take place, to discover the environment's unmet needs (e.g. student needs, community needs, and state needs), to identify some of the constraints and problems underlying those needs, and to discover the opportunities for meeting those needs which already exist in the environment. For example, a context evaluation could be conducted in a state not currently having a hunter education program to assess the needs and constraints for such a program.

Input evaluation involves identifying and assessing the capabilities of the instructional or training agency and alternative strategies to achieve identified goals and objectives. For example, this type of evaluation could determine the feasibility of a state game and fish commission's educational division conducting hunter education programs.

Process evaluation can determine if the program is being implemented as originally planned. Such important topics as interpersonal relationships among staff, performance of teachers, adequacy of communication channels, and logistics are analyzed.

Product evaluation is conducted to determine the degree to which goals and objectives have been met--that is, the effectiveness of the program after implementation. The most commonly measured product is student achievement. For example, the tests given at the completion of a hunter education course could be analyzed and related to the educational objectives of the program.

The Evaluation Audience

Any evaluator must constantly keep in mind the primary audience to which his evaluation results will be directed. For hunter education programs, the primary audience usually will be the education division of the state game and fish commissions. However, other important audiences may include the sponsoring agency, the National Rifle Association, the students, the community, the state, and possibly other states with similar programs. By knowing the evaluation audience, an evaluator can present his results in a manner likely to result in needed changes in the program.

Evaluation Decisions

Two types of decisions generally have been identified in educational evaluation, formative and summative. Formative evaluation looks at on-going programs with the purpose of making improvements. Summative evaluation may use the same approaches as formative evaluation. However, the emphasis is on deciding whether or not to continue a program or project. Therefore, most hunter

education program evaluations will be formative in nature since there is an overwhelming consensus among wildlife specialists and the public in general that education of hunters is a necessity if hunting is to continue as a sport.

Evaluation Experts

The question of who should conduct the evaluation is an important one for hunter education. Internal evaluations may provide some useful information to administrators, but they may lack objectivity. Therefore, it is recommended that evaluators from outside the agency be employed. These evaluators should be thoroughly familiar with evaluation methodology and educational measurement. In addition, the evaluators should themselves be hunters, especially if field observation of hunting behavior is involved. Jackson and Norton (1979) indicated that their evaluation of Wisconsin waterfowl hunters could have only been conducted by hunters. These researchers received tremendous cooperation from hunters in the field, an obvious advantage in any research effort.

The approach of using outside evaluators does not negate the importance of securing cooperation from agency personnel, especially in the initial phases of the project. Since many hunter education programs recruit volunteer instructors, cooperation at all levels is a necessity. This cooperation can be hampered if agency personnel fear being evaluated or feel that money spent on an evaluation could be spent on the program itself. To insure

cooperation, evaluators should stress that the purpose of the evaluation is to help agency personnel improve the program.

Another benefit of encouraging agency personnel support is that the results of the evaluation will more likely be used in making program improvements.

Evaluation Models

A model may be defined as a description or analogy intended to represent the principal elements of reality. There are many types of models used in educational evaluation. Evaluation models can be classified as goal attainment models, intrinsic judgmental models, extrinsic judgmental models, and decision facilitation models (Popham 1975). The type of model chosen will dictate the general evaluation approach, suggest various designs, and determine the types of data that are collected.

Goal attainment models entail determining objectives, measuring learner outcomes, comparing the extent to which objectives are achieved, and judging the merits of the program based on achievement of objectives. In measuring student achievement, this class of models emphasizes behaviorally stated educational objectives.

The intrinsic judgmental models emphasize the use of professional judgment in comparing attributes of a program to specified standards. If the attributes exceed the standards, then the program is successful. This model is often used in school accreditation. Since intrinsic criteria are used, judgment of the process

rather than the product is involved.

The extrinsic judgmental models again emphasize professional judgments in assessing merit or worth of a program. However, the focus is on the product of the program. Here, the evaluator assumes no responsibility to offer alternatives to the current program.

In the decision-facilitation models, the evaluator becomes an information provider. Other decision-makers utilize the provided information in assessing merit of a program.

In practice, most evaluators select portions of the various models to fulfill their particular needs. This approach is justified since no one model could ever suffice for all types of evaluation.

Evaluation Design

An evaluation design is a plan that dictates when and from whom measurements will be taken (Fitz-Gibbon and Morris 1978). A design is basically a strategy for gathering comparative information so that results from the program being evaluated can be placed within a context for judgment of the program's worth. Designs may be qualitative or quantitative.

In a comparison of quantitative versus qualitative evaluation methodology, Patton (1980) presented two alternative paradigms of evaluation measurement. The most dominant, the hypothetico-deductive paradigm, assumes quantitative measurement, experimental

design, and multivariate, parametric statistical analysis to be the epitome of "good" science. The alternative, the holistic-inductive paradigm comes from the tradition of anthropological field studies and uses techniques of in-depth, open-ended interviewing and personal observation. The hypothetico-deductive paradigm aims at prediction of social phenomena whereas the holistic-inductive paradigm strives for understanding of social phenomena. The former conflict of choosing between these two paradigms has slowly been replaced by a new paradigm of choices along a continuum ranging from purely quantitative to purely qualitative (Patton 1980).

The inductive-holistic paradigm utilizes qualitative data which consist of detailed descriptions of situations, events, people, interactions and observed behaviors; direct quotations from people about their experiences, attitudes, beliefs and thoughts; and excerpts from documents, correspondence, records, and case histories (Patton 1980). The qualitative evaluator strives to capture what people have to say in their own words and from their own frames of reference. Qualitative data describe the experiences of people in depth and in detail and are derived from an open-ended approach to investigation. The purpose of using open-ended questions is to enable the researcher to understand and capture the points of view of other people without predetermining those points of view through prior selection of categories such as in a questionnaire. The qualitative evaluator simply provides a framework

within which the respondent can accurately represent his point of view in his own terms. This approach aids in minimizing preconceptions on the part of the evaluator. The major tool of the qualitative evaluator is the in-depth interview.

Related to the holistic-inductive paradigm, the strategy of qualitative evaluation is to choose methods that permit understanding phenomena, situations, and programs as a whole. This strategy is inductive in that the evaluator does not impose pre-existing expectations on the research setting and utilizes specific observations to build toward general patterns (Patton 1980). Understanding of program activities and outcomes emerges from experience with the program, and any theories developed come from this experience rather than having a theory imposed a priori upon the research via specification of main variables and research hypotheses. Patton (1980) termed this approach to evaluation as naturalistic inquiry, a procedure whereby the evaluator does not attempt to manipulate the research setting but seeks to discover what the primary dimensions of the phenomenon under study actually entail.

Qualitative evaluation is amenable to the use of models in a manner similar to quantitative evaluation. Patton (1980) in a review of eight evaluation models proposed by House (1978) judged three models to be highly compatible with the qualitative approach (the transaction, goal-free, and decision-making model). Although these models are valuable in certain settings, Patton (1980) strongly stressed that the practice of evaluation requires more

flexibility than can be provided by any single model.

Since the concept and use of single models was deemed inadequate, Patton (1980) proposed going beyond models to the concept of utilization-focused evaluation, which is a strategy for making evaluation decisions. The focus is on identifying relevant decision-makers and information users, important evaluation questions, and appropriate research methods and data analysis techniques. Utilization-focused evaluation provides for utilization of data before it is ever collected.

Quantitative designs can be broken down further into experimental and quasi-experimental. Experimental designs usually involve two or more groups and manipulation of some variable. The key features are that subjects are randomly assigned to treatments and treatments are randomly assigned to groups. This design is rarely encountered in evaluation. The most often encountered designs are quasi-experimental where random assignment of subjects and treatments is not possible. Designs with random assignment are also termed "true" control group designs, whereas designs without random assignment are called "non-equivalent" control group designs. A variety of quasi-experimental designs is available (Cook and Campbell, 1979; Fitz-Gibbon and Morris, 1978). The evaluation design chosen will depend upon circumstances and constraints of the evaluation. One of the most important aspects of choosing a design is the number of threats to validity that may arise.

Validity in Evaluation Design

Validity refers to the best possible approximation to the truth (Cook and Campbell, 1979). There are four major types of design validity: statistical conclusion validity; internal validity; construct validity; and external validity (Cook and Campbell, 1979).

Statistical conclusion validity is concerned with drawing conclusions about covariation of variables on the basis of statistical evidence. The main concern is with avoiding drawing false conclusions and is similar to tests of statistical significance. In educational evaluation, for example, one would want to know if the variables of student achievement and participation in the program covaried and if so, to what degree. There are seven threats to statistical conclusion validity (Cook and Campbell, 1979). Specific threats will be discussed where appropriate.

Internal validity refers to insuring the absence of third-variable alternative interpretations in typical two-variable cause-effect relationships. In education, for example, we want to know if the program has a causal effect on the post-test score or some other measure of program effectiveness, and we seek to exclude third variable alternative causes. There are many threats to internal validity (Cook and Campbell 1979).

The third major form of validity is construct validity. Some researchers equate this with "confounding." Construct validity essentially involves defining the "terms" being used in a study so

that there is agreement on exactly what is being measured or manipulated. Well-known examples of confounding are the Hawthorne effect and the placebo effect (Cook and Campbell 1979). Cook and Campbell (1979) presented a detailed list of threats to construct validity. However, all of the threats involve either failing to incorporate all of the dimensions of the construct into the research operation or incorporating irrelevant dimensions. One of the best ways of insuring construct validity is to define the terms clearly and in conformity with public understanding of the words being used (Cook and Campbell 1979).

The final major form of validity is external validity which refers to the plausibility of inferring that a presumed causal relationship can be generalized to and across different types of persons, settings, and times (Cook and Campbell 1979). Threats to external validity concern the interaction of the treatment with selection of groups, settings, and history (time). Resolving these threats seems to be a matter of carefully selecting subjects, varying the settings studied, and performing the study at various times.

The four major types of validity outlined above have different priorities depending upon the type of research being conducted. In much of the applied research, which includes evaluation, the priority ordering is usually: (1) internal validity; (2) external validity; (3) construct validity; and (4) statistical conclusion validity (Cook and Campbell 1979). Regardless of priority, any

single evaluation cannot be expected to answer all of the validity questions involved in establishing cause and effect relationships between a treatment and the measured outcome variables.

The Need for Triangulation of Research Approaches

In research, each method has its own weaknesses and built in threats to validity. Therefore, in the social sciences, where true, randomized experiments are difficult to conduct, there exists a need for employing multiple research methods which tap different segments of the "universe" in question and measure slightly different content. The overall aim is to use methods which will hopefully converge toward the "truth." Webb et al. (1966) called this approach to social science studies "triangulation" and made a strong case for what they called multiple operationism -- a collection of methods combined to avoid sharing the same weaknesses. Borrowing from the outcropping model in geology, Webb et al. (1966) stated: "So long as we maintain, as social scientists, an approach to comparisons that considers compensating error and converging corroboration from individually contaminated outcroppings, there is no cause for concern. It is only when we naively place faith in a single measure that the massive problems of social research vitiate the validity of our comparisons." The basic idea is to check several outcroppings. The more remote or independent such checks, the more confirmatory their agreement. This model of science

opportunistically exploits the available points of observation. The need for this triangulation arises because there are no single social science devices designed with perfect knowledge of all the major relevant sources of variation. Again, Webb et al. (1966) argued: "... the notion of a single 'critical experiment' is erroneous. There must be a series of linked critical experiments, each testing a different outcropping of the hypothesis. It is through triangulation of data procured from different measurement classes that the investigator can most effectively strip of plausibility rival explanations for his comparison."

This triangulation approach is not only logically sound but intuitively appealing in a study where important decisions have to be made, such as the current hunter education evaluation. However, in an effort to use multiple approaches, a trap exists. Not all components of a multi-method approach should be weighed equally. Prosser (1964) in Webb et al. (1966:p.5) appropriately stated: "...but there is still no man who would not accept dog tracks in the mud against the sworn testimony of a hundred eye-witnesses that no dog had passed by."

Unobtrusive Measures

Much of the past research in social science has employed interviews and questionnaires. Questionnaires provide an economical means of gathering large amounts of data on a wide variety of

subjects and are amenable to rapid statistical analysis. In regard to the use of interviews, Webb et al. (1966) stated: "If one were going to be limited to a single method, then certainly the verbal report from a respondent would be the choice. With no other device can an investigator swing his attention into so many different areas of substantive content, often simultaneously and also gather intelligence on the extent to which his findings are hampered by population restrictions." However, with all the benefits provided to the researcher by questionnaires and interviews, some major problems also are included. The instruments used for measurement often affect the phenomenon being measured (Runkel and McGrath 1972). Webb et al. (1966) stated: "Interviews and questionnaires intrude as a foreign element into the social setting they would describe, they create as well as measure attitudes, they elicit atypical roles and responses, they are limited to those who are accessible and will cooperate, and the responses obtained are produced in part by dimensions of individual differences irrelevant to the topic at hand." Another weakness of questionnaires and interviews is their reliance on language and the fact that usually past behavior is being recalled. In addition, Webb et al. (1966) listed several factors that contribute to error when subjects know they are part of a study. Some of these error sources are: (1) guinea pig effects; (2) demand characteristics; (3) practice effects; and (4) response set bias. In addition, the interviewer may influence responses via verbal and visual cues, and the inter-

viewer may change as a measuring instrument over time.

Many of the "reactive" errors associated with survey research can be eliminated by conducting observational studies in natural settings without the individual's knowledge. Direct observation, though less obtrusive than questionnaires or interviews, is still subject to many of the same criticisms and certainly can bias behavior in a natural setting.

Patton (1980) listed several advantages in using observation in evaluation. First, observation permits a better understanding of the context within which the program operates. Second, firsthand experience with a program permits the evaluator to be more inductive and discovery-oriented in his approach since there is less need to rely on prior conceptualizations of the program. Third, observation allows the observer to record data that may normally go undetected in survey research. Fourth, observation may discover aspects of a program that participants and staff may be unwilling to discuss. Fifth, observation permits the evaluator to go beyond the selective perceptions of others. Finally, firsthand experience gained through observation allows the evaluator to access personal knowledge and direct experience that lead to a more comprehensive understanding of a program.

There are some problems associated with the use of observation in evaluation and other social research. First, there is a danger that the human observer will tend to be variable over time. However, this effect can be countered by practice and by keeping

the observer "blind" to the hypothesis (Webb et al. 1966). A second problem is that the observer may selectively expose himself to the data or selectively perceive them. Careful training of observers can alleviate some of this problem. Finally, the presence of the observer may influence the behavior being studied, especially where direct observation is utilized. Participant observation, where the observer assumes an incognita role, avoids this reactive contamination of behavior and permits a greater degree of certainty that the observed behavior was truly natural.

For the evaluation of actual hunting behavior in regard to hunter education training, participant observation was deemed the only feasible research strategy since reactivity to visible observers surely would have occurred. In addition, participant observation allowed designation of individual subjects whereby a follow-up questionnaire could be sent to tie hunter characteristics to behavior in the field, thereby permitting a triangulation of methods.

In summary, the current evaluation of the Virginia Hunter Education Program utilized three different approaches (knowledge testing, behavioral observation, and interviewing) in order to gain a balanced view of the entire program. Each approach has its own inherent, but different, strengths and weaknesses which tend to balance out in the overview of the current study.

CHAPTER III

PHASE ONE: Hunter Education Student Pre-Post Testing

INTRODUCTION

Whether mandatory or voluntary, hunter education courses in America conclude with student examinations. An underlying assumption is that if students have gained enough knowledge to pass the final exam, then, hopefully, their behavior as hunters will be improved. Though this assumption is tenuous, as will be discussed later, the first step in the evaluation was to ascertain how much hunter education students in Virginia learned in the course. Therefore, a pre- and post-test of students' knowledge was designed and implemented.

BACKGROUND

Assessment of student knowledge gain using the pre- and post-test approach requires an appreciation of the design limitations and threats to validity, since these affect the final conclusions. In addition, a reliable and valid measuring instrument is necessary in order to use this design. These considerations will be discussed in the following sections.

Quasi-experimental Design

Since the pre- and post-test design had been requested by the Commission, a consideration of its underlying assumptions and weaknesses was necessary. This design is one of the more frequently used designs in the social sciences (Cook and Campbell 1979). In using this design, pre-test observations are recorded on a single group of students, who later receive a treatment, after which post-test observations are made. Although generally considered uninterpretable due to various validity threats, there are cases where causal inference seems reasonable (Cook and Campbell 1979). In the case of the Hunter Education Program, all but one of the threats to internal validity were reasonably discounted.

Internal Validity

Internal validity refers to the elimination of third-variable explanations for a demonstrated cause and effect relationship. For the Hunter Education Program, internal validity refers to the elimination of causal influences, other than the program, which facilitate student learning. Some of the internal validity threats that can possibly operate with the before-and-after design are: (1) history; (2) regression; (3) maturation; (4) testing, and (5) instrumentation (Campbell and Stanley 1963; Cook and Campbell 1979). History is a threat when an observed effect might be due to an event which takes place between the pre-test and post-test, when this event is not the treatment (program) of interest. This threat was conceivable in the hunter education program evaluation, but was relatively unlikely since the time interval between pre-test and post-test was very short (usually two or three days).

Maturation is a threat when an observed effect might be due to students' growing older, wiser, or more experienced between pre-test and post-test. Again, the short time interval between pre-test and post-test made this threat highly unlikely in the hunter education evaluation.

Statistical regression, in the sense used here, is a threat when an effect might be due to students being classified into experimental groups based on some pre-test score. The concept of regression is difficult to explain and is beyond the scope of this

discussion. A more detailed explanation is presented in Cook and Campbell (1979). However, regression was not a threat in the hunter education evaluation since experimental groups were not created on the basis of pre-test scores.

Testing is a threat when familiarity with a test enhances performance because test items can more easily be remembered and learning is sensitized to the pre-test. This threat to internal validity was potentially the most potent one in student knowledge assessment. The time interval between pre-test and post-test was very short. Therefore, students might have been sensitized to the program by the pre-test. This threat could have affected the current evaluation.

Instrumentation is a threat to internal validity when an effect might be due to a change in the measuring instrument between pre-test and post-test and not to the treatment's differential impact. Instrumentation was not a concern with the hunter education evaluation since the same test instrument was used for both the pre- and post-test.

External Validity

External validity refers to the ability to generalize results of experiments conducted on samples to the population of interest. In the pre- and post-test design, three potential threats to external validity exist: (1) interaction of testing and the program;

(2) interaction of selection and the program; and (3) reactive arrangements. The first threat (testing and program interaction) occurs where the pre-test sensitizes students to the program and the program becomes either more or less effective. It then becomes difficult to generalize beyond the pre-tested group and the untested population of interest. However, Campbell and Stanley (1963) indicated that if experimental subjects were similar to those usually used in the program, no undesirable interaction should be present. Since the students used in the hunter education evaluation were typical, this threat should not have been present.

The threat called interaction of selection and the program refers to the un-representativeness of experimental groups. If groups are not selected or assigned at random, the program might work better or worse on these groups than it would on the population of interest. Again, the students used in the hunter education evaluation were judged to be typical and selection-program interaction was not considered important.

The threat posed by reactive arrangements refers to the artificiality of the experimental setting and the student's knowledge that he is participating in an experiment. In the hunter education evaluation, the conditions were not artificial (i.e. students were unaware that they were participating in research) and were, therefore, judged to be non-reactive. However, the instructors were

aware of the evaluation and their role in it. This threat could not be eliminated since cooperation of the instructors was needed in order to pre-test the students.

METHODS

The pre- and post-testing phase of the evaluation proceeded in three phases: (1) assessment of the appropriateness of the program's current student exam; (2) development of a new student exam; and (3) application, scoring, and statistical comparison of the pre-post-test scores on the new exam.

Evaluation of the Current Student Exam

One underlying assumption of the pre- and post-test design, which proved to be critical for the hunter education evaluation, is that the examination used is a valid measuring instrument. The exam that was being used at the time of the study was a written, 50-item, multiple-choice, true-false test. The administrators of the program indicated verbally that the test might be flawed. Therefore, one of the first tasks was to evaluate the current exam and develop a new one, if needed.

The current exam was evaluated for: readability; reliability; correlation of test items with total scores; content validity; and test item structure, including wording and grammar.

Readability was calculated using the Dale-Chall formula, which takes into account the number of words, number of sentences, and the number of words not appearing on a special list (Dale and Chall 1948). The readability calculations indicated that students on a

fourth grade level and higher should be able to comprehend the questions on the exam. This reading difficulty level insured that the Virginia Hunter Education Program's minimum age requirement of 12 years was being accommodated by the exam.

The student examination was further evaluated via an item analysis (Nunnally 1978). Several hundred previously scored student examinations were collected by the Education Division of the Virginia Commission of Game and Inland Fisheries from various instructors across the state and forwarded to Virginia Tech. Student's examinations were then coded on IBM sheets and item analyzed. Item analysis is a procedure for selecting "good" test items based on a number of criteria. Items that correlate relatively highly (usually 0.2 or higher) with total test scores are considered good items. However, other information such as the difficulty level (the proportion of students who answer the item correctly) and the attractiveness of the distractors (multiple-choice items) must also be considered. Using the above criteria, seven "poor" questions were discovered among the 50 items on the test.

Item analysis also provides a reliability estimate, which is a measure of the "repeatability" of the test administered under similar conditions. The KR-20 reliability formula (Nunnally 1978) yielded a value of 0.762, a fairly high and satisfactory figure.

Any good examination must be content valid, that is, the test composition must reflect the same relative emphasis as the course.

For example, if the hunter education course contained 40% safety material, then 40% of the test items should deal with safety. To assess content validity, the hunter education course was divided into eight sections: Hunters and Hunting; Safety Basics; Guns and Ammunition; Shooting Basis; Gun Handling; Muzzle Loading; Bow Hunting; and Outdoor Skills. This was essentially the format used in the Instructor's Manual prepared by the Education Division. The current student examination was then evaluated for content in each of the above eight sections. Next, the student manual, provided by the National Rifle Association, was evaluated for content. The Instructor's Manual was then evaluated for content using the time allotments for each section provided in the suggested course procedure. Finally, a worksheet containing the eight subject matter sections was prepared and given to the Education Lieutenants and the Hunter Safety Coordinator. Each person ranked each subject matter section from 1 to 8, with 1 being the most important. Ranks were then averaged across persons and the subject matter sections ranked using the composite average rank. The Lieutenants and Safety Coordinator were then asked to agree upon a content percentage of each subject matter section for a new, forthcoming student examination. The results of all of the above calculations are presented in Table 1. There was a substantial discrepancy among the content estimates of the current student exam, the student manual, the instructor's manual, and the desired exam. The discrepancy was greatest in the Safety Basics, Bow Hunting, and Outdoor

Table 1. Content of Current and Desired Student Examination.

Content Area	PERCENT OF MATERIAL			
	Current Exam	Student Manual	Instructor Manual	Desired Content
Hunters, Hunting & Regulations	14	17.5	8.33	20
Safety Basics**	34	7.2	16.67	25
Guns & Ammunition	10	12.4	12.5	10
Shooting Basics	4	17.5	12.5	10
Gun Handling	14	6.2	16.67	15
Muzzle Loading	4	8.2	8.33	5
Bow Hunting**	20	8.2	12.5	5
Outdoor Skills**	None	22.7	12.5	10

**Areas of greatest discrepancy.

Skills sections. Before the new student examination was finalized, content estimates were adjusted to coincide with the relative content emphasis in the course.

Finally, the current student examination was evaluated for test item structure, wording, and grammar using guidelines suggested by Brown (1976) and reproduced in Table 2. Approximately 25 (50%) of the items proved to be inadequate according to these guidelines.

In summary, the existing exam was found inadequate on several grounds. Although it was readable and scores were similar for different classes, half the exam questions were worded inappropriately, seven questions were too easy or did not have significant item to total score correlations, and the relative weights given to some of the various subject areas in the exam did not match the importance of those areas in student and instructor manuals or that desired by course administrators. Consequently, a new examination was needed.

Development of the New Student Examination

The evaluation of the existing examination helped establish guidelines for a new exam and stimulated the hunter education administrative team to participate in the project. Each member was asked to develop a list of exam questions covering each section of the course. The resulting 676 questions were considered raw material. Redundant questions were eliminated, leaving 433 unique

Table 2. Guidelines^a used to prepare hunter education student examination questions.

A. Multiple Choice

1. Write clearly, simply, and briefly. Eliminate nonfunctional words. Use only words whose meanings are clear to students.
 2. The item stem should present the problem and all qualifying phrases. The stem should include all words that would otherwise appear in each alternative.
 3. There should be one, and only one, correct response. This alternative should be clearly correct.
 4. All distracters should be plausible and attractive to students who do not know the correct answer; yet they should be clearly incorrect. Distracters can be common misconceptions, frequent errors, or other plausible but incorrect information.
 5. Alternatives should be homogeneous in form and grammatical structure. They should not overlap, be synonymous with each other, or otherwise be interdependent.
 6. Whenever possible, use new situations and examples. Try to avoid repeating textbook examples or phraseology.
 7. Each item should be independent. One item should not aid in answering another item on the test.
 8. Avoid negatively stated items. Try to avoid using all of the above, none of the above, or some of the above (for example, A and B).
 9. If an item includes controversial material, cite the authority whose opinion is used.
 10. Avoid irrelevant clues to the correct answer provided by response length, repetition of key words, common associations, or grammar.
 11. If alternatives fall in a logical arrangement (for example, alphabetically or by magnitude), list them in this order. Otherwise randomize the positions of the correct responses so that they do not fall into a pattern.
 12. Try to have each item test only one central concept or idea.
-

Table 2. Guidelines^a used to prepare hunter education student examination questions. (continued)

B. Guidelines for writing true-false items.

1. Items should be based on significant facts, concepts, or principles. Items should deal with a single idea.
 2. The crucial element in the statement should be apparent to the student. The truth of the statement should not rest on trivial details or trick phrases.
 3. Express items clearly and simply in words whose meaning are definite and precise and known to the student. Include no more than one qualifying phrase. Use quantitative rather than qualitative terms whenever possible.
 4. Statements should be clearly true or false, not partially
 5. Avoid mere repetitions or minor variations on textbook wording. Do not create false items by inserting "not" in a statement from the text.
 6. Avoid "specific determiners"--words such as always, never, or sometimes--which may provide clues to the correct answer.
 7. Include approximately equal numbers of true and false statements. Make sure correct answers do not fall in a pattern.
 8. When items refer to controversial material or to matters of opinion or value, cite the authority whose opinion is being used.
-

^aSource: Brown, F. G. 1976. Principles of educational and psychological testing. Holt, Rinehart and Winston. New York. 504 pp.

questions. Careful editing for grammatical consistency and content further reduced the pool to 232 items (Appendix I). The number of questions in each subject category is presented in Table 3. On average, it takes a skilled test maker between 30 minutes and one hour to write a thoroughly satisfactory test question, given all the constraints. Obviously, test item creation was a laborious and time consuming task.

Pilot-Testing the Newly Constructed Test Items

Regardless of how well a test item seems to be constructed, pilot-testing of items on students similar to or representative of the actual students is a must. Theoretically, the students used for pilot-testing should be a random sample from the entire population of students who will be taking the examination. However, practical constraints may force a retreat to a less rigorous sample of students for pilot-testing purposes. Due to time and logistical constraints, students from only one district in Virginia were used in the pilot-testing effort. However, the students came from both cosmopolitan and rural areas of the district and were judged to be fairly representative.

Two hundred copies of each of four 50-item tests (A, B, C and D; see Appendix II) were given to selected Hunter Education instructors in the district. Along with the tests, the instructors were given detailed, written instructions on test administration

Table 3. Number of Potential Hunter Education Program Test Items.

Section	No. of Questions
Hunters, Hunting and Regulations	36
Safety Basics	37
Guns and Ammunition	37
Shooting Basics	25
Gun Handling	23
Muzzle Loading	30
Bow Hunting	33
Outdoor Skills	11
Total	232

and instructions on returning the test answer sheets to VPI & SU.

A total of 872 tests were returned to VPI & SU for analysis. Apparently, some instructors copied the tests and administered them to additional students. The tests were returned in the following numbers: (1) Test A - 267 students; (2) Test B - 182 students; (3) Test C - 222 students; and (4) Test D - 201 students.

Item Analysis of the Four Pilot-Tests

A routine item analysis was performed on each of the four tests in order to determine test item difficulty levels and correlations with total scores. On Test A, 29 items with a positive item-to-total score correlation greater than 0.2 were found. Test B contained 37 items with a positive item to total score correlation greater than 0.2. Similarly, Tests C and D contained 39 and 37 appropriately correlated items, respectively. Theoretically, these items constituted the pool of items from which the final 50 items were chosen. However, in many cases, the items were too easy. Therefore, some items with a positive item-to-total score correlation between 0.15 and 0.19 were selected as items on the final test.

Extended Item Analysis of the Four Pilot-Tests

In addition to the regular item analysis, an extended item analysis was performed to rank the quality of items in terms of their contribution to test homogeneity. Homogeneity can be considered equivalent to reliability if the test content is such that students doing well or poorly on one area of the test might be expected to have similar performance in any other area. The formula used for evaluating test reliability/homogeneity was the Kuder-Richardson - 20 or KR - 20 (Brown 1976).

The extended item analysis detected certain items which did not add substantially to test reliability. Therefore, on Test A, eight items were omitted from the ranking. Seven items were deleted on Test B, five items on Test C, and four items on Test D. A more complete picture of the results of the extended item analysis is provided in Table 4. Basically, the extended item analysis reduced the item pool from 200 items to 176 items. However, this was still a fairly large item pool and proved to be adequate in providing 50 appropriate items for the final test.

The new exam, which was designed to function like the old exam, had an average score of 88 percent, a passing score of 70 percent, and a failure rate of five percent. The old exam had an average of 88 and a passing score of 70 percent. The failure rate estimate for the old exam was judged by the administrative team to be approximately five percent.

Table 4. Summary Statistics from an Extended Item Analysis of the four pilot-tests.
All four tests contained 50 items each.

Test	No. of Items Deleted	Mean No. Answered Correctly	Standard Deviation of the Test	No. of Students	Reliability KR-20 ^a
A	8	26.81	4.887	267	0.717
B	7	29.12	5.382	182	0.773
C	5	29.65	5.756	222	0.772
D	4	28.08	5.933	201	0.783

^aKR-20 is the Kuder-Richardson formula for calculating test reliability/homogeneity. See Brown (1976) for details.

The new test, like the former one, was norm-referenced. That is, its scores provided a ranking of the examinees according to their knowledge but did not provide estimates of what percentage of hunter education knowledge each examinee had. This limitation was unavoidable given restricted resources which precluded development of an item pool uniformly representative of the hunter education curriculum.

The mean score of 88 mentioned above is undesirably high for a norm-referenced test. A much lower mean would allow finer discrimination of examinee ability. However, in this case, a much lower passing score would be necessary to maintain the desired five percent failure rate. A more difficult test with a lower passing score was recommended to the hunter education officials. However, they rejected the proposal on the basis that the general public might not have confidence in a test with a passing score below 70 percent.

RESULTS AND DISCUSSION

The new student exam which was used for pre- and post-testing hunter education students is presented in Appendix III. Seven typical hunter education classes and one class of game warden recruits were pre- and post-tested during the Spring and Summer of 1982. Tables 5 and 6 contain the results from each class. Improvement in knowledge scores on the test ranged from 3.02 percent for the game warden recruits to 29.11 percent for the unknown origin class (the instructor failed to label the pre- and post-tests). Tables 7 and 8 contain a summary of improvement results obtained by combining the five classes taught in Spring and the three classes taught in Summer. Test scores improved 15.96 percent for the Spring classes and 19.86 percent for the Summer classes. These improvement percentages are reasonable and typical for pre- and post-test evaluations of this type. Therefore, the hunter education program increased the knowledge level of the students tested in this study. The hunter education program was apparently accomplishing one of its major goals--developing an awareness and knowledge of hunter safety and ethics. However, it was difficult to determine the extent to which student awareness could have been further enhanced, due to the nature and constraints of the pre- and post-test evaluation design. For example, the validity threat called testing could have operated to increase post-test scores since the pre-test could have sensitized the students to the mate-

Table 5. Summary of Virginia Hunter Education Pre- and Post-Test Survey - Spring 1982.

1. Daniel Lass, Fairfax Wildlife Club Summer Camp			
	No. of Students	Mean Score	Percent
		(No. right)	
Pre-test	31	29.30	73.25
Post-test	35	33.22	83.05
Improvement = 3.92		% = 11.80	
2. Kramer and Williams, Arlington and Fairfax IWLA Course			
	No. of Students	Mean Score	Percent
		(No. right)	
Pre-test	12	30.33	75.83
Post-test	12	35.16	87.90
Improvement = 4.83		% = 13.74	
3. Ager and Pittman, Fairfax Co. Hunter Safety Class			
	No. of Students	Mean Score	Percent
		(No. right)	
Pre-test	10	31.40	78.50
Post-test	10	38.40	98.00
Improvement = 7.00		% = 18.23	

Table 5. Summary of Virginia Hunter Education Pre- and Post-Test Survey - Spring 1982. (continued)

4. Bluestone Sr. High School Vo-Ag Students			
	No. of Students	Mean Score (No. right)	Percent
Pre-test	14	25.21	63.03
Post-test	15	33.44	83.60
Improvement =		8.20	% = 24.52

5. Gochland High School			
	No. of Students	Mean Score (No. right)	Percent
Pre-test	28	26.36	65.90
Post-test	24	31.25	78.13
Improvement =		4.89	% - 15.65

The first 10 questions of the 50-item test were extremely easy and were not used to compute the scores and improvement percentages.

Table 6. Summary of Virginia Hunter Education Pre- and Post-Test Survey - Summer 1982.

1. Hockenberry, Bayside Hunt Club, Portsmouth			
	No. of Students	Mean Score (No. right)	Percent
Pre-test	12	31.91	79.78
Post-test	12	36.41	91.03

Improvement = 4.50 % = 12.36

2. Kerrick, Miller, Hinchey, Game Warden Recruits, Richmond			
	No. of Students	Mean Score (No. right)	Percent
Pre-test	15	36.27	90.68
Post-test	15	37.40	93.50

Improvement = 1.13 % = 3.02

3. Unknown Origin			
	No. of Students	Mean Score (No. right)	Percent
Pre-test	38	23.82	59.55
Post-test	30	33.60	84.00

Improvement = 9.78 % = 29.11

The first 10 questions of the 50-item test were extremely easy and were not used to compute the scores and improvement percentages.

Table 7. Overall Summary of Virginia Hunter Education Pre- and Post-Test Survey - Spring, 1982.

	<u>Pre-test</u>	<u>Post-test</u>
No. of Students	95	96
Mean Score (No. correct)	28.18	33.53
Percent Correct	70.45	83.83
Improvement		5.35
Percent Improvement		15.96

The first 10 questions of the 50-item test were extremely easy and were not used to compute the scores and improvement percentages.

Table 8. Overall Summary of Virginia Hunter Education Pre- and Post-Test Survey - Summer, 1982.

	<u>Pre-test</u>	<u>Post-test</u>
No. of Students	65	57
Mean Score (No. right)	28.21	35.20
Percent Correct	70.53	88.00
Improvement		6.99
Percent Improvement		19.86

The first 10 questions of the 50-item test were extremely easy and were not used to compute the scores and improvement percentages.

rial presented in the course.

In addition, a concern for validity of the new exam existed in the pre-post test study. The test used was content valid because the content of the exam was in direct proportion to the content of the course. However, there was no statistical measure for validity, such as correlation of test scores with hunting behavior of the students tested. The best evidence of validity for the exam used in the pre- and post-testing was that the scores substantially increased on the post-test. (An invalid test would not yield such a score increase because the material taught would not help the examinees answer the questions.)

In summary, this phase of the study (student knowledge assessment) had design and measurement weaknesses that precluded making strong inferences as a result of the outcomes. Nevertheless, the results were generally favorable and point to at least a reasonable level of instructional efficacy in the hunter education program.

CHAPTER IV

PHASE TWO: Participant Observation of Virginia Dove Hunters

INTRODUCTION

The second phase of the comprehensive evaluation entailed observing dove hunters. Data on the effects of hunter education in improving safety and ethical hunting behavior in the field were needed. Although hunter education may increase knowledge of gun safety and hunting ethics, the effectiveness of the program in changing behavior was still in question. A comparison of the behavior of hunter education graduates with hunters not having had hunter education training seemed to be the most straightforward approach and was used in this study.

BACKGROUND

Only a few studies dealing with evaluation of hunter education programs have involved observation of the behavior of hunters in the field (Jackson and Norton 1979). Jackson and Norton observed waterfowl hunters in Wisconsin via a "spy blind technique". Students from two nearby universities and six retired Wisconsin game wardens were recruited and trained as observers. This approach enabled the researchers to unobtrusively monitor the natural hunting behavior of approximately 600 hunters over a two-year study period. Each subject was observed throughout his entire hunting experience, contacted briefly as he left the field, and interviewed in-depth at a later date in his home. Emphasis was placed on developing profiles of violators of legal and ethical codes. However, no comparison was made between those hunters having had hunter education versus those not having had the course. In addition, no overall index of depreciative behavior was developed. However, the study did point out the need for effective hunter education among Wisconsin waterfowl hunters.

Jackson and Anderson (no date), in studying and comparing the characteristics of Wisconsin deer hunters (gun and bowhunters), successfully utilized field interviews of hunters and post-season follow-up interviews in the home. Their study involved recruiting and training college students as interviewers. The interviewers helped fill out a two-page questionnaire in the field. Later, hunters were interviewed for one to two hours in the home. A total

of 286 interviews were completed in the field and from these, 100 hunters were randomly chosen for further interviewing. The procedure seemed to work well. Outright refusals for the home interviews were less than five percent. Again, however, this study did not make direct comparisons of hunter education graduates with hunters who had not completed a course in hunter education.

Some evaluators have voiced strong favorable opinions regarding the value and effectiveness of hunter education. Jackson (1981) reported that the Wisconsin hunting accident rate in the five years prior to 1981 had declined 44 percent from the 20-year average tallied before the hunter education program was started in 1967. Jackson felt that the key to successful hunter education was "getting involved", and "staying involved", and that hunter education was critical to the future of hunting.

Lyons (1979) surveyed 719 New York bowhunters in an effort to evaluate the relationship between knowledge and participation in a newly established bowhunter education program. The research hypothesis was that program participation was positively related to knowledge scores, and, in fact, program participants had significantly higher scores than non-participants in knowledge of deer, hunting skills, and safety/first aid. These scores were highly correlated with program participation and the extent of annual bowhunting activity (experience) of the participant.

Driver Education Studies

Since currently there is not an abundance of hunter education evaluation studies, it is difficult to tie the present study into an established context. However, one might gain some insight by reviewing studies related to driver education. Palmer (1985) conducted an evaluation of the effect of Minnesota's driver education program on highway fatality rates. Minnesota has had a formal driver education program for all new beginning drivers under the age of 18 since January 1, 1967. Palmer combined fatality data from the Minnesota Department of Public Safety and the percent of students completing driver education from the Department of Education. Palmer also divided his driver education graduates into three age ranges: (1) 15-25 years old; (2) 35 years and older; and (3) the general driving population. Using regression analysis, Palmer found that the proportion of driver education graduates in all age groups significantly predicted the fatality rate. In other words, the higher the percentage of driver education graduates in the population, the lower the fatality rate. Therefore, the policy decision to make driver education mandatory in Minnesota seemed to have significantly reduced traffic fatalities.

Tix and Palmer (no date) evaluated the effectiveness of a series of regional workshops held in the winter of 1983 to instruct driver education teachers in strategies of instruction in the use of safety belts. In 1984, data were collected via three methods:

(1) a short teacher questionnaire; (2) a questionnaire administered by teachers to junior high school students; and (3) teacher observation of student safety belt use in school parking lots. The following are some important findings from Tix and Palmer's study which may relate to hunter education programs. First, 27 percent of the high school juniors used safety belts regularly after driver education. Second, a before and after matched pairs analysis of the belt use category for 426 students indicated that changes in safety belt use which took place were statistically highly significant. This was strong evidence for the effectiveness of education on safety belt use. Third, the time spent in the workshops on attitudes and emotions was a strong predictor of safety belt use among students. Fourth, allocation of time to safety belt instruction does yield significant results. However, there was an inverse relationship between time spent on teaching facts and safety belt use, and time spent teaching skills was not an effective predictor. The percent of time spent on emotions and attitudes had the greatest influence on safety belt use. Fifth, the importance of parental role models was confirmed. Safety belts used by the mother and father were highly significant predictors of safety belt use by the students. The overall findings of the above study may have profound implications for hunter education. For example, much time is typically spent on teaching facts in hunter education and the influence of parents and peers is often neglected.

In a study of the implementation of hunter education programs in the United States, Smith (1981) also reviewed driver education studies in an attempt to relate the two programs. Smith indicated that all the studies of driver education prior to 1960 revealed that trained high school students were involved in fewer accidents and had fewer traffic citations. The validity of these earlier studies was questioned in the mid 1960's on the basis of the representativeness of the samples used in the evaluation studies. Many of the groups used for study had received the maximum training and were taught by individuals specifically trained in driver education. The consensus of the literature since the late 1960's regarding state driver education programs is that, although a great deal of advancement has occurred, the programs could still be implemented more effectively (Smith 1981).

Quasi-Experimental Design

For comparison of hunter education graduates' behavior versus hunters who have not had hunter education, the static-group comparison design was utilized (Campbell and Stanley 1963). This design involved measuring a group of hunters after receiving the hunter education course (treatment) plus taking measurements on a group of hunters that had had not received the hunter education course (no treatment). The two groups, due to the nature of the study, may

not have been equivalent. Therefore, several threats to validity may have existed.

The first internal validity threat in the static-group comparison design was maturation. This was definitely a threat in the behavior evaluation since the hunter education graduates observed while dove hunting could have been greatly different from the non-graduates in age, experience, and ability, either by chance or because the program was only 20 years old and many older hunters had no realistic opportunity to take the course.

The second and most likely threat to internal validity with the static-group comparison was selection. The groups could have differed without the influence of the program because of differential recruitment of the two groups. Importantly, the hunter education program was and still is voluntary. Sometimes, background characteristics are used to statistically match or equate the two groups. However, matching on background characteristics is usually ineffective and misleading, particularly where students in the experimental group have sought out exposure to the program (Campbell and Stanley 1963).

A third threat was mortality, which refers to differences in groups due to the differential drop-out of students from the groups. However, the hunter education program was so limited in duration that this threat was unlikely to be a problem.

The fourth internal validity threat concerned possible interactions of maturation, mortality and selection. The extent of these

internal validity threats was unknown in regard to the static-group comparison of hunter education graduates with non-graduates.

One external validity threat existed in the static-group comparison design. That threat was the interaction of selection and the program. Specifically, since the hunter education program was voluntary, this threat was very real. Differences in behavior could have been due to differential recruitment and not necessarily the program. That is, people who volunteered to take the program could have been systematically different from an average sample of hunters.

METHODS

The original request-for-proposal from the Virginia Commission of Game and Inland Fisheries mandated that a "spy blind" technique be used as a means of evaluating the effectiveness of Virginia's Hunter Education Program. The basic need was for a comparison of actual hunting behavior between hunter education course graduates and those hunters who had little or no formal training in hunter education. The spy-blind approach had been successfully used to observe waterfowl hunters in Wisconsin (Jackson and Norton 1979). The Wisconsin study involved dozens of volunteer observers and hundreds of man-hours of field observation. To have duplicated the Wisconsin study of waterfowl hunters in Virginia would have been ideal. However, due to time, money, and manpower constraints, the current effort had to be scaled down. In the process, a decision was made to observe dove hunters since they congregate in and near open fields in sufficient numbers to provide adequate sample sizes. In addition, dove hunting in Virginia tends to occur on only or one two days, primarily opening day. Also, the state of Virginia maintains several wildlife management areas that are managed specifically for dove hunting. Historically, these areas have attracted hundreds of hunters on opening day, and the Commission has controlled access to the hunting sites. For these reasons, dove hunters were selected as the best group of hunters to be observed, considering the nature of the evaluation study.

Another group of hunters which was of great interest were deer hunters. There seems to be great concern among the general public, and hunters as well, about the safety of deer hunting. Each fall, newspaper articles reveal numerous deer hunting accidents. However, following a deer hunter through the woods without being detected was deemed almost impossible. In addition, under existing study constraints, a sufficient sample size of deer hunters would have been most difficult to obtain.

General Approach

In order to test for differences in hunting behavior between graduates and non-graduates, some method of identifying each hunter and ascertaining whether or not he was a graduate had to be devised. As mentioned previously, the use of spy blinds was requested by the Commission. However, for dove hunters, a slightly different approach, participant observation, seemed more feasible. Participant observation basically involved pretending to hunt, and dressing and acting as hunters while actually observing the behavior of other hunters. The primary concern was observing without being detected, since hunting behavior might have been quite different if the hunters knew they were being observed. In addition, a method for ascertaining the observed hunters' names and addresses was needed in order to tie the field behavior to other variables, especially hunter education training or lack thereof. The approach

chosen involved both observers and interviewers. Observers recorded hunter behavior and the interviewers obtained the subject's name, address and phone number so that the subject could be interviewed over the phone or sent a mail questionnaire at the end of the season. Thus, a hunter's behavior, participation in the hunter education program, and other relevant characteristics could be ascertained using this approach.

During the 1980 dove season, Dr. Peter T. Bromley and the author traveled to several public and private dove hunting sites in order to locate a suitable study site and to ascertain the feasibility of actually observing dove hunters in the field. Elm Hill Wildlife Management Area was chosen as the original study site for the 1981 study. No plans were made at that time to add another study site. After the success of the Elm Hill effort, however, a second site, Amelia Wildlife Management Area, was selected for study during the 1982 season. The second site was added to increase the sample size for statistical comparisons and to replicate the quasi-experiment conducted at Elm Hill.

Selection of Data Recording Devices

Two devices for recording hunter observation data were evaluated, a cassette tape recorder and a miniature data card. A preliminary investigation into the merits of using each device was conducted on a farm in Ellett Valley, Montgomery County, Virginia.

The farm was a reasonable substitute for the Elm Hill Management Area, containing buildings, power lines, trees, and fences.

Four people participated in the mock dove hunt. The observer had a data card fastened to the stock of his shotgun and a card taped inside his hat. The volunteer hunters portrayed a "slob" hunter by exhibiting a random series of depreciative behaviors. The hunter was observed from the time he left his vehicle until the 30-minute observation period was exhausted. The other two volunteer hunters moved about the hunting site pretending to shoot at doves. The observer had no prior knowledge of the type and frequency of depreciative behavior that was to be exhibited. The observer maintained a distance of 25 to 60 yards from the hunter, pausing approximately one to three minutes before recording each behavior.

Approximately 20 depreciative behaviors were recorded during the observational period. Only one of the other volunteer hunters saw the observer recording data. However, this person was familiar with the study and knew the recording procedure. The observer successfully used both the data card on the stock and in the hat.

To evaluate the feasibility of using tape recorders, the observer mimicked talking into a microphone approximately six times. At a range of fifty yards, the volunteer hunter could hear the observer talking but could not discern the content of the message. This drawback, combined with the much higher cost of tape recorders, suggested that the use of data cards would be much more

efficient. Additionally, mechanical failure would be eliminated as a potential problem. The potential benefits of using tape recorders included the freedom from writing for the observers and the capacity to record a greater array of behaviors, along with more detailed descriptions. However, the data card technique was chosen because of the simplicity of recording and data analysis, minimal training required, and the greatly reduced cost.

Development of Depreciative Behavior Code

A list of depreciative hunting behaviors was developed initially by analyzing the content of the Hunter Education Course, especially the safety rules, and by informally interviewing knowledgeable hunters. During the training session, several observers suggested changes in the behavior list, many of which were incorporated into the final list of behaviors. The finalized form of the behavior data card is presented in Appendix IV.

Recruitment of Observers and Interviewers

Observers were recruited from a group of graduate students in the Virginia Tech Wildlife and Fisheries Department and interested citizens working in various professions, especially forestry, throughout Virginia. Initially, 20 observers agreed to participate

in the Elm Hill study. The six interviewers were students in various fields at Virginia Tech.

Observer and Interviewer Training

Training of both observers and interviewers took place at the Elm Hill Management Area on August 22, 1981. Due to foul weather, training was conducted in one of the large buildings on the management area. Dr. Bromley welcomed the participants and reiterated the purpose and importance of the behavior study. Data cards were then passed out. The author demonstrated and explained the entire list of depreciative behaviors. In the afternoon, a confederate acted out a series of depreciative hunting behaviors while all the observers attempted to record the occurrence and frequency of these behaviors. Five trial runs (behavior skits) were made and separate data cards collected from the observers for each run. This effort was an attempt to assess the accuracy of the observers and to train them to recognize and record depreciative hunting behavior. The trial runs were also video-recorded for later use in establishing the validity of the behaviors recorded. After the observers seemed confident about their observational ability, the management area was divided into various fields and field chiefs were assigned. The remaining observers were then assigned to the various fields. This organizational mode proved to be quite efficient and enhanced cooperation among observers and interviewers.

Training of the interviewers at the management area focused on becoming familiar with the area and the observers. Photographs of the observers were taken and later used in training the interviewers to recognize the observers. Interviewers were also assigned to fields. Using an informal approach, interviewers practiced on the observers present and became familiar with their data forms (Appendix V). Soon afterwards, the interviewers were trained to recognize various types of shotguns, ammunition, and hunting equipment for the purpose of estimating the "specialization" level of the hunters they were going to interview.

Field Observations at Elm Hill Wildlife Management Area

At Elm Hill, the actual field observations were conducted on September 5, 1981, (opening day) and September 12, 1981. Fourteen observers were present on opening day and 17 the following Saturday. Six interviewers were present both days. The observers' and interviewers' efforts were coordinated by Ed Hampton.

Prior to the first observation date, the behavior data card was finalized, photo-reduced by 35% and printed on brown cardstock. Interviewer forms were printed on manila paper and cut in a fashion that would prevent one subject from seeing another subject's name and address.

Pre- and post-observational meetings of observers and interviewers were held at Kerr Dam near the study site. In the morn-

ings, observers received final instructions, data cards, and ammunition. In the evenings, observers matched their data cards with the appropriate interviewer form and recounted the day's activity along with judgments of how well the procedure worked.

At the study site, observers located potential subjects and positioned themselves accordingly. Subjects were selected by convenience since true random sampling was not feasible. The observational period for each subject lasted 30 minutes. During that time, the observer recorded the occurrence and frequency of depreciative behaviors, the number of shots fired, and an identification number for each subject.

Interviewers were instructed to make a pass around their assigned fields at approximately hourly intervals. Upon locating an observer, the interviewers pretended to interview the observer as they would any other hunter while actually obtaining an identification number and a detailed description of the hunters previously observed. The interviewers then located their subjects, obtained names, addresses, and phone numbers, and estimated specialization levels. After completing a pass around their respective fields, the interviewers retreated to the road which bisects the area and remained as unobtrusive as possible.

In order to prevent an alteration of normal hunting behavior, observers took several precautions to avoid arousing suspicion in the hunters being observed. First, all observers dressed as normal dove hunters and pretended to dove hunt during the observation

period. Second, the data cards were concealed on the gun stock or in a hat. Third, observers actually hunted for 30 minutes after completing an observation period. Finally, in the event that another hunter might spot data recording activities, a dummy card (Appendix VI) which contained a bird counting procedure was provided to each observer as an alibi. These dummy cards proved to be unnecessary.

The September 5th observational effort was a success. Approximately two hundred hunters arrived at Elm Hill Wildlife Management Area, despite the rainy weather. Observers and interviewers found little difficulty in completing their tasks. The many anecdotes at the post-observational meeting indicated that everyone enjoyed their duties of the day. Eighty-three hunters were observed and interviewed.

The second day's observations were sparse. Only 12 hunters were observed and some of those were repeat hunters from the previous Saturday. Obviously, dove hunting at Elm Hill Wildlife Management Area was an opening day phenomenon. Testimony of the area's two managers verified this conclusion.

Field Observations at Amelia Wildlife Management Area

In order to increase the validity of the observational study, a second site, Amelia Wildlife Management Area, was chosen as a study site in 1982. Amelia was considered quite similar to Elm Hill in

its physical and social characteristics. Any error introduced into the study by using two locations was judged to be minimal. Training of observers and interviewers at Amelia was almost identical to procedures used the year before in the Elm Hill study.

The actual field observation at Amelia Wildlife Management Area took place on September 4, 1982 (opening day). Thirteen observers and six interviewers were present. The author coordinated the efforts of the interviewers and observers. Since the second day's sample size at Elm Hill the previous year was so small, Amelia was studied only on opening day. The number of hunters was much smaller at Amelia than Elm Hill. Therefore, only 29 dove hunters were successfully observed. Approximately one dozen other hunters were partially observed or could not be contacted by the interviewers.

Development and Implementation of the Mail-Back Questionnaire

During the Fall of 1982, a questionnaire was sent to the 112 dove hunters observed at both Elm Hill and Amelia Wildlife Management Areas. The questionnaire contained questions regarding the hunter's experience, time commitment to hunting, monetary investment in hunting, perceived importance of hunting, motives for hunting, knowledge of hunting and hunter safety principles, socio-economic characteristics and whether or not a hunter education

course had been completed. Copies of the questionnaire and follow-up letters sent to the hunters are contained in Appendix VII.

Prior to final printing, the questionnaires were pre-tested on a non-random group of VPI&SU professors, graduate and undergraduate students. No major problems were discovered in the questionnaire.

The original questionnaire was mailed out, along with a stamped, pre-addressed envelope, in early December, 1982. Two weeks later, a reminder letter was sent to all hunters who had not returned questionnaires. Finally, on January 5, 1983 a final follow-up reminder letter and another questionnaire were sent to the remaining non-respondents.

Coding and Statistical Analysis of Observational and Questionnaire Data

In the statistical analysis, data from Elm Hill and Amelia Wildlife Management areas were combined in order to insure an adequate sample size. In addition, there was no reason to suspect the two populations were systematically different from one another. Data from the observer and interviewer field records were coded on IBM OP-SCAN sheets and transferred to computer data cards using a program of the Learning Resources Center, VPI&SU. The data were then analyzed using SAS (SAS Institute, Inc. 1982), yielding frequencies and percentages for all variables. The data recorded on the mail-back questionnaires were coded and analyzed in the same manner as the observer data. In addition, 33 composite variables

were constructed from the basic observer and questionnaire variables and tested for correlations using a SAS multiple correlation routine (SAS Institute, Inc. 1982). The 33 composite variables and their component variables are presented in Appendix VIII.

Costs of the Observational Field Studies

The major portion of the cost for the dove hunter observational study was provided by monies from the National Rifle Association and the National Wildlife Federation. Costs incurred included ammunition, meals, and travel for the observers and meals and wages for the interviewers. In addition, a shotgun was given away to one of the Amelia observers as incentive to participate in the study. The entire cost for Elm Hill was approximately \$3,500.00. The cost for Amelia was approximately \$2,000.00.

RESULTS

A total of 83 dove hunters were observed successfully at Elm Hill Wildlife Management Area during two days of observation in early September, 1981. In September, 1982, 29 dove hunters were observed successfully at Amelia Wildlife Management Area. Therefore, the total sample size for the dove hunter observation study was 112.

The number and percentage of dove hunters exhibiting each of the 38 depreciative behaviors is presented in Table 9. Three behaviors were especially prevalent. The behavior, "point gun at self or others", was exhibited by 47 percent of the dove hunters; "wrong carry position" was exhibited by 46 percent of the hunters; and the behavior, "talk-others-no unload", was recorded for 38 percent of the hunters. In addition, three behaviors, "sky blasting", "poor trigger guard control", and "wearing bright-inappropriate clothing" were exhibited by 31, 22, and 21 percent of the dove hunters, respectively. Six behaviors, "drive vehicle-environmental damage", "defacing property", "steal another's stand", "kill over 12-bird limit", "loaded gun in car", and "jump ditch-gun loaded", were not recorded during any of the 30-minute observation periods. However, the author, while traversing both hunting areas several times during the observational study, did informally observe hunters with loaded guns in the car and hunters who killed more than 12 doves. In addition, behaviors such as

TABLE 9. Number and percent of Elm Hill and Amelia Wildlife Management Area dove hunters who exhibited each of the 38 depreciative behaviors; September, 1981 and September, 1982. A total of 112 hunters were observed.

<u>Behavior</u>	<u>Frequency</u>	
	<u>Number of Hunters</u>	<u>Percent of Hunters</u>
1. Drive vehicle, env. damage	0	0
2. Defacing property	0	0
3. Littering	5	4.0
4. Leaving spent shells	16	14.0
5. Sky blasting	35	31.0
6. Shooting sitting doves	3	3.0
7. Shoot to flush doves from trees or wires	1	1.0
8. Leave dead or wounded doves	3	3.0
9. Wear bright-inappropriate clothes	24	21.0
10. Encroach on another's stand	5	4.0
11. Steal another's stand	0	0
12. Move around-disturb	13	12.0
13. Shoot too soon-greed	5	4.0
14. Shoot falling doves	3	3.0
15. Steal downed birds	4	4.0
16. Kill over 12-bird limit	0	0
17. Shoot songbirds or out-of-season game	5	4.0
18. Gun holds more than 3 shells	1	1.0
19. Loaded gun in car	0	0
20. Action closed-gun in or near car	11	10.0
21. Remove gun from car by muzzle	1	1.0
22. Place gun on or near unsafe surface	11	10.0
23. Load guns near car	6	5.0
24. Transfer gun wrong	7	6.0
25. Wrong carry position	51	46.0
26. Horseplay	3	3.0
27. Muzzle on foot or hand	15	13.0
28. Trigger guard control	25	22.0
29. Jump ditch - gun loaded	0	0
30. Running - gun loaded	3	3.0
31. Stumble - no muzzle control	2	2.0
32. Talk-others-no unload	43	38.0
33. Mock firing	16	14.0
34. Shoot low-flying doves	8	7.0
35. Shoot outside zone of fire	6	5.0
36. Point gun at self or others	53	47.0
37. Drinking	11	10.0
38. Other	12	11.0

discharging a firearm in the parking lot, and actually shooting other hunters were also observed by the author.

The observer accuracy for the Elm Hill Wildlife Management Area study is presented in Tables 10 through 14. Although approximately 20 observers were originally trained and tested for accuracy, accuracy scores only for observers actually making field observations are presented. In addition, only 13 observers who contributed useful observations were present at Elm Hill for the second day of observation. These 13 observers were tested for accuracy immediately before entering the management area. This fact explains the smaller number of observers presented in Table 14. Only sixteen observers were tested during behavior skit four (Table 13) because one observer had to leave the management area early.

Overall, the accuracy ratings for Elm Hill observers were good. With practice, average observer accuracy improved from 51.0 percent in Skit One (Table 10) to 66.7 percent in Skit Four (Table 13). The observer accuracy for the second day's study, 69.2 percent, was again at a satisfactory level. Considering the difficult nature of the observational task, these accuracy values indicate that the reliability and validity of the observational data were sufficient for the purposes of the present study.

At Amelia Wildlife Management Area in 1982, the average observer accuracy values were substantially higher than at Elm Hill. The data presented in Tables 15 through 18 again indicate a practice effect, progressing from 57.2 percent in Skit One to 86.8

TABLE 10. Observer accuracy values for Elm Hill Wildlife Management Area, Behavior Skit One.

Actual Behaviors	OBSERVERS																	Actual number of Behaviors	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		
	Reported number of behaviors																		
Ammo with gun in car.....		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Action not open.....		1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Prop up guns on car.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Muzzle on foot or hand.....	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1
Trigger guard control.....	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1
Mock firing	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<u>Behaviors reported but not actually occurring</u>																			
Move around-disturb.....	1				1									1					
Load guns near car.....	1	1	1	1	1	1	1	1	1	1	1	1	1		1	1			
No muzzle control.....	1	1	1	1	1	1	1		1	1	1	1			1	1	1		
Loaded gun in car.....		1																	
Remove gun from car by muzzle.....		1																	
Transfer gun wrong.....		1													1				
Wrong carry position.....		1	1				1	1								1			
Horseplay.....															1				
Shoot low-flying doves.....															1				
Number of behaviors	7	12	8	8	7	8	9	8	8	8	8	8	7	6	11	9	6	$\bar{x} = 8.1$	6
Number of under-estimates	2	0	1	0	2	0	0	0	0	0	0	0	0	1	0	0	1	$\bar{x} = 0.4$	
Number of over-estimates	3	6	3	2	3	2	3	2	2	2	2	2	1	1	5	3	1	$\bar{x} = 2.5$	
Number of wrong decisions	5	6	4	2	5	2	3	2	2	2	2	2	1	2	5	3	2	$\bar{x} = 2.9$	
Accuracy	16.7	0	33.3	66.7	16.7	66.7	50.0	66.7	66.7	66.7	66.7	66.7	83.3	66.7	16.7	50.0	66.7	$\bar{x} = 51.0$	

TABLE 11. Observer accuracy values for Elm Hill Wildlife Management Area, Behavior Skit Two.

Actual Behaviors	OBSERVERS																	Actual Number of Behaviors
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
	Reported number of behaviors																	
Shoot non-game species.....																		
Sky blasting.....																		
Cursing.....																		
Loud talking-disturb.....																		
Gun > 3 shells.....																		
Loaded gun in car.....																		
Prop up guns on car.....																		
Load guns near car.....																		
Trigger guard control.....																		
Shoot low-flying doves.....																		
Shoot outside zone of fire..																		
No muzzle control.....																		
<u>Behaviors reported but not actually occurring</u>																		
Move around-disturb.....																		
Ammo with gun in car.....																		
Remove gun from car by muzzle.....																		
Wrong carry position.....																		
Shoot too soon-greed.....																		
Action not open.....																		

TABLE 11. Observer accuracy values for Elm Hill Wildlife Management Area, Behavior Skit Two. (continued).

Actual Behaviors	OBSERVERS																	Actual Number of Behaviors
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
	Reported number of behaviors																	
<u>Behaviors reported but not actually occurring</u>																		
Muzzle on foot or hand.....		1																
Transfer gun wrong.....		1		1		1								1	1			
Talk-others-no unload.....		1	1	1	1	1	1	1	1	1	1	1		1	1	1	1	
Mock firing.....		1	1															
Leave wounded doves.....							1				1				1	1		
Shoot over road.....							1											
Horseplay.....															1	1		
Number of behaviors	11	18	13	17	12	13	14	13	11	11	14	13	9	14	19	15	10	$\bar{x} = 13.4$ 12
Number of under-estimates	5	3	4	0	4	3	3	2	4	4	2	3	6	3	1	3	3	$\bar{x} = 3.1$
Number of over-estimates	4	9	5	5	4	4	5	3	3	3	4	4	3	5	8	6	1	$\bar{x} = 4.5$
Number of wrong decisions	9	12	9	5	8	7	8	5	7	7	6	7	9	8	9	9	4	$\bar{x} = 7.6$
Accuracy (percent)	25.0	0	25.0	58.3	33.3	41.7	33.3	58.3	41.7	41.7	50.0	41.7	25.0	33.3	25.0	25.0	66.7	$\bar{x} = 36.8$

TABLE 12. Observer accuracy values for Elm Hill Wildlife Management Area, Behavior Skit Three.

Actual Behaviors	OBSERVERS																	Actual Number of Behaviors
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
Littering.....		1		1	1	1	1	1	1	1			1		1	1		1
Shoot non-game species.....	1	1	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1
Loud talking-disturb.....				1	1	1												
Ammo with gun in car.....		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Remove gun from car																		
by muzzle.....	1	1	1	1	1	1	1	1	1		1	1	1				1	1
Prop up guns on car.....	1		1	1	1	1	1	1	1	1	1	1	1			1	1	1
Load guns near car.....	1	1				1		1	1		1	1	1	1	1	1	1	1
No muzzle control.....	1		1	1	1			1	1	1	1	1	1	1	1	1	1	1
Muzzle on foot or hand.....	1	1	1	1		1	1	1	1	1	1	1	1	1	1	1	1	1
Horseplay.....	1	1		1		1	1	1		1	1	1	1	1	1	1	1	1
Cross fence-loaded.....		1			1		1	1	1	1	1	1	1	1	1	1	1	1
Running-loaded.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Stumble-no muzzle control....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Fall in dirt-no check barrel.	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Trigger guard control.....	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Shoot low-flying doves.....	1		1	1		1	1	1	1	1	1	1	1	1	1	1	1	1
<u>Behaviors reported but not actually occurring</u>																		
Move around-disturb.....	1				1									1				
Transfer gun wrong.....		1																
Wrong carry position.....		1					1		1	1	1					1		

TABLE 12. Observer accuracy values for Elm Hill Wildlife Management Area, Behavior Skit Three. (continued)

Actual Behaviors	OBSERVERS																	Actual Number	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		
Reported Number of Behaviors																			
<u>Behaviors reported but not actually occurring</u>																			
Mock firing.....			1							1									
Loaded gun in car.....				1		1													
Action not open.....				1			1												
Alcohol.....								1	1										
Shoot over road.....										1									
Shoot outside zone of fire...										1						1			
Jump ditch-loaded.....											1								
Talk-others-no unload.....											1			1		1	1		
Leave wounded doves.....												1					1		
Number of behaviors	13	13	11	15	13	15	13	16	14	16	17	13	12	15	12	12	15	$\bar{x} = 14.1$	16
Number of under-estimates	4	5	6	3	4	2	5	1	3	4	2	5	4	3	4	3	3	$\bar{x} = 3.6$	
Number of over-estimates	1	2	1	2	1	1	2	1	1	4	3	2	0	2	0	3	2	$\bar{x} = 1.7$	
Number of wrong decisions	5	6	6	5	5	3	7	2	4	8	5	7	4	5	4	6	5	$\bar{x} = 5.2$	
Accuracy (Percent)	68.8	56.3	56.3	68.8	68.8	81.3	56.3	87.5	75.0	50.0	68.8	56.3	75.0	68.8	75.0	62.5	68.8	$\bar{x} = 67.3$	

TABLE 13. Observer accuracy values for Elm Hill Wildlife Management Area, Behavior Skit Four.

Actual Behaviors	OBSERVERS																Actual Number of Behaviors		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16			
	Reported Number of Behaviors																		
Gun > 3 shells.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Cross fence-loaded.....	1		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
Trigger guard control.....	1	1	1	1	1	1		1	1	1	1	1						1	
<u>Behaviors reported but not actually occurring</u>																			
Ammo with gun in car.....	1																		
Shoot low-flying doves.....	1																	1	
No muzzle control.....	1			1						1								1	
Wrong carry position.....											1							1	
Remove gun from car by muzzle.....																		1	
Number of behaviors	6	2	3	4	3	3	2	3	3	4	4	3	2	2	4	4	4	$\bar{x} = 3.3$	3
Number of under-estimates	0	1	0	0	0	0	1	0	0	0	0	0	1	1	1	1	1	$\bar{x} = 0.4$	
Number of over-estimates	3	0	0	1	0	0	0	0	0	1	1	0	0	0	2	2	2	$\bar{x} = 0.6$	
Number of wrong decisions	3	1	0	1	0	0	1	0	0	1	1	0	1	1	3	3	3	$\bar{x} = 1.0$	
Accuracy (Percent)	0	66.7	100.0	66.7	100.0	100.0	66.7	100.0	100.0	66.7	66.7	100.0	66.7	66.7	0	0	0	$\bar{x} = 66.7$	

TABLE 14. Observer accuracy values for Elm Hill Wildlife Management Area, Behavior Skit Five.

Actual Behaviors	OBSERVERS													Actual Number of Behaviors
	1	2	3	4	5	6	7	8	9	10	11	12	13	
	Reported Number of Behaviors													
No. of shots fired.....	6	6	7	6	6	6	6	6	6	9	7	6	6	6
Littering.....	1	2	1	1	1	1	1	1	1	1	1	1	1	1
Leaving spent shells.....	2	2	2	2	2	1	1		2	1		1		2
Shoot songbirds-out-of-season game	1	2	1	1	1	1	1	1	1	1	1	1	1	1
Gun > 3 shells.....	1	1	2	3	1	1	1	2	1	1	1	1	1	2
Action closed-gun in or near car..		1	1	1	1	1	1	1	1	1		1	1	1
Remove gun from car by muzzle.....	1	1	1	1	1	1	1	1	1	1		1	1	1
Place gun on car or unsafe surface	1	1	1	1	1		1	1	1	1	1	1	1	1
Load guns near car.....	1	1	1	1	1	1	1	1	1	1	1	1		1
Transfer gun wrong.....	1	2	2	2	2	1	1	1	2	2	2	2		2
Wrong carry position.....	1	1	2	2	2	8	2	2		3	2	2	2	4
Muzzle on foot or hand.....	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Trigger guard control.....	2	1	3	2	5	4	3	5	2	4	4	3	3	3
Running-gun loaded.....	1	1	1		1	1		1	1	1		1		1
Mock firing.....	1	1		2	2	1	2	1	1	1	1	2	1	2
Shoot outside zone of fire.....	1	1	1	2	1	1		1	1	1	1		1	1
Point gun at self or others.....	2	6		3	2		4	3	2	5	4	4	5	3
<u>Behaviors reported but not actually occurring</u>														
Move around-disturb.....	1	1			1	1								
Talk-others-no unload.....	1	1				1		1	1		2			

TABLE 14. Observer accuracy values for Elm Hill Wildlife Management Area, Behavior Skit Five. (continued)

Actual Behaviors	OBSERVERS													Actual Number of Behaviors	
	1	2	3	4	5	6	7	8	9	10	11	12	13		
	Reported Number of Behaviors														
<u>Behaviors reported but not actually occurring</u>															
Shoot low-flying doves.....	1	1						1	1	1		1	1		
Stumble-no muzzle control.....				1											
Shoot too soon-greed.....															
Number of behaviors	28	35	29	33	33	33	28	31	28	37	30	31	27	$\bar{x} = 31.0$	34
Number of under-estimates	9	7	6	4	4	7	7	7	8	4	9	5	10	$\bar{x} = 6.7$	
Number of over-estimates	3	8	1	3	3	7	1	4	2	7	5	2	3	$\bar{x} = 3.8$	
Number of wrong decisions	12	15	7	7	7	14	8	11	10	11	14	7	13	$\bar{x} = 10.5$	
Accuracy (Percent)	64.7	55.9	79.4	79.4	79.4	58.9	76.5	67.6	70.6	67.6	58.9	79.4	61.8	$\bar{x} = 69.2$	

TABLE 15. Observer accuracy values for Amelia Wildlife Management Area, Behavior Skit One.

Actual Behaviors	OBSERVERS												Actual Number of Behaviors
	1	2	3	4	5	6	7	8	9	10	11	12	
No. of shots fired.....	9	6	9	4	6	9	7	9	9	9	9	9	9
Remove gun from car by muzzle.....	1	1	1		1	1	1	1	1	1	1	1	1
Shoot sitting doves.....	1	1	1	1	1	1	1	1	1	1	1	1	1
Point gun at self or others.....	2	2	2	4		3	3	3	3	1	3	3	3
Shoot too soon-greed.....	2							1					1
Shoot falling doves.....	1	1			1		1	1	1	1	1		1
Running-gun loaded.....	1	1	1	1	1	1	1	1	1	1	1	1	1
Sky blasting-shoot beyond range.....	1	2	2	2	1	2	2	2	5	2	2	6	1
Jump ditch-gun loaded.....	1	1	1	1	1	1	1	1	1	1	1	1	1
Talk others-no unload.....	1			1	1	1	1	1	1	1	1	1	1
Other (using illegal substances).....	1	1	1	1	1	1	1	1	1	1	1	1	1
<u>Behaviors reported but not actually occurring</u>													
Load guns near car.....		1					1	1					
Gun > 3 shells.....										1	1		
Trigger guard control.....	1				1		6			1	1		
Shoot to flush doves from trees-wires.		1											
Action closed-gun in or near car.....		1	1		1	1				1			
Horseplay.....		1						1					
Muzzle on foot or hand.....			1										
Shoot low-flying doves.....								1					

TABLE 15. Observer accuracy values for Amelia Wildlife Management Area, Behavior Skit One. (continued).

Actual Behaviors	OBSERVERS												Actual Number of Behaviors	
	1	2	3	4	5	6	7	8	9	10	11	12		
Wrong carry position.....													2	
Leave dead or wounded doves.....					1			1						
Wear bright-inappropriate clothes.....				1										
Move around-disturb.....					1		2							
Transfer gun wrong.....					1									
Shoot outside zone of fire.....									1					
Leave spent shells.....										1	3	5		
Number of behaviors	22	22	20	16	18	21	28	25	24	22	26	30	$\bar{x} = 22.8$	21
Number of under-estimates	1	6	4	8	8	2	3	1	2	4	1	3	$\bar{x} = 3.6$	
Number of over-estimates	2	7	3	3	5	2	10	5	5	5	6	12	$\bar{x} = 5.4$	
Number of wrong decisions	3	13	7	11	13	4	13	6	7	9	7	15	$\bar{x} = 9.0$	
Accuracy (Percent)	85.7	38.1	66.7	47.6	38.1	81.0	38.1	71.4	66.7	57.1	66.7	28.6	$\bar{x} = 57.2$	

TABLE 16. Observer accuracy values for Amelia Wildlife Management Area, Behavior Skit Two.

Actual Behaviors	OBSERVERS												Actual Number of Behaviors
	1	2	3	4	5	6	7	8	9	10	11	12	
	Reported number of behaviors												
No. of shots fired.....	7	5	6	7	6	7	7	7	6	7	7	6	7
Defacing property.....	1		1		1	1	1	1	1	1	1	1	1
Littering.....	1	1		1	1	1	1	1	1	1	1	1	1
Shoot to flush doves from trees-wire..	1	1		1	1	1	1	1	1	1	1	1	1
Leave dead or wounded doves.....	1		1	1		1	1	1	1	1	1	1	1
Wear bright-inappropriate clothes.....	1	1	1	1	1	1	1	1	1	1	1	1	1
Steal another's stand.....	1	1	1	1	1	1	1	1	1	1	1	1	1
Shoot songbirds or out-of-season game.	1	1	1	1	1	1	1	1	1	1	1	1	1
Wrong carry position.....	1	1	1	1	1	1				1	1	2	1
Muzzle on foot or hand.....	1	1	1	1	1	1		1	1	1	1	1	1
Shoot low-flying doves.....	1	1	2	1	1	1	1	1	1	1	1	1	1
<u>Behaviors reported but not actually occurring</u>													
Point gun at self or others.....	1	1	1				1	1	1				
Encroach on another's stand.....	1									2	1		
Move around-disturb.....							2			1	1		
Horseplay.....		1											
Shoot outside zone of fire.....		1			1				1				
Leaving spent shells.....											1	1	
Talk-others-no unload.....													

TABLE 16. Observer accuracy values for Amelia Wildlife Management Area, Behavior Skit Two. (continued).

Actual Behaviors	OBSERVERS												Actual Number of Behaviors		
	1	2	3	4	5	6	7	8	9	10	11	12			
	Reported number of behaviors														
Drive vehicle, environmental damage....				1											
Sky blasting-shoot beyond range.....					1										
Transfer gun wrong.....					1										
Trigger guard control.....					1		2								
Number of behaviors	19	16	17	17	19	17	20	17	17	20	20	18	$\bar{x} = 18.1$	17	
Number of under-estimates	0	2	2	1	2	0	2	1	2	0	0	1	$\bar{x} = 1.1$		
Number of over-estimates	2	3	2	1	4	0	5	1	2	3	3	2	$\bar{x} = 2.3$		
Number of wrong decisions	2	5	4	2	6	0	7	2	4	2	2	3	$\bar{x} = 3.4$		
Accuracy (Percent)	88.2	70.6	76.5	88.2	64.7	100	58.8	88.2	76.5	82.4	82.4	82.4	$\bar{x} = 79.9$		

TABLE 17. Observer accuracy values for Amelia Wildlife Management Area, Behavior Skit Three.

Actual Behaviors	OBSERVERS												Actual Number of Behaviors	
	1	2	3	4	5	6	7	8	9	10	11	12		
	Reported number of behaviors													
No. of shots fired.....	15	15	15	15	15	15	15	13	15	15	15	15	15	15
Drive vehicle, environmental damage....	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Leaving spent shells.....	1	1	2	1					3	3	3	3		2
Encroach on another's stand.....	1	1	1	1	1	2	2	1	1	1	1	1	1	1
Move around-disturb.....	4	3	1	1	1	4	5	4	2	8	1	1		2
Kill over 12-bird limit.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Action closed-gun in or near car.....			2						1	1	1	1		1
Place gun on car or unsafe surface.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Load guns near car.....	1	1		1			1	1		1		1		1
Stumble-no muzzle control.....		1	1	1	1	1	1	1	1	1	1	1	1	1
Mock firing.....	2	1	1	1		1	1	1	1	1	1	1	1	2
<u>Behaviors reported but not actually occurring</u>														
Defacing property.....		1												
Wrong carry position.....			1											
Point gun at self or others.....				1	1									
Gun > 3 shells.....						1						1		
Shoot low-flying doves.....								1						
Sky blasting-shoot beyond range.....					1									

TABLE 17. Observer accuracy values for Amelia Wildlife Management Area, Behavior Skit Three. (continued).

Actual Behaviors	OBSERVERS												Actual Number of Behaviors	
	1	2	3	4	5	6	7	8	9	10	11	12		
	Reported number of behaviors													
Running-gun loaded.....					1							1		
Loaded gun in car.....	1						1					1		
Leave dead or wounded doves.....				1	1							1		
Number of behaviors	28	27	27	26	25	27	29	25	27	34	30	28	$\bar{x} = 27.8$	28
Number of under-estimates	3	3	3	4	7	5	3	5	2	1	2	2	$\bar{x} = 3.3$	
Number of over-estimates	3	2	2	2	4	3	5	3	1	7	5	2	$\bar{x} = 3.3$	
Number of wrong decisions	6	5	5	6	11	8	8	8	3	8	7	4	$\bar{x} = 6.6$	
Accuracy (Percent)	78.6	82.1	82.1	78.6	60.7	71.4	71.4	71.4	89.3	71.4	75.0	85.7	$\bar{x} = 76.5$	

TABLE 18. Observer accuracy values for Amelia Wildlife Management Area, Behavior Skit Four.

Actual Behaviors	OBSERVERS												Actual Number of Behaviors	
	1	2	3	4	5	6	7	8	9	10	11	12		
	Reported number of behaviors													
No. of shots fired.....	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Steal downed birds.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gun > 3 shells.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Loaded gun in car.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Transfer gun wrong.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Horseplay.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Trigger guard control.....	3	2	1	1	1	3	3	1	3	3	3	2	3	3
Shoot outside zone of fire.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Drinking.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Action closed-gun in or near car.....	1	1	1	1	1	1	1	1	1	1	1	1	1	1
<u>Behaviors reported but not actually occurring</u>														
Point gun at self or others.....			1	1						1				
Sky blasting-shoot beyond range.....					1									
Leave dead or wounded doves.....					1									
Wrong carry position.....					1									
Talk-others-no unload.....					1									
Leaving spent shells.....						1		1						
Running-gun loaded.....												1		
Number of behaviors	18	18	17	17	19	19	18	18	18	18	19	18	$\bar{x} = 18.08$	19
Number of under-estimates	1	1	2	3	4	1	1	2	2	1	1	1	$\bar{x} = 1.7$	
Number of over-estimates	0	0	1	1	4	1	0	1	1	0	1	0	$\bar{x} = 0.8$	
Number of wrong decisions	1	1	3	4	8	2	1	3	3	1	2	1	$\bar{x} = 2.5$	
Accuracy (Percent)	94.7	94.7	84.2	78.9	57.9	89.5	94.7	84.2	84.2	94.7	89.5	94.7	$\bar{x} = 86.8$	

percent in Skit Four. The observer accuracy values for Amelia were considered very good by the investigators.

Questionnaire Returns and Responses

Out of the 112 questionnaires sent to Elm Hill and Amelia dove hunters, 79 were returned in usable form, yielding a 70.5% return rate (Table 19). Fifty-nine (71.08 percent) of the Elm Hill hunters returned questionnaires, whereas 20 (68.96 percent) Amelia dove hunters returned questionnaires. The overall return rate was in line with other studies of recreation populations (Heberlein and Baumgartner 1978) and was considered good by the investigators.

The majority of hunters (71 percent) had frequented the management areas at which they were contacted less than five years (Table 19). Sixty-eight percent of the hunters were either somewhat or reasonably satisfied with dove hunting on the management areas. Only 10 percent of the dove hunters were dissatisfied with their hunting experience at the management areas. However, 19 percent indicated an unwillingness to return to the management areas.

The demographic characteristics of the dove hunters are presented in Table 20. The 30 to 39 year old age group was predominant. The educational level of hunters was considered high with approximately 75 percent having completed at least high school and 32 percent with four or more years of college. The hunters primarily lived in rural areas in their youth, and that pattern had

TABLE 19. Experience with and level of satisfaction of sampled dove hunters at Elm Hill and Amelia Wildlife Management Areas.

	Frequency	Percent
Number of observed dove hunters responding to the mailed questionnaire.		
Elm Hill Wildlife Management Area	59	71
Amelia Wildlife Management Area	20	69
Total	79	71
Number of years of experience at Elm Hill or Amelia Wildlife Management Area.		
1- 5 years	55	71
6-10 years	18	23
11-15 years	4	5
16-20 years	0	0
21-25 years	1	1
Level of satisfaction with dove hunting at Elm Hill and/or Amelia Wildlife Management Area.		
1 - Not at all satisfied	8	10
2 - Somewhat satisfied	28	35
3 - Reasonably satisfied	26	33
4 - Very satisfied	13	17
5 - Extremely satisfied	3	4
Number of hunters indicating a willingness to return to Elm Hill or Amelia Wildlife Management Area to hunt doves.		
NO	15	19
YES	64	81

TABLE 20. Demographic characteristics of the observed dove hunters at Elm Hill and Amelia Wildlife Management Areas.

		Frequency	Percent	
Age group:	12-19 years old	10	13	
	20-29	16	20	
	30-39	29	37	
	40-49	15	19	
	50-59	6	8	
	60 or older	3	4	
Level of education attained:	Elementary school	6	8	
	High School	Grade 9	6	8
		Grade 10	3	4
		Grade 11	5	6
		Grade 12	19	24
	College	Freshman	6	8
		Sophomore	8	10
		Junior	1	1
		Senior	17	22
	More than 4 years of college	8	10	

TABLE 20. Demographic characteristics of the observed dove hunters at Elm Hill and Amelia Wildlife Management Areas. (continued).

	Frequency	Percent
Type of residence as a youth:		
Rural	30	38
Village or town under 20,000 people	10	13
City of 20,000 to 99,999 people	16	20
Urban area of 100,000 to 250,000 people	8	10
Metropolitan area of over 250,000 people	15	19
Current type of residence:		
Rural	27	34
Village or town under 20,000 people	4	5
City of 20,000 to 99,999 people	11	14
Urban area of 100,000 to 250,000 people	23	29
Metropolitan area of over 250,000 people	14	18

continued until the time of the study. Though not formally recorded, only one or two of the hunters were females.

The hunting experience of Elm Hill and Amelia dove hunters varied greatly (Table 21). Twenty-five percent of the hunters had hunted for 30 years or more. However, no one had hunted doves for more than 30 years. In general, the respondents had hunted other species much longer than they had hunted doves. The greatest number (41 percent) had started hunting between the ages of 11 and 15. However, most hunters started dove hunting at a later age. As expected, many hunters (44 percent) had been introduced to the sport by a parent.

Data regarding hunter education training are presented in Table 22. Twenty-one (27.0 percent) hunters had taken a hunter education course and, of these, 19 (90.0 percent) had received a certificate for successful completion of the course. Eleven (52 percent) hunters had been trained in Virginia. The majority (52 percent) had taken the course between 1975 and 1982. However, 20 percent of the hunters were trained before 1966.

The self-estimated hunting skill levels of the dove hunters (which are probably subject to much error) presented in Table 23 indicate that marksmanship and success in bagging doves was fairly high. Thirty-five percent of the hunters claimed they usually bagged a dove with only one or two shots and 82 percent of the hunters usually brought home a least four birds. The majority of hunters (83 percent) usually bagged doves in the less than 40 yards

TABLE 21. Hunting experience of the observed dove hunters at Elm Hill and Amelia Wildlife Management Areas.

		Frequency	Percent
Number of years of hunting experience			
	1- 5 years	11	14
	6-10	13	17
	11-15	13	17
	16-20	10	13
	21-25	12	15
	26-30	8	10
	31-35	4	5
	36-40	5	6
	41 or more	3	4
Number of years of dove hunting experience			
	1- 5 years	19	24
	6-10	28	35
	11-15	13	17
	16-20	8	10
	21-25	7	9
	26-30	4	5

TABLE 21. Hunting experience of the observed dove hunters at Elm Hill and Amelia Wildlife Management Areas. (continued)

	Frequency	Percent
Age at which respondent first started hunting		
5-10 years old	24	30
11-15	32	41
16-20	15	19
21-25	5	6
26 or greater	3	4
Age at which respondent first started dove hunting		
5-10 years old	10	13
11-15	16	20
16-20	21	27
21-25	12	15
26 or greater	20	25
Number of respondents introduced to hunting by:		
Parent	35	44
Spouse	2	3
Other Relative	11	14
Friend	24	30
No One	7	9

TABLE 22. Hunter education experience of the observed dove hunters at Elm Hill and Amelia Wildlife Management Areas.

	Frequency	Percent
Number of respondents who had taken a hunter education course		
NO	58	73
YES	21	27
Year in which the hunter education course was completed		
1982-1979	7	33
1978-1975	4	19
1974-1971	3	14
1970-1967	3	14
1966-1963	2	10
1963 or before	2	10
Number of respondents who received a certificate for successful completion of a hunter education course		
NO	2	10
YES	19	90
Number of respondents who took the hunter education course in Virginia		
NO	10	48
YES	11	52

TABLE 23. Self-estimated hunting skill of observed dove hunters at Elm Hill and Amelia Wildlife Management Areas.

	Frequency	Percent
Number of shots usually required to bag one dove		
1-2 shots	27	35
3-4	28	36
5-6	18	23
7-8	2	3
9-10	1	1
10	2	3
Average distance for bagging a flying dove		
20 yards	7	9
30	33	43
40	24	31
50	8	10
60	3	4
70	1	1
80	0	0
90	1	1
Number of doves bagged on an average hunting trip		
1-3 doves	14	18
4-6	26	34
7-9	25	32
10-12	12	16

range, typical of any hunting involving shotguns and small game. Based on the investigator's experience, these self-reported skill levels are probably over estimated and should be viewed with caution.

Table 24 indicates that the Elm Hill and Amelia dove hunters used fine quality guns and appropriate ammunition. Browning and Remington 12 gauge, semi-automatic shotguns were most popular. Field grade ammunition (No. 7 1/2 or 8 shot) was used by the majority of hunters.

Time commitment to hunting varied greatly for the observed dove hunters (Table 25). At the extremes, seven percent of the hunters spent one to five days per year hunting, whereas 12 percent of the hunters spent 41 or more days each year in the field. The most frequently reported level of hunting (21 percent) was 26 to 30 days per year. Time spent dove hunting, however, was quite limited. The majority (70.0 percent) of the hunters spent only five days or less dove hunting. This reported pattern fits the opening day phenomenon observed in this study. Approximately 83 percent of the respondents spent six or more hours in the field during a typical day of hunting. Due to the dove hunting regulations at the time of the study, shooting was not permitted until 12:00 noon. Therefore, most hunters usually spent a half day dove hunting. As expected, most hunting (80.0 percent) occurred during weekends or off-days. The same pattern (91.0 percent) was reported for dove hunting.

TABLE 24. Guns and ammunition used by observed dove hunters at Elm Hill and Amelia Wildlife Management Areas.

	Frequency	Percent
Brand of shotgun used for dove hunting		
Browning	21	27
Remington	35	44
Fox	1	1
Winchester	4	5
Savage	2	3
Stevens	2	3
Ithaca	5	6
Other	10	13
Type of action on shotgun used for dove hunting		
Single-shot	2	3
Bolt	1	1
Lever	0	0
Side-by-side	5	6
Over-and-under	9	11
Pump	13	17
Semi-automatic	44	56

TABLE 24. Guns and ammunition used by observed dove hunters at Elm Hill and Amelia Wildlife Management Areas. (continued)

	Frequency	Percent
Gauge of shotgun used for dove hunting		
410 gauge	1	1
28	1	1
20	8	10
16	2	3
12	61	77
Ammunition shot size used for dove hunting		
No. 4	0	0
No. 5	0	0
No. 6	8	10
No. 7 1/2	34	44
No. 8	34	44
No. 9	2	3
Ammunition power used for dove hunting		
Field grade	52	68
High brass	21	28
Magnum	3	4

TABLE 25. Time committed to hunting by the observed dove hunters at Elm Hill and Amelia Wildlife Management Areas.

	Frequency	Percent
Average number of days spent hunting each year		
1- 5 days	5	7
6-10	10	13
11-15	9	12
16-20	13	17
21-25	5	7
26-30	16	21
31-35	2	3
36-40	7	9
41 or more	9	12
Average number of days spent dove hunting each year		
1- 5 days	52	70
6-10	17	23
11-15	1	1
16-20	4	6

TABLE 25. Time committed to hunting by the observed dove hunters at Elm Hill and Amelia Wildlife Management Areas. (continued).

	Frequency	Percent
Number of hours spent hunting in a typical hunting day		
3 hours	3	4
4	3	4
5	7	9
6	14	18
7	5	7
8	16	21
9	29	38
Number of hours spent hunting in a typical dove hunting day		
2 hours	1	1
3	6	8
4	18	23
5	22	28
6	23	29
7	5	6
8	3	4
9	1	1

TABLE 25. Time committed to hunting by the observed dove hunters at Elm Hill and Amelia Wildlife Management Areas. (continued).

	Frequency	Percent
When hunting usually occurs		
Workdays	15	19
Weekends or off-days	63	80
Vacation	1	1
When dove hunting usually occurs		
Workdays	5	6
Weekends or off-days	72	91
Vacation	2	3

In addition to doves, the observed hunters also pursued a wide variety of game animals (Table 26). No clear patterns in hunting are evident from the data. However, deer, rabbit, squirrel, and doves seemed to be the most sought-after species.

The data presented in Table 27 indicate that the respondents had made substantial monetary investments in guns, vehicles, clothing, and other hunting gear. Fifty-one percent of the hunters owned four or more firearms. Thirty-four percent of the hunters owned a vehicle used primarily for hunting. In addition, the majority of hunters were well equipped with hunting clothing and related gear. Fifty percent of the respondents also owned hunting dogs.

Evidence that hunting was an important aspect of the lives of many of the respondents is presented in Table 28. Thirty-eight percent of the respondents belonged to at least one hunting club. Ninety-two percent of the respondents owned at least one hunting book and, many respondents subscribed to prominent hunting magazines. Nineteen percent of the respondents currently or had previously belonged to a competitive shooting team and 25 percent reloaded their own ammunition. Hunting was also an important family and social function for many of the respondents. Fifty-four percent of the respondents indicated that most of their close friends hunted and 62 percent indicated that at least some of their co-workers also hunted. Forty-four percent of the respondents usually hunted with a group consisting of family and friends. Only

TABLE 26. Days or portion of days spent hunting various game animals during 1981.

Animal		Frequency
Bear	1- 5 days	1
Deer (gun)	1- 5 days	11
	6-10	18
	11-15	16
	16-20	8
	21-25	6
	26-30	4

	36-40	1
41 or more	1	
Deer (bow)	1- 5 days	16
	6-10	5
	16-20	1
Fox	1- 5 days	2
	6-10	1
Raccoon	1- 5 days	4
	6-10	1

	21-25	1
	26-30	1
41 or more	1	
Rabbit	1- 5 days	23
	6-10	1
	31-35	1
Squirrel	1- 5 days	23
	6-10	13
	11-15	2
	16-20	1
Woodchuck	1- 5 days	1
	6-10	1

TABLE 26. Days or portion of days spent hunting various game animals during 1981. (continued)

Animal		Frequency
Crow	1- 5 days	8
	6-10	1
Ring-necked pheasant	6-10 days	1
Quail	1- 5 days	15
	6-10	9
	11-15	1
	----- 26-30	1
	----- 41 or more	1
Ruffed grouse	1- 5 days	6
	6-10	1
Turkey (spring)	1- 5 days	18
	6-10	4
	16-20	1
Turkey (fall)	1- 5 days	16
	6-10	6
	11-15	2
	16-20	1
	21-25	1
Dove (early season)	1- 5 days	54
	6-10	15
	11-15	2
	16-20	1
Dove (late season)	1- 5 days	12
	6-10	1
Duck and Coot	1- 5 days	9
	6-10	6
	11-15	1
	16-20	4
Goose	1- 5 days	10
Marsh Hen	1- 5 days	1

TABLE 27. Investment in hunting firearms and equipment made by the observed dove hunters at Elm Hill and Amelia Wildlife Management Areas.

	Frequency	Percent
Number of firearms owned		
1- 3 guns	32	41
4- 6	14	18
7- 9	14	18
10-12	7	9
12 or more	5	6
Number of hunters who owned a vehicle used solely for hunting		
NO	52	66
YES	27	34
Number of hunters who owned the following types of hunting equipment		
<u>Clothing</u>		
Camouflage suit	55	70
Camouflage shirt	9	11
Camouflage pants	2	3
Camouflage hat	11	14
Rain gear	50	63
Hunting boots	70	89
Hunting coat	55	70
Hunting vest	59	75
Insulated underwear	68	86

TABLE 27. Investment in hunting firearms and equipment made by the observed dove hunters at Elm Hill and Amelia Wildlife Management Areas. (continued).

		Frequency	Percent
Number of hunters who owned the following types of hunting equipment			
<u>Hunting Gear</u>	Folding stool	52	66
	Hunting knife	73	92
	Decoys	25	32
	Game calls	41	52
	Boat	28	35
	Camouflage netting	10	13
	Cooler	62	78
<u>Shooting Gear</u>	Reloader	20	25
	Hand trap	11	14
	Foot trap	6	8
	Shooting bench	5	6
	Gun cabinet	26	33
	Gun rack	43	54
	Spotting scope	13	16
	Binoculars	43	54
	Ear protectors	29	37
<u>Dogs</u>	Retriever	6	8
	Bird dog	18	23
	Hound	15	19

TABLE 28. Factors relating to the importance of hunting in the lives of the observed dove hunters at Elm Hill and Amelia Wildlife Management Areas.

	Frequency	Percent
Current membership in hunting clubs		
None	49	62
One club	23	29
Two clubs	6	8
Three clubs	1	1
Number of hunting books owned		
None	22	28
One	29	37
Two	13	16
Three	4	5
Four	10	13
Five	1	1
Hunting magazines read on a regular basis		
Field and Stream	29	37
Outdoor Life	25	32
Sports Afield	16	20
The American Hunter (NRA)	23	29
The American Rifleman (NRA)	8	10
Virginia Wildlife	26	33
Other	18	22

TABLE 28. Factors relating to the importance of hunting in the lives of the observed dove hunters at Elm Hill and Amelia Wildlife Management Areas. (continued).

	Frequency	Percent
Number of hunters who had been or were currently members of a competitive shooting team.		
NO	64	81
YES	15	19
Number of hunters who reloaded their own ammunition		
NO	59	75
YES	20	25
The approximate number of close friends who hunted		
None	1	1
Some	35	45
Most	42	54
The approximate number of co-workers who hunted		
None	13	18
Some	45	62
Most	15	21

TABLE 28. Factors relating to the importance of hunting in the lives of the observed dove hunters at Elm Hill and Amelia Wildlife Management Areas. (continued).

	Frequency	Percent
The kind of group the individual hunted with most often		
Family	11	14
Friends	24	30
Family and friends	35	44
Co-workers	1	1
Hunting club members	6	8
Usually hunted alone	2	3
The member of the hunting group who usually initiated the hunting trip		
Yourself	24	31
Another group member	5	6
Both yourself and another group member	49	63

three percent of the respondents normally hunted alone. In addition, the typical hunting trip was usually initiated by both the respondent and another member of the usual hunting group.

Ratings of the importance of various hunting related factors in the lives of the respondents are presented in Table 29. The measurement scale used ranged from one (Strongly Disagree) to five (Strongly Agree). Hunting was not rated as the major form of recreation for most respondents (Mean = 2.32). However, hunting with people of about the same skill level was perceived as important (Mean = 3.85). In addition, the statement indicating that a great deal of the respondent's life was organized around hunting also received a high rating (Mean = 3.63). Also, many respondents agreed that much of their life was organized around hunting (Mean = 3.32). Finally, some respondents indicated that their choice of career was or would be based, in part, on considerations related to hunting (Mean = 3.09). On the other side, the statement relating current residence to hunting opportunities was not highly rated by the respondents (Mean = 2.32). In contrast to earlier responses in the questionnaire, the statement that most of the respondents' friends were in some way connected with hunting also received low ratings (Mean = 2.59). Although not rated as the major form of outdoor recreation, the responses indicated that hunting was a fairly important aspect of many of the respondent's lives.

Data regarding the motivations of Elm Hill and Amelia dove hunters are presented in Table 30. The two motivations receiving

TABLE 29. Ratings of statements regarding the importance of hunting in the lives of the observed dove hunters at Elm Hill and Amelia Wildlife Management Areas.

	Strongly Disagree (1)	Disagree (2)	Neutral (3)	Agree (4)	Strongly Agree (5)	Mean Response
Hunting is my major form of outdoor recreation	24 ^a 30	5 6	49 62	0 0	0 0	2.32
I try to hunt with people who are at about the same skill level as I am	0 0	14 18	9 11	31 39	25 32	3.85
I get greater satisfaction out of hunting than I do my work	7 9	13 16	18 23	30 38	11 14	3.32
I find that a lot of my life is organized around hunting	5 6	12 15	15 19	22 28	11 14	3.63
My choice of career was (or will be) based in part on considerations related to my hunting	8 10	21 27	17 22	22 28	11 14	3.09
One of the major reasons I now live where I do is that it has opportunities for hunting	21 27	28 35	16 20	9 11	4 5	2.32
Most of my friends are in some way connected with hunting	17 22	27 34	13 16	15 19	7 9	2.59

^aThe first row of numbers represents the frequency of responses. The second row represents the approximate percentage of responses.

TABLE 30. Ratings of motivations of the observed dove hunters at Elm Hill and Amelia Wildlife Management Areas.

	Not at all Important (1)	Slightly Important (2)	Moderately Important (3)	Very Important (4)	Extremely Important (5)	Mean Response
To be outdoors.	6 ^a 8	11 14	23 29	32 41	7 9	3.29
For relaxation.	0 0	2 3	14 18	35 44	28 35	4.13
To get away from the regular. routine	1 1	4 5	21 27	35 44	16 20	3.79
For the challenge or sport.	4 5	6 8	12 15	35 44	21 27	3.81
To be with my family.	2 3	3 4	23 29	24 30	25 32	3.87
To obtain wild meat for eating.	29 37	15 19	13 16	13 16	5 6	2.33
For physical exercise	16 20	13 16	23 29	12 15	12 15	2.88
To be with my friends	8 10	14 18	29 37	20 25	7 9	3.05

TABLE 30. Ratings of motivations of the observed dove hunters at Elm Hill and Amelia Wildlife Management Areas. (continued).

	Not at all Important (1)	Slightly Important (2)	Moderately Important (3)	Very Important (4)	Extremely Important (5)	Mean Response
For the experience of the kill; bagging game.	4 5	13 16	29 37	23 29	8 10	3.23
To obtain a trophy.	21 27	15 19	22 28	15 19	4 5	2.56
To use my guns or other hunting equipment	31 39	13 16	12 15	11 14	9 11	2.39
To enjoy nature	19 24	16 20	18 23	16 20	8 10	2.71
To develop my hunting skills.	1 1	4 5	7 9	31 39	34 43	4.21
To develop my shooting skills	4 5	9 11	19 24	24 30	21 27	3.64
For the sense of accomplishment . . it brings	7 9	11 14	20 25	22 28	17 22	3.40

^aThe first row of numbers represents the frequency of responses. The second row represents the percentage of responses.

the highest scores were: "To develop my hunting skills" (Mean score = 4.21); and, "For relaxation" (Mean score = 4.13). The next most important motivation was, "To be with my friends", (Mean score = 3.87). The two least important motivations were related to obtaining meat for eating (Mean score = 2.33) and obtaining a trophy (Mean score = 2.56).

The knowledge test scores for Elm Hill and Amelia dove hunters (Table 31) revealed that most respondents were fairly knowledgeable about hunting and hunting safety, with 68 percent of the hunters scoring 72 percent or above. Twenty-two percent of the hunters scored in the 85 percent or greater range. However, five percent of the respondents scored very poorly on the knowledge test, receiving scores ranging from nine to 44 percent. Twenty-eight percent of the respondents scored in the 45 to 71 percent range. It should be noted that the knowledge test taken by the dove hunters was different than the test used in knowledge pre- and post-testing. The dove hunter exam was more difficult (average item difficulty was near 0.5) but was similar in content.

Correlation of Behavior and Questionnaire Variables

Thirty-three variables were derived and/or constructed from the dozens of behavioral and questionnaire variables measured in this study. Of primary interest was the hunter education variable and how it related to depreciative behavior and other variables such as

TABLE 31. Hunter education knowledge test scores of the observed dove hunters at Elm Hill and Amelia Wildlife Management Areas.

Raw Score ^a	Percent Score ^b	Frequency	Percent
19-21	>85	17	22
16-18	72-85	36	46
10-15	45-71	22	28
2-9	9-44	4	5

^aNumber of questions answered correctly. The maximum possible raw score was 22. Three of the original 25 questions were deleted after an item-analysis revealed inadequacies.

^bApproximate percentage.

experience, education, and residency. It is interesting, and at the same time quite discouraging, that the hunter education variable did not correlate meaningfully with any of the other 32 variables. There appeared to be no relationship between hunter safety training and behavior in the field. Table 32 presents the correlation coefficients of three behavior variables (total number of errors, ethical errors, and safety errors) and 10 related variables, including hunter education. A coefficient of 0.30 or greater was considered meaningful for the purpose of this study (Nunnally 1978). None of the 10 variables correlated at the 0.30 level with any of the three behavioral variables. However, some of the correlations, though not meaningful, were statistically significant, given the sample size.

Of the remaining variables, a few significant correlations were found but had no practical bearing on the primary research questions addressed by this study. Therefore, these correlations are not presented.

TABLE 32. Correlation coefficients of 10 selected variables with the ethical, safety, and total number of errors committed by the observed dove hunters at Elm Hill and Amelia Wildlife Management Areas. Coefficients of .30 and greater were considered meaningful.

Variables	Ethical Errors	Safety Errors	Total Errors
Hunter Education Course	.03	-.13	-.11
Knowledge	.03	.01	.01
Hunting Experience	.19	-.10	-.18
Hunting Skill	.11	-.19	-.08
Time Investment	-.02	-.01	-.02
Monetary Investment	-.02	.12	.10
Importance of Hunting	.001	.003	.02
Age	-.21	-.21	-.28
Education	.23	-.16	.001
Present Residence	.07	-.08	-.05

DISCUSSION

Many dove hunters exhibited unsafe and unethical behaviors while dove hunting. In fact, considering that hunters were observed only 30 minutes, the number of depreciative acts recorded in the dove fields was alarming. In addition, hundreds of other infractions of the rules of good hunting were observed but only informally noted. A strong case could be made that dove hunting on Elm Hill and Amelia Wildlife Management Areas is a dangerous enterprise. However, many would argue that dove hunting per se is non-existent and that only dove shooting occurs. This idea may explain the willingness of hunters to tolerate crowding and an almost "carnival-like" setting. Given these conditions, one might expect the rowdiness, drinking, unnecessary shooting, and other problem behaviors that were observed. In addition, only shotguns are used, and many hunters might assume that therefore danger is reduced compared to deer hunting. However, hunter education teaches that firearms should be handled safely and carefully at all times and that the rules and regulations of hunting should also be obeyed at all times. Therefore, there are no legitimate excuses for the many depreciative behaviors discovered in the observational study. That the hunter education graduates proved to be neither safer nor more ethical than untrained hunters should be viewed with concern.

Some researchers and hunter education specialists might argue that the hunters in our sample were atypical and that our results

do not apply to hunters in general. However, overall results from the dove hunter questionnaire indicated that the observed hunters had a great deal of experience, interest in, and commitment to hunting and shooting sports at all levels. Though not directly comparable, several characteristics of the observed dove hunters were similar to results reported in, "1980 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation", (U.S. Department of Interior and U.S. Department of Commerce 1982). For example, most hunters are male (92 percent). Sixty-nine percent of all hunters come from towns and rural areas. Twenty-nine percent of all hunters had completed one or more years of college. Twenty-eight percent of all hunters were in the 25-34 years of age range and 18 percent of the hunters were in the 35-44 years of age range. The majority (43 percent) of all hunters began hunting between the ages of 12 and 15 years. The experience level was fairly evenly distributed from the 3-5 year range to the 25-34 year range. Only seven percent of the hunters had been hunting for 45 years or more. Ninety percent of all hunters usually went on at least one hunting trip per year. Ninety-two percent of the migratory bird hunters also hunted on at least one trip per year. For all hunting reported, the average days of participation per hunter was 19, with an average of eight days for migratory bird hunters. The average hunting trip lasted five hours for all hunting and for migratory bird hunting as well. Ninety-four percent of all dove hunting was in the state of residence and there was an average of six days of

participation per hunter. Fourteen percent of all sportsmen in 1980 (hunters and fishermen) owned a vehicle used primarily for their sport. Six percent of all hunters belonged to a local rod and gun club. Forty-six percent of all hunters frequently read magazines or other periodicals related to hunting, fishing, or wildlife.

When considering the above selected characteristics of U.S. hunters in 1980, the Elm Hill and Amelia Wildlife Management Area hunters in Virginia do not seem in the least atypical. In addition, the subjective impression of the investigator was that the observed dove hunters seemed typical in every respect. Therefore, the results were judged to be representative of Virginia hunters in 1980 and 1981, at least, and probably of hunters in general.

The correlations between the hunter education variable and the variables representing hunter characteristics and depreciative behavior in the field were all negligible ($r \leq .3$). However, there was a weak negative correlation between total errors and age, indicating that older hunters tended to make fewer errors. This result would most likely apply to many areas of safety, considering that increased age, in general, tends to make one more cautious.

Though our study was limited in scope and sample size, the conclusion that hunter education seemed to have little or no effect on hunting behavior is inescapable. Further studies of different types of hunters in other locales would be necessary in order to make concrete judgments about the ultimate value of hunter educa-

tion. However, if our study proved to be representative on a national basis, the validity of hunter education training would be in serious question.

Though some encouraging evidence for the benefits of hunter education has been reported (Jackson 1981), no definite conclusions can be made about the role of hunter education in changing behavior. Palmer (1985) presented some strong statistical evidence that driver education reduced fatality rate, and many hunter education specialists argue that the same results can be achieved with young hunters. This argument may be very sound. However, there are currently many differences between driver education and hunter education training which make such a comparison tenuous. First, driver education involves a much larger amount of time in class compared to hunter education. Second, driver education students are exposed almost constantly to the automobile as part of everyday life, whereas hunter education students receive much less exposure to firearms. Third, a significant amount of time in driver education classes is spent in actual driving. Many hunter education classes still have no live firing and little handling of firearms. Fourth, once a driver education student begins driving, the opportunity to practice safe driving habits occurs daily. The opportunity to practice safe gun handling habits may only occur during hunting season. Fifth, the influence of parents and peers regarding safe driving is more prevalent than for hunting. That is, the driver education student has ridden with Mom or Dad on hundreds of

occasions, whereas the hunter education student may have only been on a relatively few hunting trips with parents. Finally, driver education is taught by professional teachers, whereas many hunter education instructors have typically little formal educational training. In summary, both teachers and students invest more time and energy in driver education compared to hunter education teachers and students. Therefore, until hunter education greatly expands, any comparison between driver education and hunter education should be made with caution.

Actually, the finding of no correlation between hunter education and behavior in the field was not surprising to the author. After spending approximately four years studying the entire Virginia Hunter Education Program and working closely with hunter education officials, and after studying educational evaluation at the graduate level, the author realized that changing a person's behavior requires a great deal of energy on both sides. The students must have some kind of motivation to change, and fear of being involved in an accident does not seem to be adequate. In addition, hunter education tends to be a once-in-a-lifetime effort to change a lifetime of hunting behavior. In 1981, the program was only six hours in length and involved no live firing. It is difficult for the author to believe that a lecture, a slide show, and a couple of films could have a long-term effect on hunters. Yet, this is the basis for many hunter education programs.

In the author's opinion, hunter education officials have had a rather naive attitude about the overall effectiveness of their programs. It seems reasonable that to improve a hunter's behavior permanently, a much longer program is needed, with handling and shooting firearms under simulated hunting conditions a necessary part of the program. In addition, frequent refresher courses might prove helpful. These courses could be contained in overall courses on hunting various species, for example turkey, and thereby be more enticing to adult and previously trained hunters.

CHAPTER V

PHASE THREE: Naturalistic Inquiry Evaluation of Virginia's Hunter Education Program

INTRODUCTION

The Virginia Hunter Education Program had been undergoing rapid change in the early 1980's, due primarily to massive increases in federal funding. As a consequence of the rapid changes, many problems had surfaced and were being dealt with in a piecemeal fashion. There was a tremendous need for management to get a firm grip on the program and provide direction. However, there was a lack of leadership in the hunter education program across the state. This crippling situation was due to many factors, foremost of which were a lack of unified agency support and the absence of an effective Hunter Education Coordinator position. With the recurring issue of mandatory hunter education facing the Commission and the new, federally mandated 10-hour basic course nearing implementation, hunter education in Virginia was at a critical stage. The managers of the program needed a comprehensive objective evaluation in order to redesign and implement a much better hunter education program in Virginia.

The first two quantitative phases of the evaluation had yielded some interesting results. However, many questions about

the program remained and could best be answered by another approach. Though it was not a requirement of the original request-for-proposal, a naturalistic inquiry, utilization-focused evaluation, based on ideas presented by Patton (1980), was implemented in late 1983. The goal of this phase of the evaluation was to determine how the hunter education program was working in Richmond and across the state, and how well it was being received by the citizens of Virginia. The basic objectives of the third phase of the evaluation were to identify problems of the program and recommend solutions to those problems.

BACKGROUND

The purpose of this section is to briefly summarize relevant aspects of Smith's 1981 study of the implementation of state hunter education programs. Specific findings of Smith (1981) will also be presented. In addition, this section will also present an overview of interviewing as a research tool in naturalistic inquiry evaluation.

Smith's 1981 Implementation Study

Smith (1981) utilized both questionnaires and in-depth interviews to study implementation of state hunter education programs. The hunter education coordinators of 30 states were sent questionnaires dealing with five basic areas of hunter education: (1) program instructors; (2) program funding; (3) program communication; (4) program organizational support; and (5) program content. Specific questionnaire questions were developed from these five general areas. Twenty-five of the coordinators responded to the questionnaire.

In order to gain a greater depth of understanding regarding hunter education program implementation, Smith (1981) also interviewed three prominent figures in hunter education: (1) Dr. Fred Eveden -- Former Director of the Wildlife Society and the study team leader for the International Association of Fish and Wildlife Agencies 1957 Hunter Education Study; (2) Mr. James Dabb --

Program Coordinator for Michigan's Hunter Education Program; and (3) Dr. Howard Tanner -- Director of the Michigan Department of Natural Resources.

In general, Smith (1981) found that program funding, communication, placement within the organization, and instruction were the areas that posed the greatest concern in attempts to improve hunter education program implementation. Smith also presented several recommendations for improvement of program implementation as well as a model hunter education program. Many of these specific recommendations duplicate those presented in the current Virginia Hunter Education Program evaluation. Specific problems with hunter education discovered by Smith are presented below.

The following list represents some of the specific problems discovered by Smith (1981). These concerns will not be discussed in detail since many of Smith's findings overlap the present naturalistic inquiry evaluation.

1. The design of most programs was adequate. Program implementation was the greatest problem.
2. The hunter education course needed to stress more ethics.
3. External communication with the public was lacking in most programs.
4. Internal agency communication was lacking in many organizations.

5. Funding was inadequate due to hunter education funds being channeled into other wildlife programs within the agency.
 6. Shortage of staff trained in education was a frequent problem mentioned.
 7. The hunter education program had relatively low priority in many states.
 8. Chief administrators were not adequately familiar with their hunter education programs. Many of them still thought of hunter education as only gun safety.
 9. Placement of the hunter education program within the agency posed a continuing problem. Most programs were in law enforcement. However, educational programs traditionally have had low priority within enforcement divisions.
 10. There was a lack of autonomy of hunter education programs within the agencies.
 11. Many problems with volunteer instructors were discovered, such as the need for more training, especially in teaching methods. Lack of personal contact with instructors and adequate incentive awards were also mentioned.
- Evaluation of instructors was a concern of many state coordinators but was favored by only about half of these leaders. Evaluation of instructors might have drastically reduced the size of the volunteer corps.

12. Lack of public support of hunter education was a major concern. This problem, of course, was related to poor external communication. Improved media coverage was stressed as a means to partially alleviate this problem.
13. Many states did not provide course materials such as a student manual and visual aids. Several states with comprehensive programs did, however, provide these materials.
14. The hunter education coordinators were highly frustrated with their jobs. This situation most likely stemmed from many of the previous problems mentioned such as lack of agency support.

Many of the problems discovered in Smith's study were also revealed in the naturalistic inquiry evaluation of Virginia's Hunter Education Program. Before addressing those specific concerns, the use of interviews in evaluation will be discussed.

Interviews In Naturalistic Inquiry Evaluation

Interviewing is one of the major tools of a qualitative evaluator and lends itself well to a naturalistic inquiry approach to evaluation. Patton (1980) stressed that the purpose of interviewing is to find out what is in and on someone else's mind, and that the purpose of open-ended interviewing is not to put things in someone's mind, but rather to access the perspective of the person being interviewed. Interviews are

conducted to find out from people what cannot readily be observed. The assumption of interviewing is that someone else's perspective is meaningful, knowable, and able to be made explicit. The evaluator's responsibility is to provide a framework within which people can respond comfortably, accurately, and honestly to relevant evaluation questions.

Patton (1980) listed three basic approaches to interviewing: (1) the informal conversational interview; (2) the general interview guide approach; and (3) the standardized open-ended interview. Differences among these three approaches hinge on the extent to which the interview questions are determined and standardized before the interview occurs. The informal conversational interview relies on spontaneous questions and answers as part of a natural flow of conversation. The respondent may not even be aware of being interviewed.

The general interview guide approach entails an outline of issues that are to be discussed at some point during the interview. Issues are discussed in any order and no standardized questions are written in advance.

The standardized open-ended interview involves constructing a set of carefully worded questions, arranged and presented in a predetermined sequence. This approach minimizes bias and interviewer effects and is especially appropriate when a large number of people is to be interviewed.

Once an interview approach has been decided upon, the important issue of what questions to ask remains. Patton (1980) listed six kinds of questions an interviewer can ask. First, experience/behavior questions are about what a person does or has done. Second, opinion/value questions reveal what people think about a specific program. Third, feeling questions are aimed at understanding the emotional responses of people to their experiences and thoughts. Fourth, knowledge questions help determine what factual information the respondent has. Fifth, sensory questions are about what is seen, heard, touched, tasted, and smelled. Finally, background/demographic questions concern the identifying characteristics of the person being interviewed.

Interview questions can be asked in the past, present, or future tense. By combining the three time frames with the six kinds of questions, a total of 18 kinds of questions can be asked during an interview. The use of all 18 types in any one interview, however, would be highly unlikely.

Several factors should be considered to create good interview questions. First, the sequencing of questions is important. Patton (1980) recommended starting the interview with questions about noncontroversial present behaviors, activities, and experiences. Second, the wording of questions determines the quality and usefulness of responses. In interviewing, good questions should be open-ended, neutral, singular, and clear. Open-ended questions encourage the respondent to talk freely and in his own

terms. Dichotomous (yes or no) questions discourage response from subjects and the interviewer may do more talking than the respondent. Neutrality means that the person being interviewed can tell anything without eliciting the interviewer's favor or disfavor with regard to the content of his response. Singularity of questions refers to keeping only one topic per question. Clarity means that questions are phrased in terms the respondent can relate to and understand.

Other issues that affect the quality of interviews include proper prefatory statements, appropriate probing questions, and appropriate verbal and nonverbal cues to respondents' answers as a means of controlling the interview. In addition, Patton (1980) recommended tape recording interviews, having them transcribed verbatim, taking notes during the interview, and completing notes and summaries immediately after completion of the interview.

METHODS

The persons most closely involved with and affected by the hunter education program were chosen as sources of information. In essence, information was gathered from top administrators on down to students in the basic course. Interviews were conducted by the investigator and Dr. Peter Bromley. The following list comprises the sample of people interviewed in the third phase of the evaluation:

Administrators/Managers of the Program	- 6
Education Lieutenants	- 6
Game Wardens	- 6
Volunteer Instructors	- 6
Public School Officials	- 10
Hunter Education Students	- 12
Sportsmen/Conservation Leaders	- 6
Outside Hunter Education Experts	- 5

In total, 57 people were interviewed. Each person in the study was contacted and an interview appointment made. Before the interview, the respondent was told the purpose of the interview, was asked permission to tape record the interview, and was guaranteed confidentiality. Most respondents were interviewed face-to-face. However, the six volunteer instructors were interviewed by phone. The interviews ranged in length from 20 minutes for students to two hours for some administrators, Lieutenants, and Wardens.

Once recorded, the interviews were transcribed verbatim by a professional typist. No editing of the tapes was done. After

transcribing, the interviews were coded according to issue and topic in order to provide a means of cross-validating the claims made by some respondents.

The various interview questions were developed using procedures and guidelines recommended by Patton (1980). All questions were open-ended and designed to encourage free response. A complete list of interview questions for most groups of respondents is presented in Appendix IX. Since familiarity with the program varied greatly among sportsmen/conservation leaders and outside experts, standard sets of questions were not used for these two groups. Instead, the interviewer devised appropriate questions as the interviews progressed. The issues addressed by the interview questions are listed in the following section.

ISSUES ADDRESSED BY THE NATURALISTIC INQUIRY
EVALUATION OF THE VIRGINIA HUNTER EDUCATION PROGRAM

The following list of issues was developed after many hours of discussion with knowledgeable people associated with the hunter education program. The list was not intended to be exhaustive but to address the most significant issues facing the program.

1. Primary purpose of the program.
2. The effectiveness of the program.
3. Strengths of the program.
4. Weaknesses of the program.
5. Most liked aspects of the program.
6. Most disliked aspects of the program.
7. Most important experience since involvement with the program.
8. Administration and management of the program.
9. Evaluation of Administrators, Education Lieutenants, Wardens, and Volunteer Instructors.
10. Reward and incentive system for Administrators, Education Lieutenants, Wardens and Volunteer Instructors.
11. Management and staff conflicts.
12. Handling of funds.
13. Appropriateness of settings in which hunter education is currently taught.
14. Reaction of public school officials to the program.
15. Contributions of volunteer instructors.
16. Effectiveness of volunteer instructors.

17. Potential problems caused by volunteer instructors.
18. Appropriateness of the basic course content.
19. Appropriateness of the instructors manual.
20. Appropriateness of the student manual.
21. Appropriateness of the slide program.
22. Appropriateness of the film selection.
23. Appropriateness of the training aids (guns, bows, etc.)
24. Appropriateness of video in teaching hunter education.
25. Adequacy of the new, basic exam.
26. Feasibility and desirability of a 10-hour basic course.
27. Feasibility and desirability of having mandatory hunter education in Virginia.
28. Recommended improvements in the current program.

STRENGTHS OF THE CURRENT HUNTER EDUCATION PROGRAM

The following strengths of the program were derived from an overall analysis of the interviews and represent the most significant and/or most often mentioned aspects of the program. Note that these findings were made in 1983 and that significant changes are noted parenthetically.

1. Mr. Kerrick, the current Hunter Safety Coordinator had been a faithful steward of the program and was admired by many his peers for his devotion. (Mr. Kerrick retired in 1985.)
2. The Education Lieutenants were quite dedicated, especially considering their difficult situation in working for both Law Enforcement and Education.
3. There were some highly dedicated, competent, and unselfish volunteer instructors.
4. Funding for the program was quite adequate and the funds were not being misused.
5. The program reached thousands of students each year. Close to 400,000 had been certified.
6. The program had been rapidly changing and improving during the years 1980 through 1983.
7. The basic course content was adequate and well balanced.
8. The new training aids (guns, bows, etc.) were excellent.
9. Some dedicated wardens were doing a terrific job teaching the basic course.
10. The program had a very good image and was well received in many public schools.
11. Many students enjoyed the basic course and appreciated the opportunity to become safer hunters and handlers of firearms.

MAJOR PROBLEMS WITH THE VIRGINIA HUNTER EDUCATION PROGRAM

The following problems concerning the Hunter Education Program represent the culmination of hundreds of hours of interviews with approximately 50 people and weeks of analyses and summarization. Much of the information came directly from the people interviewed. However, some problems were conclusions drawn by the investigator after much thought and familiarity with the program. Although the problems are arranged by headings and sometimes associated with a specific group of people (for example, Education Lieutenants), the information did not come exclusively from any particular group. Many of the problems associated with volunteer instructors, for example, came from top administrators, Lieutenants, and Wardens as well as the volunteers.

Many of the problems are validated with quotations from various sources. However, some problems were listed by almost everyone and quotes were not necessary. In addition, some problems were listed by a very important person in the program and not necessarily mentioned by several people.

Problems Involving Agency Support and Communication

During the course of the present evaluation, many important problems with the Virginia Hunter Education Program were uncov-

ered. First and foremost among problems was in the category of internal agency support. There seemed to be a lack of internal support for the hunter education program from all divisions within the Game Commission, especially the Law Enforcement Division. One top administrator stated that one of the top officials in Law Enforcement did not appreciate the current status of the hunter education program. He apparently had a ten-year-old view of the program. This same top administrator believed that the Law Enforcement Division had not really supported the hunter education program over the years or at least had not made the program a priority. As a reflection of the frustration levels created by lack of internal agency support, one top administrator remarked that the present evaluation report would probably go to the Director of the Commission and never be consulted or acted upon. Another administrator close to the hunter education program remarked also that the Law Enforcement Division did not really support the program. One Game Warden stated that he also felt that Law Enforcement did not support hunter education. Some of the Education Lieutenants also felt the lack of support. A few of the volunteer instructors indicated their belief that the Commission did not provide enough support for the program. One volunteer instructor with years of experience stated that 20 years ago he went to Richmond and found Mr. Kerrick, the Safety Officer in a tiny office with hardly any support facilities, and 20 years later he can go to the Richmond office and find the same

situation. To this volunteer instructor, that situation indicated that the Commission did not support hunter education. One Education Lieutenant stated, "... we don't have a commitment from our administration." One volunteer instructor remarked, "...probably the main weakness is the Game Commission does not endorse it (hunter education) enough." Another volunteer instructor, when asked about the most disliked aspect of the program remarked, "The support you get."

In summary, many of the people associated with the hunter education program believed that there was a lack of support from the administration of the Game Commission. This certainly created a morale problem with personnel at all levels.

Another major problem was that there seemed to be a lack of effective and direct communication between the Law Enforcement and Education Divisions. One high ranking Law Enforcement Official remarked, "Quite frankly, we probably are in touch with it (hunter education) more by hearsay than active participation."

A third and related problem that was listed by one of the top officials was that many of the top administrators were not familiar with the program, or at best, had an antiquated view of the program.

Problems Associated with Top Level Managers
And the Overall Management of the Program

Some of the most difficult problems facing the Virginia Hunter Education Program were related to the administration and

management of the program. No one division was entirely responsible for the program. This led to some difficulties, especially in view of the fact that the two divisions primarily responsible for the program, Law Enforcement and Education, did not, as stated above, cooperate fully nor communicate well. Therefore, the first major problem related to management was that the hunter education program had no solid home base. Both Education and Law Enforcement Divisions share responsibility for the program. This administrative setup led to a great deal of uncertainty. Some personnel were not sure of their responsibilities and therefore, many tasks failed to get done on a timely basis. The top management officials of the program were well aware of the difficulties created by having the program housed in both the Education and Law Enforcement Divisions. However, there seemed to be a consensus that moving the program under any one division would create many problems. One top administrator felt that the hunter education program would be greatly diluted if it were moved under Law Enforcement. Another administrator felt that if the program was moved entirely under the Education Division, there would be no one to do the work in the field because the Wardens were teaching most of the classes. However, the top administrators were not satisfied with the current setup. They realized that it created a great deal of frustration and many problems. One top administrator aptly stated, "You know, a house divided can't stand is another old expression."

Another serious problem with the hunter education program was that the Hunter Safety Officer had low status and pay compared to other employees of the Game Commission. In fact, the Safety Officer was paid on a scale equivalent to a Warden in the field. He had the six Education Lieutenants supposedly working under him. However, their positions were higher in status and pay than the position of Safety Officer. Most of the top administrators were familiar with this problem but could offer no real suggestions for improvement. Also, many of the Education Lieutenants were aware of this and felt disturbed about this problem. One top administrator commented that the Safety Officer was on the same pay level and status as a secretary. This situation most likely eroded the authority and credibility of the current Safety Officer and desperately needed to be corrected.

The low status and pay associated with the Safety Officer's position created another problem. The Safety Officer was due to retire within the next year and some of the people most likely in line to fill this position were two of the Education Lieutenants. These gentlemen strongly indicated that they would not accept the Safety Officer position because it would mean a decrease in pay and status for them.

The lack of effective leadership on the part of the Safety Officer was cited many times by several top administrators and Education Lieutenants as a critical problem that was greatly affecting the hunter education program. One top administrator

said, "Lack of creativity in that person (the Safety Officer) is a big hindrance to the program." One outside expert remarked that the Safety Officer had alienated many people that could have helped the hunter education program. Another top administrator remarked that the Safety Officer did not fully appreciate the value of volunteer instructors and did not seem to work well with them. One Education Lieutenant remarked that the complexities of the Hunter Education Program were so great that the Safety Officer was not capable of handling them. One sportsman leader stated that he had little respect for any of the administrators of the hunter education program. In summary, there was an overall feeling among many people interviewed that new leadership was necessary in order for the hunter education program to grow and prosper.

A fourth problem was that the current Hunter Education Officer could not directly control the Education Lieutenants. The Lieutenants work directly under the Law Enforcement Division. In fact, the Safety Officer could not order anyone in the agency to do anything, due to his low status.

A fifth problem was that the Safety Officer seemed to be insufficiently trained in formal education, particularly administrative education. A large education program such as hunter education needs someone at the helm who can control and direct the overall functioning of the program in order to achieve optimal educational benefit, and formal training in education would

seem to be a minimal requirement for this helmsman.

A sixth problem was that the Safety Officer had the responsibility for both hunter education and boating safety. The Safety Officer stated that he could spend only 50 percent of his time in hunter education. Almost all the top administrators and Education Lieutenants indicated a similar time allocation problem. That is, the Safety Officer had a dual responsibility and not enough time to devote to hunter education.

The Safety Officer also lacked sufficient support staff for handling administrative, secretarial, and bookkeeping duties. The Governor's ban on hiring at the time of this study contributed to this shortage of staff.

Due to a lack of support staff, recordkeeping was a problem. Records were often lost or inefficiently handled in the Richmond Office. This created frustration and destroyed motivation of the Education Lieutenants, Wardens, and volunteer instructors. Every Education Lieutenant and most top administrators indicated that recordkeeping was a major problem. One top administrator stated that recordkeeping was "atrocious". One volunteer instructor said that he no longer kept any records nor bothered with trying to ascertain the number of students he taught because the records were lost or misplaced in the Richmond Office. Another volunteer instructor stated, "...in plain English, it (recordkeeping) was one hell of a mess." A few of the Education Lieutenants indicated that they, on several occasions, had to send duplicate

copies of records to Richmond because the original records had been lost. One Lieutenant was so frustrated that he promised not to keep any more duplicate records in his office;. if the Richmond Office lost them, then they were gone forever. Another Lieutenant indicated that he did not generate many records (certify students) because the Richmond Office could not handle the recordkeeping job. In summary, almost everyone involved with recordkeeping indicated that, in the past, there had been a tremendous problem.

Problems Associated Primarily with the Education Lieutenants

The six Education Lieutenants were directly responsible for supervising the hunter education program in their respective regions and are an integral part of the program. They interface with top management officials in both Law Enforcement and Education Divisions, Wardens, volunteer instructors, public school officials, and students. In addition, the Lieutenants took an aggressive role in designing and implementing major changes in the program over the last few years. For example, the Lieutenants, along with Mr. Kerrick, decided upon the relative weighting of each section of the new, basic exam and helped draft over 600 questions as potential test items on the new exam. Most importantly, the Lieutenants served as liaison between the Law Enforcement and the Education Divisions and provided a vital

communication link between those divisions. In the field, the Lieutenants, being Wardens themselves, gave credibility to the hunter education program among the Warden force. Finally, the Lieutenants helped shuttle needed equipment from location to location. All of the above functions were performed in addition to normal law enforcement duties.

In view of the vital role played by the Education Lieutenants, it was unfortunate that they found their job oftentimes unattractive due to many of the following problems. These problems were revealed by outside experts, top management officials, and the Lieutenants as well.

The first major problem was that the Lieutenants were "serving two masters", referring to the Law Enforcement and Education Divisions. This situation was, as one outside expert put it, "most awkward". Most of the Lieutenants preferred the military-type chain of command existing in the Law Enforcement Division but lacking in the Education Division. The situation was worsened by the lack of communication and real cooperation between the two divisions. In effect, the Lieutenants were forced to serve as diplomats and liaison officers between the two divisions. Many Lieutenants felt they had to "walk a tightrope" most of the time. This "mixed duty" arrangement for the Lieutenants was a rarity in the hunter education programs across the country. One outside expert stated that only two states, Virginia and Rhode Island, had this mixed duty arrangement. Everyone inter-

viewed regarding this matter seemed somewhat displeased and favored placing the program entirely under the authority of just one division, either Education or Law Enforcement.

A second problem concerned the restrictions placed on the Lieutenants' time available for work in hunter education. Though estimates varied, the consensus was that from 25 to 50 percent of a Lieutenant's time could be spent in educational activities. In reality, much more time was required to fulfill the Lieutenants' educational obligations. The Lieutenants' time allocation problem was further compounded by the resentment some higher level enforcement officials had toward the hunter education program in terms of taking the Lieutenants' time away from law enforcement duties. One Lieutenant stated that some of his superiors in Law Enforcement viewed hunter education as a "necessary evil" and therefore as little time as possible should be devoted to it.

A third problem concerned the increased role the Lieutenants had played in collectively making many of the management decisions affecting the hunter education program. Some of the Lieutenants did not desire this decision-making responsibility and felt that the Safety Officer should have been making the decisions. One Lieutenant summarized the situation by stating that, in his opinion, only one person should have been making the final management decisions. It appeared that the Lieutenants desired a chain of command in their educational activities as well as law enforcement duties. Under the prevailing administra-

tive system, the Safety Officer could not order anyone in Law Enforcement to do educational work for him.

The fourth problem was that, although the Lieutenants had to work closely and cooperatively in the hunter education program, one Lieutenant was perceived as being only minimally involved with the program. Two Lieutenants indicated a strong level of frustration regarding this situation.

A fifth problem was that most Education Lieutenants preferred to be full time law enforcement officers. They were originally hired as Game Wardens and accepted the promotion into the Education Lieutenant's position primarily because it was an advancement in pay and status, rather than desiring an opportunity to do more educational activities. One Lieutenant stated that as a full time law enforcement agent he never had a day of job related depression. He gained great pleasure from his enforcement duties. However, he indicated that, since becoming an Education Lieutenant, he had often been depressed due to his job.

A sixth and related problem was that the seemingly high level of frustration in educational work expressed by some of the Education Lieutenants stemmed partially from the fact that most Lieutenants had relatively little formal training in education. A program as large and complex as hunter education would seem to require a background in education.

A seventh problem was that the Education Lieutenants' positions were perceived as being inferior in status to the Law

Enforcement Lieutenants' positions. This feeling of inferiority led to more frustration with educational work. In addition, the Education Lieutenant's position was not as conducive to advancement in rank within the Warden force as the Law Enforcement Lieutenant's position. One Education Lieutenant regarded his position as "a dead end street as far as promotion goes."

As evidenced by the aforementioned problems regarding the Education Lieutenants' positions, it should be no surprise that most Lieutenants felt their main reward and incentive was a paycheck. The small recognition awards were appreciated but did not serve as motivation to improve job performance. The primary reward for doing educational work, as indicated by every Education Lieutenant, was a feeling of personal satisfaction in helping people by promoting safety. Additional training for himself was listed by one Lieutenant as a reward for his hunter education efforts.

A final problem with the Education Lieutenants' positions was that the yearly job performance evaluations did not take hunter education activities into account. All six Lieutenants indicated that their hunter education performance had never been formally evaluated.

Problems Associated Primarily with the Wardens

At the time of this study, the Warden force handled the overwhelming majority of classes for the hunter education program. Without the Wardens' cooperation, the hunter education program would have suffered greatly. Many Wardens were excellent teachers and were highly involved with hunter education. However, there were some important problems concerning the Wardens and the hunter education program.

Some Wardens did not want to teach the hunter education course. One Warden stated, "I don't think law enforcement should be doing the instructing, and I can speak for everybody that I work with in saying this." This same Warden later reiterated, "I would rather not teach it (the hunter education course)." Another Warden voiced a similar opinion, "The Wardens have a lot of complaints about the way things are running. You know, you have a law man doing educational work and to my way of thinking, you know hunter safety is Educational Division's job." Two top administrators and two Education Lieutenants also commented that some Wardens did not want to teach hunter education.

As with the Education Lieutenants, most Wardens have little training in formal education. This may explain, at least partially, why some Wardens did not enjoy their educational activities.

Many people indicated that Wardens simply did not have enough time to do both law enforcement and education. This situation was worsened in the early fall when demand for hunter education was at a peak and need for increased law enforcement activity was at its greatest due to the opening of hunting season. Many people, ranging from top administrators to Wardens, mentioned this scheduling problem. At the time of this study, the problem was being resolved by a Law Enforcement Division policy which prohibited the Wardens from teaching hunter education during the hunting season. This policy most likely led to a great deal of public frustration since demand for hunter education was greatest at this time of year. This policy was also strong evidence that the Law Enforcement Division did not strongly support hunter education.

Another problem concerned the manner in which Wardens had to teach hunter education. Since demand for hunter education was greatest during a brief time in the fall, the Wardens formed a team and taught at several different schools. With this team approach, the Wardens had to teach four to five class periods per school day, covering the same material repeatedly. This procedure, after several weeks, led to frustration and boredom for the Wardens.

Shuttling equipment (projectors and training aids) from area to area was sometimes a significant problem for the Wardens and Lieutenants as well, especially during peak demand in the fall

and in larger, more populated areas. Two Lieutenants mentioned that their cars were not large enough to carry all of the necessary equipment at times.

In some areas, Wardens resented having volunteer instructors teaching hunter education and refuse to cooperate with them. For example, one volunteer stated, "...I told him (the Warden) I'd be more than happy to help him if he needed help, if he'd give me enough time that I could make it down there and stuff, and he told me flat right out that he didn't need any outsiders helping him." This same volunteer also indicated a lack of Warden cooperation by stating, "...I have almost had to pull teeth to get a Game Warden into my class to answer questions on Game Commission laws and stuff like that."

Similar to the Education Lieutenants, each of the six Wardens explicitly stated that they had never been formally evaluated regarding their hunter education activities. The Wardens did receive the small recognition awards, but these awards hardly constituted a formal evaluation. One Warden remarked about his job performance evaluation, "I don't think it (the hunter education program) has any significant effect on anything." Another Warden stated, "I have never been evaluated as an instructor." Finally, another Warden said, "I really don't have any idea. It (hunter education) isn't in our job evaluation." This same Warden remarked that maybe he was evaluated by the number of students

taught. So, in effect, Wardens were not evaluated according to their work in the hunter education program.

Problems Associated Primarily with the Volunteer Instructors

Volunteers performed only a minor portion of the teaching for the hunter education program. However, their potential contribution to the program is tremendous, and, therefore, the following problems presently occurring with volunteers should be resolved.

First, volunteer instructors were not welcomed by some Wardens, Education Lieutenants and higher level personnel. The volunteers were often referred to as "civilians" in a less than complimentary manner. One top administrator explained this phenomenon by noting that Wardens were a tight group and everyone else was an outsider. This same administrator indicated that some Wardens felt that volunteers were a pain to take along to teach courses and were, therefore, considered of minimal value. Another top administrator felt there should not be any volunteer instructors; the program should have been conducted entirely by Wardens. As was indicated by certain quotes in the preceding section on Wardens, some Wardens told the volunteers that their help was not wanted. One Education Lieutenant indicated that volunteers were considered a nuisance, and he was luckier than other Lieutenants in not having many volunteers in his district. Another Lieutenant indicated that volunteers made his job more

complicated. Another Lieutenant voiced his frustration with volunteers by stating that some of them (volunteers) felt that Commission personnel had to drop everything and do what they wanted right then and there. This same Lieutenant rather snidely commented that the volunteers did not teach many classes but always wanted to attend the workshops and conferences, which, of course, were fun and educational.

Another administrative problem was that volunteers were recruited, trained, and certified, but were then almost abandoned by management. Two top administrators voiced this opinion and one placed the blame on the Commission. He expected the volunteer to be a self-starter and if he was not, then the Commission had not properly trained and motivated him. One outside expert and two Education Lieutenants commented that volunteers were not recruited properly nor managed well overall. Some volunteers also voiced concern that hunter education officials did not provide adequate communication and feedback to the volunteers.

Until recently, volunteers had been poorly trained in teaching methods. Previously, the volunteers sat through the basic course, were examined, and certified. There was little instruction regarding principles of education or teaching methods. This lack of training probably accounted for the several remarks made by Wardens, Lieutenants and top administrators that some volunteers were poor teachers and many were afraid of public speaking. One Lieutenant recalled a class where the volunteer instructor

simply read from the manual. On the other hand, many volunteers were excellent teachers. In fact, some volunteers were public school teachers and needed little training in teaching methods.

Several Wardens and Lieutenants stated that keeping volunteers supplied with materials and teaching aids was a problem. This same problem was mentioned by some volunteers as well.

Most of the Education Lieutenants and Wardens indicated that volunteers tended to be tardy and negligent in preparing and submitting reports. The volunteers, of course, could not be forced to send in reports and suffered nothing when their reports were late.

Many people, ranging from top administrators to Wardens, indicated that many volunteers were inactive and several never taught a course in hunter education. This was a tremendous waste of money and resources. One administrator remarked that many volunteers, when initially recruited, never intended to teach. They simply wanted the prestige of having been certified as a graduate of the instructor course. Most hunter education officials wanted a method to eliminate the "deadwood" among the volunteer corps.

Volunteers were available to teach hunter education on a limited basis, primarily during evening hours. However, with the emphasis on public schools, the need for volunteer services was during the day when schools were in session. One Warden, in trying to utilize volunteers with free time during the day

remarked, "And I tried retired military people, and most of them are retired-period."

Some volunteers were almost autonomous and taught their own hunter education course. One Lieutenant remarked that some volunteers were "fanatics" and did not follow recommended guidelines. One volunteer told us that he had his own program working well and that he could continue teaching hunter education without the help of the Commission. This volunteer had his own equipment and was even making his own films with a video camera to use in class. One Lieutenant referred to a former volunteer instructor who had been deleted from the list of volunteers but was still teaching hunter education and claiming to be a regional representative of the Game Commission.

The County Coordinator system was not working in many areas. One volunteer remarked that it was a "totally useless" position. This volunteer stated that all hunter education courses were supposed to be under his supervision, but that he did not even know the other instructors in his county. One county coordinator who spent months recruiting other coordinators, supposedly for Operation RESPECT, was highly displeased to later learn that the coordinators were for hunter education. Finally, one Lieutenant remarked that he had trouble recruiting county coordinators, primarily because he entrusted the job to Wardens, many of whom did not want the volunteers in their region. As an aside, there

were some areas where the county coordinator system was working extremely well.

One top administrator and one Lieutenant mentioned that, due to the many changes and improvements in the hunter education program over the last few years, the older, more experienced volunteers needed to be retrained and brought up to date. Since communication between the Commission and volunteers was relatively poor, this updating process could be difficult unless some incentive program could be developed for the volunteers.

The lack of appropriate and timely awards for volunteers was mentioned by several people as a significant problem. Recognition was listed as the primary reward for most volunteers. Several Commission personnel stated that the volunteers needed to be "patted on the back" more and more often. The recognition awards and plaques were often months late in coming. One volunteer told of waiting more than a year for his award. One Lieutenant was so frustrated with the Richmond Office in failing to provide volunteers' awards on a timely basis that he said, "...and I don't care if anybody ever gets another award."

A final problem regarding volunteers was that many of the Commission personnel felt frustrated by a lack of control over the volunteers. Most officials wanted a volunteer contract that could be enforced. This contract would, hopefully, would have insured that volunteers taught some basic courses and that no

volunteer could have been autonomous or misrepresented the Commission.

In summary, there were many problems with the Virginia volunteer program for hunter education. An aggressive and progressive volunteer management program, if instituted by the Commission, could solve most of these problems, many of which existed due to a lack of effective two-way communication and feedback.

Problems Associated Primarily with the Public Schools

The public school system in Virginia was and is currently the primary focus of the hunter education program. Most Commission personnel stated that the public schools provided a captive audience and were the best means of training large numbers of students. In addition, most officials believed that young people were more receptive to the program compared to adults who had already formed habits and attitudes about safety and hunting. However, it should be noted that this attitude ignores the importance of role models in children's lives. Adults influence children greatly. Therefore, adult hunter education should be stressed. Some school administrators were very pleased to have hunter education in their schools, especially in rural areas where a larger proportion of students hunt.

The program is offered in physical education in some schools and in vocational agriculture in other areas. The program seemed

to work better in vocational agriculture. The classes were usually smaller and the students were more prone to outdoor activities, including hunting. However, due to a recent resolution and agreement with the State Department of Education, hundreds of physical education teachers are being certified as hunter education instructors. These teachers are given credit by the Department of Education and thus were motivated to become involved with hunter education. In spite of this new development, there were still some significant problems with the hunter education program in public schools.

The schools already had a number of programs in their curricula. Providing adequate time for the hunter education program created conflicts with other school programs. Many Wardens, Lieutenants, and school officials indicated that the program was given only five fifty-minute periods in some schools. This, of course, was less than the recommended six-hour program. One school principal was concerned that hunter education took away time that could have been spent on Health. Other school officials voiced mild concern that some programs had to be cut in order to accommodate hunter education. One principal stated that he could not afford to allocate more time to hunter education.

In view of the above statements, the federally proposed 10-hour hunter education course would have created a significant time problem in some schools. However, in other schools, some teachers were already spending from ten to twelve hours on the

program. Due to the agreement with the Department of Education, this problem has not likely disappeared.

A significant problem mentioned by several Wardens, Lieutenants, outside experts, and administrators, was that many hunter education classes were excessively large and taught in poor classroom settings. A typical example might have been in a gymnasium with 250 to 300 students. Maintaining students' interest and enforcing discipline was extremely difficult in such settings.

Another problem, mentioned by several Wardens, Lieutenants, and school officials, was that many students who had to take the program, due to school policy, were not interested, especially the girls. One Warden stated, "I feel as if we are babysitters." One outside expert, in commenting about disinterested students and learning stated, "I would think that the impact would be greater if the students had to leave their daily routine and go somewhere of their own accord voluntarily to take the course." However, most of the persons interviewed felt that exposing all the kids to gun safety was a worthwhile endeavor, regardless of the students interests in learning about hunter education.

Finally, a major problem with the hunter education program concerned the patchiness of the program across the state. Some areas, especially urban areas, had schools that were not receptive to hunter education. School administrators in urban areas believed that the program was designed to teach hunting, while

anti-hunting sentiment was strongest in urban schools. This situation was unfortunate since, according to some top administrators of the program, many hunters resided in these same urban areas which were not covered by the hunter education program.

Problems Associated Primarily with Students

Most of the students interviewed in this study indicated that their exposure to hunter education was a worthwhile experience. Many students enjoyed learning more about hunting and safety. However, the manner in which the program was conducted created some fundamental problems. First, the course was often boring due to the passive role played by the students. The lecture format of the course prevented real and effective student participation. At the most, a few students were used in demonstrating safe gun handling practices for the remainder of their classmates. In addition, one film, "Shoot or Don't Shoot" involved some decision-making and participation on the part of the student. Overall, however, students were primarily receivers of information and had little opportunity to reinforce, through actual training, the principles they were exposed to via the lecture. When asked what he disliked most about the course, one student stated, "Sitting there and listening to it. It's boring."

Another problem, listed by many people, was that some topics were not covered adequately due to time constraints. As mentioned earlier, many schools only give five fifty-minute periods to the program. One Lieutenant remarked that he could have easily spent six hours on each of the eight major topics in the course and indicated that the information given in the program was highly condensed.

One of the most serious problems with the course was the lack of actual handling and firing of firearms. Most students indicated that live firing would have greatly enhanced their experience with hunter education. One volunteer instructor spoke about the lack of live firing in this manner, "That's one of the big drawbacks of the whole course." One Warden plainly stated, "Hands-on is the best way to learn anything." Most people interviewed, from some top administrators to students, stressed the need for some type of live firing in the course.

Another problem concerned the homework portion of the hunter education course. The National Rifle Association student manual was only partially read by many students. Most students indicated they had read from 25 to 60 percent of the manual.

Probably the most significant problem with the entire hunter education program was that the behavior of students while hunting or handling firearms was not necessarily changed by increased knowledge of safety. Nearly all administrators, Lieutenants, Wardens, and volunteer instructors believed that the program had

positive effects on students' behavior but had little evidence to support their claims other than an intuitive feeling based on years of experience and verbal feedback from students. The brevity of the course was one reason why changing students' behavior may have been difficult. One top administrator remarked that, in a six to ten hour program, one cannot really teach safety, obedience of game laws, and respect for landowners. Peer pressure and the influence of relatives may also overshadow the effect of hunter education in changing behavior. Admitting this influence, one public school official (also a volunteer instructor) stated, "... even though we may not have as much influence say that a father or friend, yet we'll still be giving them another perspective and giving them something to think about, and I think that's the important part." Another public school official felt that presenting the course to students, was, at least, much better than students' having no or wrong information and trying to figure out the correct procedures for themselves. However, some students indicated that their hunting behavior had not been significantly altered by hunter education. One student (who had been taught hunting by his father) when asked how hunter education had affected him stated, "I don't know. I did much the same stuff as always." Two students said that they knew to unload before crossing a fence but probably would not do it. Another student when asked if hunter education had changed his behavior, responded, "Not much."

On the positive side, some students indicated that hunter education had made a difference in their behavior. One student said, "I look a little bit more before I shoot." Another student stated that he did not carry his gun with the safety off anymore and always wore something colored blaze orange. Still another student remarked that he was more careful in controlling the muzzle of his gun. Finally, another student said that he definitely unloaded his gun before crossing fences.

In summary, the behavior of some students was changed by the hunter education program but, for some students, the program had little effect. Obviously the brevity of the course and parent/peer influences were intervening and, perhaps, overriding factors which determine the effects of the program in the field.

Related to the problem referred to above, a sharp distinction between Commission personnel and public school officials was detected in the course of the present evaluation. When asked about the primary purpose of the hunter education program, most Commission personnel essentially stated that creating safe hunters was of paramount importance. On the other hand, public school officials said that the purpose of the program was to expose the students to gun safety principles and procedures. The latter view seems much more realistic, especially considering the nature of the course, its brevity, and the remarks made by several of the students. The individual is responsible for his/her behavior, not the Game Commission. The Commission is responsible

for creating, designing, implementing, and delivering the best Hunter Education Program possible under existing conditions and constraints.

Problems Associated Primarily with Sportsmen
Groups and Conservation Organizations

During the course of the present evaluation, some interesting insights were gained into how well the hunter education program interfaced with sportsmen and conservation organizations throughout Virginia. These organizations and citizens had fairly consistent responses to questions regarding the program. First, the hunter education program was not well-known among sportsmen and conservation organizations, due primarily to a lack of two-way communication between the Commission and the sportsmen groups. One conservation organization leader indicated that he dealt with over 9,000 hunters per year and had never been approached by Game Commission personnel to discuss presenting a course to these hunters. One conservation organization leader did not know anything about the hunter education program. Another conservation leader faulted the Commission for not working with his organization to alleviate problems concerning hunters and hunting. According to a top administrator, the Commission did not aggressively approach the various sportsmen organizations and push the hunter education program.

Some conservation leaders were familiar with the hunter education program, but were not pleased with their exposure to

it. One person, in referring to the materials and teaching methods utilized in the course he participated in stated, "They were miserable. Ninety percent was from a lecture format."

Another sportsman leader said, "It's very hard to find anyone who went through the course and state, 'Yeah, I got something out of it.' I've never met anyone like that." In view of such statements from two of Virginia's leading sportsmen organizations, a solid public relations program for hunter education seems to be lacking.

A major drawback of the hunter education program is that the adult hunting population in Virginia did not, for the most part, receive hunter education training. Almost everyone involved with presenting the program voiced frustration regarding the inability to attract adults to hunter education classes. Advertising on radio and in local newspapers did not work. Realistically, since hunter education was not mandatory in Virginia, adults had little incentive to invest six hours of their spare time in taking hunter education classes. Additionally, the program was not designed for adults. However, program officials were planning some new advanced courses in hunter education which would be designed to alleviate this problem and appeal more to adults.

Most of the sportsmen and conservation leaders who were familiar with the program were concerned that the basic course did not place enough emphasis upon ethics of hunting. One Education Lieutenant was also concerned with the need to stress ethics

more during the course. However, two Wardens presented an opposing view. One Warden remarked that if the student did not receive ethical training at home, then the Hunter Education Program could not teach them. Another Warden, voicing a similar opinion stated, "And I believe ethics is something that quite frankly, that the parents are going to have to teach them."

One final problem which was stressed by several of the sportsmen and conservation leaders was that the hunter education program in Virginia was not mandatory for hunters. Most of these leaders gave several reasons for favoring mandatory hunter education such as: (1) all hunters would get the same basic information before they started hunting; (2) people who get a hunting license ought to demonstrate that they have the ability to handle a firearm in the field; (3) six to ten hours of instruction is not too much to ask of any would-be hunter; and (4) hunting is a privilege and therefore carries a responsibility for safe and proper conduct. Many other people were also in favor of a mandatory program, including students, school officials, volunteer instructors, Wardens, Education Lieutenants, outside experts, and top administrators. One top administrator remarked, "Properly planned and implemented, I would like to see it." One Warden stated, "Yeah, I expect the mandatory system would work pretty well in Virginia." One Lieutenant said, "I think that's going to be the only way to go if we're going to try to reach the students." One outside expert voiced the opinion that the Game

Commission ought to accept the citizens' desire for a mandatory program and stop trying to avoid it.

All of the people familiar with the current hunter education program who wanted a mandatory program also knew that it would require some major changes in the current management and administration of the program. Most people knew that the Commission could not handle a mandatory program immediately, but thought that steps to implement a mandatory program should be taken as soon as possible.

Many people, mostly Commission personnel, were against a mandatory program. One top administrator remarked, "I'd have to accept it." An Education Lieutenant stated, "It scares me. It really does." Several Wardens, Lieutenants, and administrators remarked that the Commission could not handle a mandatory program. The Wardens could not teach all the classes due to time and manpower constraints. Some Commission personnel objected to a mandatory program because it was a restriction on hunting and it imposed regimentation upon the individual. One administrator indicated that the current voluntary program was reaching as many students as mandatory programs in other states. In summary, many Commission personnel felt that the current voluntary program was working well enough and could be handled with current level of effort.

Problems Associated Primarily with
The Basic Course Content and Materials

The majority of persons interviewed thought that the basic course content was adequate and presented the necessary material. However, a few people wanted more survival information in the course. One Warden wanted everything deleted except gun handling. Another Warden wanted shooting techniques deleted, stressing that actual practice and experience is needed to gain benefit from instruction. On a related point, almost everyone agreed on the need for live firing and actual gun handling to reinforce the knowledge gained in the classroom. One Education Lieutenant remarked, "Because you can stand up in front of the kids and show them a gun all day, but if you let them pick it up and handle it and see how it operates, you know, they'll probably learn more in two minutes than you talking an hour." An outside expert voiced a similar opinion in stating, "But as long as you are stuck in the classroom, I think you're kind of stuck in more ways than one." Of course, any live firing would have to be well supervised and controlled.

Many people voiced concern that all the teaching materials, especially the old instructor's manual and the student manual, did not match and therefore made development of lesson plans difficult. However, the new instructor's manual, compiled primarily by one Education Lieutenant, was designed to match, not only the student manual, but the slide program as well.

Some people were concerned that the basic course was not standardized across the state. One Education Lieutenant remarked, "...and I guarantee you that if you went to 15 different counties in the state of Virginia, you'd have 15 Wardens teaching it (hunter education) in a different way." The lack of course standardization was also a problem with courses taught by volunteer instructors. One Education Lieutenant remarked that some "fanatic" volunteers teach according to their own primary interests instead of presenting a balanced course.

The basic course was not geared toward adults. Several instructors indicated that adults often find the course uninteresting, even though everyone needs to be reminded of basic safety principles from time to time. However, the new adult hunter education classes should provide a solution to the above problem.

Many people criticized the old slide program, especially the cartoon slides. The new slide program was much improved but was still in need of revision. Since the slide program was an integral part of the basic course, the quality of slides was quite important.

Although a few people liked the film, "Sweet Sunday's Gone", most saw it as too gruesome and bloody. There were several reports of students fainting upon seeing the film. The film, "Shoot or Don't Shoot", was highly recommended by almost everyone and, in fact, was the only film recommended by the group of Education Lieutenants.

The use of video in presenting the hunter education program was not advocated by anyone. Most instructors believed that student-teacher interaction was not possible with video. One Warden aptly stated, "You can't ask the video machine questions." Others felt that video was boring and had a tendency to put students to sleep. The consensus was that video should be used only as a supplement when an instructor was weak in a particular area or topic. Video had also been used to good advantage in taping instructor trainees and then providing criticism of teaching abilities.

The old test for the basic course was severely criticized by several persons, many of whom had not seen the new basic exam. Some of the Education Lieutenants indicated that the new exam, which was a weighted exam, was not being graded properly by some Wardens and volunteer instructors. During the course of the evaluation, the investigator talked with several instructors about testing and measurement and most had misconceptions about the nature of tests. One Warden used his own criterion for passing instead of the Commission's recommended score of seventy percent. This Warden indicated that, if the student missed more than four questions, he failed the exam. The Warden's reasoning, although seemingly logical, indicated his lack of understanding regarding testing. This same Warden, along with many other instructors, had a tendency to equate the score on a pencil-and-paper knowledge test with behavior in the field, an extremely

naive view. This Warden remarked, "But you figure you have 40 questions and you miss four. That's ten percent. So, when you walk in the woods, you don't have but a 90 percent chance of not having an accident or of knowing what you're doing with the weapon." In effect, although the new basic exam is educationally sound and statistically correct, its abuse by instructors could negate the benefits of having a good exam.

Miscellaneous Problems

A few problems came out in the course of discussions which were not directly assessed by the evaluation. Though not mentioned by many persons interviewed, these problems were significant and worthy of analysis. First, a few people believed that the current hunter education program stressed numbers of students over quality of instruction. One Education Lieutenant, when asked about strengths of the program responded, "We've got strength in numbers if nothing else." On a related issue, the investigator believed that the hunter education program was not focusing on a target audience. All the students in school, both girls and non-hunters, were given the basic course and certified. In many schools, all the students in a particular class, such as physical education, were usually required to take the course. Most instructors believed that the girls and everyone should be exposed to gun safety, but the same instructors often complained

of having to teach disinterested students. So, in effect, the hunter education program may have been reaching more students, but many of those students did not benefit as much as the young, future hunters.

A third problem, mentioned by some Education Lieutenants, Wardens, and volunteer instructors, was that Operation RESPECT was being too closely associated with hunter education. Most people felt that Operation RESPECT should stand alone. However, one volunteer instructor saw the two programs as highly compatible and always made a brief presentation about Operation RESPECT in his hunter education classes. This same volunteer was also greatly upset that the county coordinators ultimately became associated with hunter education instead of Operation RESPECT.

A final problem, which was mentioned by one top administrator and almost all the Education Lieutenants, was that the present evaluation report would never be read and acted upon by hunter education management personnel within the Game Commission. Again, this indicated a high level of frustration among Commission employees.

RECOMMENDATIONS FOR THE VIRGINIA HUNTER EDUCATION PROGRAM

The following recommendations to alleviate previously mentioned problems with the program were derived both from interview respondents and from conclusions reached by the investigator. More general and comprehensive approaches to solving problems are given in the following section.

1. Resolve past and current conflicts with other divisions within the Commission and generate more internal agency support.
2. Develop more communication between the Law Enforcement and Education Divisions.
3. Encourage the top administrators within the Commission to become more familiar with the current hunter education program.
4. Move the entire program under the Education Division.
5. Elevate the status and pay of the Hunter Safety Coordinator's position to the level of Assistant Chief of Education.
6. Rewrite the job description of the Hunter Safety Coordinator to stress formal training in Education Management and Administration.
7. The Hunter Safety Coordinator should devote 100 percent of his time and energy to hunter education.
8. Hire more support staff in the Richmond office to handle records and bookkeeping.
9. Create six full-time positions in Education to serve as Regional Educational Specialists. These positions would replace the current Education Lieutenants positions. The specialists should be trained and interested in education.
10. Generate an agreement with the Law Enforcement Division whereby Wardens could make a brief presentation of wildlife regulations and so forth to each hunter education class. Wardens interested in hunter education could continue teaching if they so desired.

11. Recruit and train a large volunteer instructor force to teach the classes.
12. In conjunction with No. 11, develop an effective feedback and reward system for volunteers. The primary reward is personal recognition.
13. Develop a program to re-certify all instructors at periodic intervals.
14. Enhance and improve the volunteer county coordinator system.
15. Develop a contract for volunteers which would require volunteer instructors to teach a minimum number of courses and to teach the standardized hunter education basic course. Failure to meet standards could result in loss of certification.
16. For those volunteers who are not already professional educators, the instructor's course should stress public speaking and teaching methods.
17. Work with the public school systems in gaining more time to present the program properly. Ten hours will soon be required and the schools need advance notice in order to adjust their curricula and schedules.
18. Reduce the class size to approximately 30 students. Class sizes of 250 to 300 students are unacceptable for proper education.
19. Decide on the primary clientele to be served by the program (hunters or all school students) and conduct the program accordingly. The investigator feels that only hunters or future hunters should be the primary target audience.
20. Aggressively develop hunter education classes in all areas of the state. Large, metropolitan areas should receive immediate attention.
21. Encourage more active participation from students in the basic course.
22. Add some form of gun handling and live firing to the basic course.
23. Allocate funds to build regional firing ranges.

24. Build a central training center with live firing facilities. This would be used primarily to train volunteer instructors and hold annual hunter education meetings.
25. Encourage everyone involved with presentation of the hunter education program to develop a realistic view of the purpose and capability of the program. Students' behavior in the field depends on many factors external to the program. The Commission is only responsible for designing and implementing, under existing constraints, a program which will expose the students to safe and ethical hunting practices.
26. Convince the National Rifle Association to develop a more interesting student manual. A color manual of shorter length would be more accepted and utilized by students.
27. Develop a positive and aggressive public relations program to inform the citizens of Virginia, especially members of the various sportsman and conservation groups, about the hunter education program.
28. Develop a basic, adult hunter education course.
29. Rapidly develop and implement the planned advanced hunter education courses.
30. Stress ethics of hunting as much as gun safety in the hunter education program.
31. Lobby for mandatory hunter education in Virginia.
32. Implement the new instructor's manual which matches both the student manual and the new slide program. All teaching materials should be well integrated.
33. Develop measures to insure that a standard basic course is presented to each student.
34. Use experts in audio-visual presentation to design and make slide programs.
35. Select one film to be shown during the basic course. The currently agreed upon, "Shoot or Don't Shoot, seems to be appropriate.
36. Delete "Sweet Sunday's Gone" from the program.
37. Use video for presentation of the basic course only when other methods are not feasible.

38. Educate all instructors regarding the proper use of the new, basic exam.
39. Contract with an educational consultant to develop several standardized tests. If mandatory hunter education becomes a reality, then more difficult and discriminating tests would be desirable.
40. Stress quality of the educational experience instead of numbers of students processed.
41. Purchase some larger vehicles such as vans or station wagons to carry the training aids and other educational materials used currently by the Education Lieutenants.
42. Develop a formal policy regarding the relationship between Operation RESPECT and the hunter education program.

POTENTIAL FUTURE DIRECTIONS FOR THE
VIRGINIA HUNTER EDUCATION PROGRAM

There are several future directions the Virginia Hunter Education Program could take. Each approach has important advantages and disadvantages. In addition, some approaches to hunter education seem more plausible than others in view of the current political and managerial climate. The following program descriptions provide a brief outline of the possible future Virginia Hunter Education Programs.

Program A - The Game Commission could choose to maintain the status quo and tolerate the multitude of problems listed in this report. A significant number of students could be certified annually, but the quality of the program would remain in question. The high levels of frustration among officials, Education Lieutenants, Wardens, and volunteer instructors would most likely persist. Therefore, for the foregoing reasons and others, we highly recommend that the hunter education program not continue its present course of action.

Program B - The entire hunter education program could be transferred directly into the Law Enforcement Division. The major advantage to this action would be an active, functioning chain of command. The Majors and Captains in Law Enforcement would be able to control the amount of time and effort expended by Wardens and Education Lieutenants on hunter education. The Wardens would continue to teach the overwhelming majority of

students. The program, which currently varies in content and length, could be readily standardized by direct order. Overall, the program could be run more efficiently. However, there would be some serious problems if the Law Enforcement Division was entirely responsible for hunter education.

The most serious problem concerns support for the hunter education program by chief Law Enforcement officials. Currently, the hunter education program is viewed as a nuisance by some Law Enforcement personnel, including high-ranking officials as well as Wardens in the field. Some management personnel have voiced concerns that the hunter education program under the control of the Law Enforcement Division would, "die on the vine."

Another critical problem would be the tremendous demand placed on Wardens as instructors in the program. If the program became mandatory across the state, the Wardens would be unable to meet that demand. This would be especially true in heavily populated areas such as Hampton and Newport News. In addition, many Wardens do not want to teach the hunter education program.

In summary, though moving the hunter education program within the Law Enforcement Division would improve the chain of command and possibly improve efficiency, the drawbacks to this alternative seem overwhelming.

Program C - The hunter education program could be kept within the Education Division, but some major changes in management, philosophy, and personnel would be needed in order to be success-

ful. First, the Hunter Safety Coordinator position could be upgraded in status and salary to an Assistant Chief of Education. The job description for this position could also be rewritten to include formal training in education and, particularly, administration of educational programs. In addition, the Education Lieutenant positions could be changed to Regional Educational Specialist positions and become full-time jobs. These specialists could devote their entire time to recruiting and training an effective volunteer instructor corps. Volunteers could (as has been done in other states such as Maryland) teach the majority of classes with, of course, the close supervision of the Regional Educational Specialist. The Regional Specialists could also work more aggressively and closely with the public schools. Currently, the State Department of Education is providing incentive for health and physical education teachers in the public schools to become certified instructors. This would greatly ease the shortage of qualified, active volunteer instructors and alleviate the need for instructing volunteers in teaching methods.

Many Wardens do not wish to relinquish their teaching duties because the hunter education program is perceived as a prime public relations tool and an effective means to prevent wildlife law infractions. This problem could be readily solved by requesting that a warden present a brief talk on the need for obeying wildlife regulations, hunting ethically, and promoting good landowner relations. Of course, cooperation from the Law

Enforcement Division would be necessary for the latter procedure to work efficiently.

There are numerous advantages to this alternative approach for the hunter education program. First and foremost, personnel trained in and committed solely to education would be conducting the program. Second, with the full-time Regional Educational Specialists, the program could receive the effort and attention it deserves. Third, the warden force could be more efficiently utilized for enforcement duties. A much smaller amount of warden time would be spent on teaching hunter education. This would remove a great deal of frustration among the Wardens and higher ranking law enforcement officials. Fourth, the creation of a large, effective volunteer force could enhance the image and popularity of the hunter education program among the general public. As stated earlier, many citizens and sportsman organizations are not well aware of the program. Fifth, some sincere efforts could be made to develop and implement, again through volunteers, a truly adult hunter education course. Finally, and most important, a mandatory hunter education program in Virginia could be accommodated without great difficulty utilizing the above outlined approach to hunter education. If the current approach to hunter education continues or if the Law Enforcement alternative is adopted, a mandatory hunter education program will create tremendous chaos and confusion.

There are some disadvantages to the Education Division approach to hunter education. The primary obstacle is the Governor's freeze on state hiring. The Regional Educational Specialists' jobs could not be filled if the Education Lieutenants refused to work in the Education Division. This is likely because most Education Lieutenants prefer law enforcement activities to educational endeavors. A second disadvantage is that envy of the funding level of the hunter education program compared to Law Enforcement and other divisions could increase. A third and major problem is that an effective volunteer force for Virginia might not materialize, leaving thousands of potential students without instructors. However, this outcome would be unlikely if an aggressive volunteer recruiting campaign could be launched.

In summary, if the hunter education program outlined above could be implemented in Virginia, the advantages would clearly override any disadvantages, and a highly recommended mandatory program could be implemented effectively.

CHAPTER VI

SUMMARY, CONCLUSIONS AND IMPLICATIONS FOR THE FUTURE

Summary of Findings

Hunter education programs began in the late 1930's and early 1940's as a response to a growing social problem, hunting accidents. The first programs were strictly gun safety and were successful in reducing accidents. As the programs evolved, the topic of ethics was added to help curb the expanding problem of hunter depreciative behavior. An amendment to the Pittman-Robertson Act signed by Richard M. Nixon in 1970 provided for federal funding of hunter education (Smith 1981). As programs grew due to increased demand and funding, the need for evaluation of hunter education programs became apparent.

In 1980, very few evaluations of specific hunter education programs had been conducted in a comprehensive fashion. Reasons for this situation were varied. First, few, if any, wildlife professionals had expertise in evaluation. Second, hunter education officials feared evaluation of their programs. Third, many professionals believed that money spent for evaluation could be better used in improving existing programs. Finally, evaluation as a field of study was relatively new, having begun in the mid-1960's. Though these forces operating against evaluating hunter education programs were strong, the need for evaluation

grew stronger. The evaluation of Virginia's Hunter Education Program was one attempt to fulfill that growing need.

During the period 1980 through 1984, a comprehensive evaluation of the Virginia Hunter Education Program was conducted. Phase one, student pre-and-post knowledge testing, revealed that the non-random sample of students improved their pre-test scores by an average of 16 percent on the post-test. Though sizable, this increase was most likely due, in large part, to the students having taken the test before the course was given and therefore being sensitized to the material presented in the course. However, the hunter education students were, apparently, learning the course material. Therefore, the program seemed to be accomplishing one of its major goals, improving students' knowledge of firearm safety and hunter ethics.

The second phase, participant observation of dove hunters, revealed that having had hunter education was not meaningfully related to any of the behavioral, educational, or socio-demographic variables generated by the study. The dove hunters sampled in the study were judged to be fairly representative of hunters in general. Therefore, the finding that hunter education training failed to influence behavior in the field was disturbing.

Phase three, the naturalistic inquiry evaluation, proved to be most enlightening regarding the overall workings of the program and how the program was being received by the students.

Many problems were revealed, including lack of real leadership, communication problems, and a shortage of staff interested in and trained in education. The program was under the authority of the Education Division, but was being carried out by game wardens in the Enforcement Division. Many other problems were discovered in the course of the study and several recommendations for improvement were made. The primary recommendations were to create an effective Safety Officer position with real authority and to move the entire program into the Education Division.

Though the results of the individual phases of the evaluation were interesting, the perspective gained from an overview of the entire project seems most enlightening and has profound implications for hunter education in Virginia as well as the entire United States. Before presenting final conclusions and future research suggestions, it is appropriate to discuss how the present study fits into the overall view of evaluation.

Evaluation, Validity, and Triangulation of Methods

Evaluation is a highly varied and much debated field of study. No single approach has proven to be dominant. Both quantitative and qualitative evaluations are used when appropriate, and, many times a combination of these two approaches is necessary. In any evaluation, a major concern with validity exists. Though many kinds of validity have been discussed, two types, internal and external, seem most relevant to hunter educa-

tion. Threats to validity are potentially numerous, and the evaluator's task is to eliminate or account for as many of these threats as possible. The goal of assessing validity and validity threats is to attribute observed effects to a program and to generalize those findings to the population of interest. One way of dealing with validity is to use a variety of methods, each with different sets of validity threats. This triangulation of methods permits a more complete view of the object being evaluated and oftentimes a greater depth of understanding. Another method of increasing validity is to use unobtrusive measures whenever possible in order to avoid observer contamination of the phenomena under study.

All of the above factors were considered in the evaluation of Virginia's Hunter Education Program. Both quantitative and qualitative approaches were utilized and, where appropriate, validity threats were either ruled out or taken into consideration. By using three evaluation approaches, a broader perspective of the program was gained. In addition, any conclusions drawn about hunter education were based on a broader set of data. Therefore, the results of the evaluation are more certain than if only one method had been utilized.

The use of three evaluation approaches was worthwhile for Virginia's program. However, the sequencing of the various phases was out of order due to contract obligations. Ideally, the sequence should be to use the more qualitative and inductive

naturalistic inquiry approach first in order to gain an overall view of the general workings of the program. Afterwards, a more focused quantitative approach, such as student pre-post testing, could be utilized.

Conclusions

At the time the comprehensive evaluation was begun, Virginia's Hunter Education Program was in a state of confusion and disarray. The Safety Officer was nearing retirement and had started to share a great deal of the decision-making responsibility with the six Education Lieutenants. These lieutenants were under the Enforcement Division's authority and cooperated with the Safety Officer and Education Chief on a voluntary basis. This lack of chain of command was interfering with the progressive renovation of the program. In addition, many of the game wardens who actually taught the classes resented their duties and were usually not trained in educational principles. A further complication was that the program was usually offered during fall, the busiest season for enforcement personnel, and a work overload was inevitable. Also, the program was being given in a "shotgun" fashion to a variety of students in the public school system, many of whom were not or even wanted to be hunters. Many of the course materials (slide show, films, displays, etc.) were outdated or inappropriate. There was no live firing and very little, if any, actual handling of firearms. The volunteer

instructor program was not well coordinated, being strong in some sections of the state and weak or non-existent in others. Overall, it is difficult for the author to imagine how an educational program of any kind in this condition could be expected to properly inform and improve behavior in any group of people. However, the critical flaw in the entire hunter education field seems to be lack of a realistic perspective on education.

In the course of the evaluation, the author was struck by the unrealistic expectations held by many people associated with hunter education. A six or even ten-hour program given once in a lifetime cannot be expected to change the behavior of students dramatically. Providing that the course is well presented, hunter education officials should not feel guilty if one of their students causes a hunting accident or behaves in an unethical manner. A more realistic goal of hunter education programs would be to raise the consciousness of students in the areas of safe, legal and ethical conduct while hunting, handling firearms, and relating hunting experiences to others. Another realistic objective would be to significantly increase the knowledge of students. Hunter education personnel should not assume responsibility for hunting accidents. Much of the behavior of individuals is due to the influence of family, peers and community standards, factors which operate each day of one's life. However, hunter education officials and agencies are responsible for providing the best hunter education program possible within the constraints

of time, funds, personnel and other resources. Nevertheless, the number of students trained per year is not a good measure of program success. Also, equipment and training aids are not the real strengths of any educational program. The people managing and teaching the program are the real strengths. Currently, in many states, the people in charge of hunter education tend to be either oriented toward natural resources or law enforcement. People trained and interested in education should manage a huge, important program such as hunter education. Though this shift in focus of personnel is not likely to occur in the near future, the necessity of this eventual evolution seems inescapable.

Finally, a simple, yet personal, analogy might shed some light on the nature of hunter education training. The investigator has been an instructor of personal safety and self-defense for the past 15 years and has trained several thousand students. It would be ludicrous to assume that a martial arts student could take a six, 10 or even 20 hour program of self-defense and realistically defend himself in a real, life-threatening situation. An instructor in martial arts who promulgated the idea that a shortcourse in self-defense would be sufficient would be judged by his peers as a "rip off" artist and shunned by the authentic martial arts community. Every legitimate instructor knows that it takes at least one year of training (with two or three sessions per week) to become minimally proficient at self-defense and more realistically, three years for a reasonable level of

proficiency to be achieved. Also, regular practice and continued training are necessary to maintain this level of proficiency. Therefore, in light of this analogy, the perspective and expectations of most hunter education personnel seem rather naive. Since hunting involves both knowledge and physical skills, training in actual safe gun handling and shooting should be conducted over a much longer period of time than is currently done in hunter education. In addition, continued practice and training should be provided via adult hunter education courses and specialized hunting skills courses.

Changes in Virginia's Hunter Education Program as a Result of Evaluation

The evaluation of Virginia's Hunter Education Program brought about several changes. First, a new, valid student examination was developed and has been utilized successfully for several years. Second, the content of the instructor's manual was altered to coincide with the content of the new exam. Third, a new slide presentation was developed. Fourth, the hunter education program was moved into the Law Enforcement Division. Though contrary to the recommendations of this study, the hunter education program did find a solid home base in Law Enforcement which resolved one of the major conflicts within the program. Finally, within the Enforcement Division, the Hunter Safety Coordinator position was elevated to the level of Captain with concomitant authority and salary.

Future Hunter Education Research Suggestions

Future research in hunter education contains many possibilities. For evaluation research of any program, a naturalistic inquiry, qualitative approach should be the first step, followed by a variety of focused, quantitative measurements. The qualitative overview of the program could possibly prevent needless research. For example, if a hunter education program was being poorly implemented, this problem should be corrected before evaluating, say, the behavior of hunters in the field. It seems fruitless to study in detail a program that is not being presented properly.

More evaluation research on the behavior of hunters in the field is needed. If there are states where hunter education is being implemented properly, thousands of students have been trained in mandatory programs, and where dove hunting is permitted, a duplication of Virginia's dove hunter evaluation could prove to be most interesting. However, the author recommends more elaborate training of observers, observation at several sites within a region, and increased sample sizes.

Creation of new courses dealing with specialized topics such as turkey hunting could lead to interesting studies on the effects on teaching gun safety and ethics indirectly as a part of a larger course. Pre-and-post knowledge gain studies could be conducted along with behavioral studies on a small scale. For example, a few well trained observers disguised as hunting part-

ners could accompany randomly selected graduates of the specialized course on a hunt and record behavior. The graduates could be chosen by a mock drawing and the prize could be an all expenses paid hunting trip. Though the sample size would necessarily be small, the intensity of data collection could be greatly increased by gathering detailed background data on the hunters being observed.

Finally, a simulation study of "shoot" or "don't shoot" situations could be conducted on hunter education students before and after taking the course. Scores could be obtained and compared with test results. Though not addressing actual hunting behavior, this study could be an intermediate level assessment of the effectiveness of hunter education since more than just knowledge would be involved.

Regardless of the direction taken by future hunter education evaluation studies, the advice given by Patton (1980) should be heeded: "An evaluation not worth doing is not worth doing well."

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Appendix I. Initial list of hunter education questions
utilized in developing a new student
examination for Virginia's Hunter Education
Program.

Hunters, Hunting, and Regulations

1. Permission to hunt on private land must be obtained whether or not the property is posted.
 T F
2. Written permission must be obtained before hunting on posted land.
 T F
3. The maximum number of shells that a shotgun can legally hold is:
A. five
B. four
 C. three
D. two
4. Everyone who hunts in Virginia must have a valid hunting license.
T F
5. The landowner or tenant has the right to check your hunting license.
 T F
6. Devices such as walkie-talkies and CB radios are very useful to good sportsmen.
T F
7. Wildlife management in Virginia is paid for by:
 A. hunters and fishermen
B. the general public
C. the state government
D. the federal government
8. Wildlife is one of the few natural resources that can be stockpiled.
T F

9. Wildlife populations are most affected by:
- A. hunting and trapping
 - B. forestry and farming practices
 - C. diseases and parasites
 - D. poachers and market hunters
10. One of the best management practices for wildlife is:
- A. habitat manipulation
 - B. stocking game
 - C. killing predators
 - D. posting land
11. After completing a hunt on private land, the hunter should:
- A. leave by the back way to avoid disturbing the landowner
 - B. drive by slowly and wave at the landowner
 - C. call the landowner after getting home and thank him
 - D. drive to the landowner's home, thank him, and offer to share the game killed
12. If you see a game law violation, you should
- A. report the violation to the local game warden
 - B. ignore the violation and try to forget it happened
 - C. tell the violator that he should obey the game laws
 - D. tell the landowner to keep other hunters off his land
13. Hunting can be done legally on one's own property on Sunday.
- T F
14. Which of the following is an unethical hunting practice?
- A. using a shotgun that only holds three shells
 - B. shooting quail on the ground
 - C. reporting game law violations
 - D. cleaning game too soon after it is killed
15. Shooting over the bag limit is stealing wildlife from other sportsmen.
- T F
16. Hunting is a basic right in America.
- T F
17. The best way to cool a deer carcass is by transporting it home on the hood of a car.
- T F

18. Many kinds of North American game animals are in danger of being overharvested by hunters.
T F
19. The rule for camping while hunting is "leave an area as you found it."
 T F
20. One of the main concerns of an ethical hunter is:
A. killing the limit of game
B. carrying a good supply of ammunition
 C. developing good marksmanship
D. learning to reload ammunition
21. If you have purchased a Virginia hunting license, the license must be carried with you while hunting in Virginia.
 T F
22. Elimination of habitat is the most serious threat to Virginia's wildlife
 T F
23. In some areas, coyotes, wolves, and mountain lions kill many deer each year and these predators should be eliminated.
T F
24. For hunting purposes in Virginia, a bow must be capable of casting an arrow 125 yards.
 T F
25. In America, the wildlife belongs to the landowner.
T F
26. When leaving the woods after hunting, a good hunter should:
 A. unload his gun and leave the action open
B. mark some trees with an axe in order to find the same
C. empty his gun by firing into a nearby tree
D. carve his initials and the date into a tree for historical purposes

27. Game should be field dressed as soon as possible in order to:
- A. make the carcass easier to carry
 - B. keep from spoiling the meat
 - C. avoid making a mess at home
 - D. provide extra food for other animals in the woods
28. Good marksmanship is important primarily to beginning hunters.
- T F
29. A deer is wounded by a hunter. The hunter should:
- A. shoot more rounds at the spot where the deer was last seen
 - B. reload quickly and try to chase the deer until he gets another shot
 - C. remember the spot where the deer was shot, sit and wait for 20 minutes, and then try to track the animal
 - D. move to another hunting spot and try to shoot another deer
30. Because modern guns usually hold several rounds of ammunition, marksmanship is not as important to a hunter as it was years ago.
- T F
31. Pistols should be carried concealed while hunting.
- T F
32. All types of hunters should wear blaze orange while hunting because all game animals in Virginia are color blind.
- T F
33. According to state law, no hunter can shoot within 100 feet of a public road.
- T F
34. In those areas in Virginia where rifles are legal, handguns with 350 foot-pounds of muzzle energy may be used to hunt non-migratory game birds and game animals.
- T F

35. To avoid being mistaken as a game animal, hunters should wear some blaze orange colored outer garment.

F

36. Immediately after bagging a deer, bear, or turkey, a hunter must attach the appropriate kill-tag and take the animal to an official game checking station.

F

Safety Basics

1. Over half of the firearm fatalities in the United States occur:
 - A. at firing ranges
 - B. while hunting
 - C. in the home
 - D. while traveling to the hunting site

2. Most hunting accidents involve:
 - A. teenagers
 - B. city folks
 - C. elderly hunters
 - D. deer hunters

3. Every firearm should be treated as if it were loaded at all times.

T F

4. Muzzle control refers to:
 - A. how well a person can point or aim a gun
 - B. keeping the muzzle end of a gun pointed in a safe direction
 - C. the amount of powder placed in a muzzle loading rifle
 - D. a device placed over the mouths of hunting dogs to prevent biting

5. The action of a gun should be kept open when not being used for hunting.

T F

6. The first thing to do when you pick up a gun is:
 - A. point the gun at a window and snap the trigger
 - B. ask someone if the gun is loaded
 - C. wipe off any rust or dirt
 - D. point the gun away from anyone present and open the action

7. Firearm safety rules prevent accidents.

T F

8. The main reason for teaching the hunter education course in Virginia is to:
 - A. prevent accidents
 - B. sell more hunting licenses
 - C. sell more guns and ammunition
 - D. get more kids involved in hunting

9. When taken in moderate amounts in the field, alcohol helps sharpen a hunter's aim and reflexes.
T F
10. The safety on a gun should be released only when you are ready to shoot.
 T F
11. The best thing to do if you stumble while hunting is to:
 A. hold on to the gun and control the muzzle
B. throw the gun out of the way
C. use the gun stock to catch your fall
D. point the gun toward the sky and pull the trigger
12. Physical conditioning (exercise) helps create safer hunters.
 T F
13. When carrying a gun in the field, one hand should be on:
 A. the trigger guard
B. the action
C. the trigger
D. the safety
14. Which of the following methods of deer hunting is the safest?
A. surround a small area with hunters and send one hunter in to chase out the deer
 B. plan the hunt so that every hunter knows the position of all other hunters
C. surround an area and fire a few shots into the brush to scare the deer out
D. start a big fire in the woods upwind of the hunting area to smoke out the deer
15. A shotgun is dangerous at distances greater than 150 yards.
 T F
16. In Virginia, more firearm accidents involve shotguns than rifles or pistols.
 T F
17. A gun kept in the home should be:
A. locked up
B. unloaded
 C. kept behind a door
D. hidden in a closet

18. Guns were primarily designed for:
- A. hunting
 - B. self-defense
 - C. killing
 - D. target shooting
19. If mud or snow are stuck in your gun barrel, the gun should be:
- A. shaken vigorously to loosen the mud or snow
 - B. fired in the air to blow out the mud or snow
 - C. tapped lightly against a tree while held upside down
 - D. unloaded and freed of mud or snow
20. Handguns, being much smaller, are safer than shotguns or rifles.
- T F
21. A good safety rule for hunting is, "Point a gun only at what you intend to shoot."
- T F
22. Due to better visibility, safer and more accurate shots can be obtained across flat, open water.
- T F
23. Firearms and ammunition can be stored together if every person in the household has taken the Hunter Safety course.
- T F
24. The zone of fire refers to the distance firearms will shoot.
- T F
25. Shooting on or over a road is permissible after looking both ways.
- T F
26. Before traveling over slippery or unsure footing, the firearm should be unloaded and the action kept open.
- T F
27. Shooting from a vehicle is recommended only after coming to a complete stop.
- T F

28. Which of the following devices are recommended as aids in target identification while hunting?
- A. mounted rifle or shotgun scopes
 - B. hand-held radar guns
 - C. contact lens or prescription glasses
 - D. spotting scopes or binoculars
29. A firearm transported in a vehicle should be:
- A. pointed out the window
 - B. unloaded and cased
 - C. hidden behind the seat
 - D. stored in the trunk or a gun rack
30. Safety should be the first principle in handling a firearm.
- T F
31. Mud or snow lodged in the barrel may cause a gun to blow up when fired.
- T F
32. At close range, a shotgun is safer than a rifle.
- T F
33. A loaded gun is most dangerous when:
- A. the safety is not working
 - B. the barrel is very short
 - C. someone is holding the gun
 - D. it is stored in a corner or closet
34. When carrying a gun in the field, your finger should be on the trigger when you are:
- A. ready to fire
 - B. working the action
 - C. checking the safety
 - D. chasing down game
35. The best back stop for shooting is:
- A. the side of an old building
 - B. a hill free of rocks
 - C. a large tree
 - D. a stone wall

36. During a hunt, a deer walks behind a clump of bushes and pauses. You believe you can still see him. You should:
- A. shoot into the bushes to scare the deer out
 - B. shoot where you last saw the deer
 - C. yell loudly and shoot when the bushes move
 - D. shoot when positive identification is made
37. Firearms and ammunition in the home should be:
- A. stored together in a locked cabinet
 - B. stored separately under lock and key
 - C. stored in a gun rack
 - D. stored out of sight of children

Shooting Basics

1. To properly sight in a rifle, a group of at least _____ shots should be fired.
 - A. six
 - B. five
 - C. two
 - D. three
2. Use only your master eye when aiming a rifle or pistol.

T F
3. The rule for sight adjustment is to move the _____ sight in the direction you want to move the hits on the target.
 - A. rear
 - B. front
 - C. telescopic
 - D. peep
4. The trigger pull on a rifle or handgun should be slow and easy so that each shot is a surprise.

T F
5. The best breathing pattern while shooting is to:
 - A. hold your breath until the shot is fired
 - B. exhale fully before pulling the trigger
 - C. inhale fully before pulling the trigger
 - D. take slow and easy breaths while pulling the trigger
6. The least steady shooting position is:
 - A. kneeling
 - B. prone
 - C. standing
 - D. sitting
7. A shotgun is pointed and a rifle is aimed.

T F
8. When shooting a shotgun, most of your body weight should be on the rear leg.

T F

9. When "mounting the shotgun," the gun should be brought up to the cheek first and then back to the shoulder in one continuous motion.

T F

10. When shooting a shotgun, the eyes should focus on the front bead of the gun.

T F

11. The correct rigger pull technique for shotguns is best described as a slap, similar to striking a manual typewriter key.

T F

12. Even though a shotgun shell's pellets spread over a large area, follow through is necessary.

T F

13. Accuracy with a handgun is limited because of:

A. a short sight radius
 B. difficulty in holding the handgun steady
 C. the heavier trigger pull required
 D. the lower powered ammunition used

14. Lining up the front and rear sights on a gun is called:

A. zeroing in
 B. signing in
 C. sight alignment
 D. sight picture

15. The arc-like path of a bullet is called the:

A. trajectory
 B. flight pattern
 C. elevation
 D. maximum range

16. The pattern of a shotgun is:

A. its overall shape
 B. the checkering on the stock
 C. the shot concentrations and gaps
 D. the mold from which the gun was made

17. The "choke" helps control the pattern of a shotgun.
T F
18. The arc-like path of a bullet is called the pressure curve.
T (F)
19. The best grip to use when shooting a handgun is:
(A) the two-handed grip
B. the one-handed grip
C. the reinforced forearm grip
D. the three-fingered grip
20. In target and field shooting, positions are basically identical.
(T) F
21. The three most accepted shooting techniques are:
A. follow-up, steady hold, and slap shooting
B. circular swing, one-hand grip, and quick shooting
(C) fast swing, slow lead, and spot shooting
D. swing through, sustained lead, and snap shooting
22. Patterning a shotgun is essentially sighting-in a shotgun.
(T) F
23. The "zone of fire" is the region from the gun's muzzle to the target.
T (F)
24. The main purpose of a sling is to:
(A) steady the gun for shooting
B. aid in carrying a heavy gun
C. enhance the appearance of the gun
D. soften the recoil of the gun
25. With respect to accuracy, handguns have a greater range than rifles.
T (F)

Gun Handling

1. The first thing to do when you pick up a gun is to check the safety.
T F
2. The majority of hunting accidents occur within:
 - A. 5 yards
 - B. 20 yards
 - C. 50 yards
 - D. 75 yards
3. Guns can be transported safely in a boat when:
 - A. wrapped in plastic and placed on the bottom of the boat
 - B. fully cased and strapped to the sides of the boat
 - C. carried by the hunter and pointed in a safe direction
 - D. unloaded, action open, and pointed in a safe direction
4. When your hunting companions are out of sight, the most important factor to consider is:
 - A. what lies beyond your target
 - B. the distance your shot will travel
 - C. the positive identification of your target
 - D. what obstacles could cause your bullet to ricochet
5. Your gun should be loaded when:
 - A. returning to the automobile or house
 - B. walking around barns and houses
 - C. hunting in the field
 - D. crossing old fences
6. Gun safety rules should be followed by:
 - A. hunters
 - B. deer hunters
 - C. trained hunters
 - D. everyone
7. The muzzle of a gun should be pointed in a safe direction.
T F
8. A good safety rule is, "Be sure of your target and beyond."
T F

9. You may assume that a gun just removed from a locked gun rack is unloaded.
T F
10. A gun can be safely carried with one hand.
 T F
11. A loaded gun is most dangerous when a person is holding it.
 T F
12. While not in use a pistol should be carried in a holster.
 T F
13. When you are certain the safety is working, a gun can be carried with one finger on the trigger.
T F
14. When road hunting, only one gun should be loaded in the car.
T F
15. While cleaning your gun, keep some ammunition nearby for use in checking the gun's action after cleaning.
T F
16. A good safety rule is to always check your gun barrel:
A. after the first shot
 B. after a fall
C. after shooting a magnum round
D. after using black powder
17. The bore of a gun should be cleaned through the breech end where possible.
 T F
18. When going hunting, your gun should be loaded:
A. in the field at the hunting site
B. at home before leaving to hunt
C. in the car if you are driving on country roads
D. in the parking lot at the hunting site

19. The best way to store guns is in:
- A. a holster or gun case away from heat
 - B. a hidden gun rack mounted on a wall
 - C. a horizontal position in a closet
 - D. a locked cabinet separated from ammunition
20. Handguns may be used for hunting in Virginia if:
- A. the local game warden has been notified
 - B. the barrel is longer than six inches
 - C. they are visibly carried and of legal size
 - D. you have never been arrested for a game law violation
21. When preparing for the first hunt of the season, take your gun out of storage and:
- A. walk outside to fire a few practice rounds
 - B. chamber a few shells to see if the action is working
 - C. wipe off the stock and outer metal parts
 - D. control the muzzle, open the action, and clean the gun thoroughly
22. When placing a firearm in a vehicle, it should be:
- A. unloaded, action open, and in a case if possible
 - B. pointed down at the floorboard and keep the safety on
 - C. handled by the stock end and pointed at the roof
 - D. handled with both hands and placed in a rack
23. When hunting three abreast:
- A. hunters should shoot in established zones of fire
 - B. the first hunter to see the game should shoot
 - C. hunters should take turns in shooting at game
 - D. hunters should shoot at the same time if possible.

Guns and Ammunition

1. The "action" of a gun refers to:
 - A. the manner in which the gun recoils
 - B. the portion of a gun through which the bullet is propelled
 - C. the type of metal used in making the barrel
 - D. the set of moving parts which chamber and fire the ammunition

2. The three main parts of any firearm are:
 - A. magazine, sights, and muzzle
 - B. butt, receiver, and chamber
 - C. bolt, barrel, and stock
 - D. stock, action, and barrel

3. Shotguns have barrels with a smooth interior and rifles have barrels with lands and grooves.

T F

4. Caliber is determined by measuring the interior diameter of a rifle or pistol barrel.

T F

5. Gauge of a shotgun refers to:
 - A. the weight of the gun
 - B. the thickness of the barrel
 - C. the inside diameter of the barrel
 - D. the size of shot used

6. An over and under double barrel shotgun has the following type of action:
 - A. lever
 - B. hinge
 - C. bolt
 - D. pump

7. For the beginning hunter, the following type of rifle or shotgun is generally considered the safest:
 - A. semi-automatic
 - B. pump action
 - C. lever action
 - D. hinge action

8. Gauge is the number of lead balls of the same diameter as the gun barrel equalling one pound in weight.
 T F
9. Telescopic sights are particularly useful when hunting in heavy brush and timber.
 T F
10. Open sights are the simplest and least expensive.
 T F
11. A truly semi-automatic action firearm continues to fire as long as the trigger is pulled back and the ammunition lasts.
 T F
12. It would take 410 balls of lead the same size as the diameter of a .410 shotgun barrel to weigh one pound.
 T F
13. Which of the following gauges of shotgun is the largest?
 A. 28 gauge
 B. 12 gauge
 C. 20 gauge
 D. 16 gauge
14. There are two basic types of rifle ammunition, centerfire and rimfire.
 T F
15. The type of action determines if a firearm is a rifle or a shotgun.
 T F
16. The three main parts of ammunition are the primer, case, and bullet.
 T F
17. The new color coding of shotgun ammunition allows the hunter to carry different gauges of shotgun shells safely in the same pocket or pouch.
 T F
18. Most gun repair is best performed by a professional gunsmith.
 T F

19. The maximum range of any rifle is:
- A. the actual range of a rifle when fired at 30° elevation
 - B. from one to five miles depending on the caliber
 - C. almost 500 yards, depending on the marksmanship of the hunter
 - D. farther in the Western states due to the flat terrain
20. A good marksman can use his favorite gun to hunt any North American game species.
- T F
21. Rifles are usually named by caliber and shotguns by gauge.
- T F
22. Number 8 shot travels farther than number 4 shot.
- T F
23. Rifles have greater accuracy because:
- A. the sights allow better aiming
 - B. the bullet spins as it leaves the barrel
 - C. less gas escapes from the chamber
 - D. the ammunition contains more powder
24. The muzzle is considered the business end of a gun.
- T F
25. The maximum range of a shotgun is:
- A. 50 yards
 - B. 175 yards
 - C. 150 yards
 - D. greater than 150 yards
26. A pistol, having a shorter barrel, is safer than a rifle or shotgun.
- T F
27. Lands and grooves are:
- A. the raised and lowered surfaces inside a rifle barrel
 - B. two types of open sights found on rifles
 - C. found on checkered shotgun and rifle stocks
 - D. small hills and valleys indicated on a topographical map

28. Zeroing a rifle is the process of adjusting the sights for accuracy.
 T F
29. The muzzle of a gun is the:
A. end placed against the shoulder when firing
B. place where the stock attaches to the barrel
C. place where telescopic sights are mounted
 D. end of the barrel where bullets or shot come out
30. The choke on a shotgun determines the spread of the shot pattern.
 T F
31. A ten gauge shotgun can legally be used to hunt waterfowl in Virginia.
 T F
32. Both a 20 gauge and a 12 gauge shell can be inserted into the same barrel of a 12 gauge shotgun.
 T F
33. Firing a gun while holding the barrel under water is a good way to:
A. test the strength of the barrel
 B. cause the gun to blow up
C. shock and stun fish
D. clean the burned powder out of the barrel
34. Both rifles and shotguns can be muzzleloaders.
 T F
35. Fully automatic firearms, such as machine guns, can legally be used for hunting in Virginia.
T F
36. Buckshot, when combined with the correct caliber of rifle, is an excellent type of ammunition for deer hunting.
T F
37. Which of the following types of chokes or shotguns shoots the widest pattern?
A. full
B. partial
 C. modified
 D. improved cylinder

Muzzle Loading

1. Black powder is sensitive and can be exploded easily.
 T F
2. The modern smokeless gun powder replaced black powder around 1800.
 T F
3. Older guns, especially muzzle loaders, should be fired using smokeless powder.
 T F
4. The two basic types of black powder firearms most commonly used today are:
 - A. the flintlock and the percussion cap
 - B. the Hawken and the Kentucky rifle
 - C. the Damascus steel shotguns and rifles
 - D. the flashpan and the ramrod
5. The best overall black powder for use in muzzle loaders is:
 - A. Fg
 - B. GGf
 - C. AAA
 - D. FFFg
6. A muzzle loader can be fired with only a primer load in the flashpan or percussion cap when:
 - A. it's a close shot and the game is standing still
 - B. oil in the nipple and breech plug needs burning away
 - C. the ramrod becomes jammed in the barrel
 - D. the gun failed to fire the first time
7. Since pouring powder directly from the powder horn into the muzzle speeds up the process of loading, this method should be used when shooting at wounded game.
 T F
8. After each shot with a muzzle loader, a good safety practice is to:
 - A. cool down the barrel with water
 - B. disassemble the lock and wipe it clean
 - C. wipe the bore with a damp patch
 - D. oil the flashpan or nipple

9. Leaving an airspace between the ball and powder when loading a muzzle loader provides a margin of safety.
- T (F)
10. The flat side of the ball used in muzzle loaders is called the:
- (A) spruce
B. plane
C. splat
D. face
11. The flat side of the ball used in muzzle loaders should always face downward into the barrel.
- T (F)
12. The recommended way to determine if a muzzle loader is loaded is to:
- A. pull the trigger
B. check the bore with a marked ramrod
C. disassemble the lock and barrel
D. blow gently into the barrel
13. When loading a muzzle loader, the ball should be started down the barrel using the:
- (A) short starter
B. long starter
C. ramrod
D. patch knife
14. The conical shaped bullet used in muzzle loading rifles is called a:
- (A) mini ball
B. shot
C. rocket nose
D. projectile
15. A muzzle loading firearm is loaded through the:
- A. breech
B. lock
C. action
D. barrel

16. While loading, powder for a muzzle loading firearm should be poured:
- A. directly into the barrel from the powder horn
 - B. into a measure and then into the barrel
 - C. into the patch and then pushed down the barrel
 - D. into the barrel using a small funnel
17. The first step in loading a muzzle loading firearm is to:
- A. pull the hammer back to half cocked position
 - B. place a new cap on the nipple
 - C. insert a patch into the barrel
 - D. pour the powder into the barrel
18. For hunting in Virginia, a .45 caliber muzzle loading firearm is the minimum, legal size.
- T F
19. The term "muzzle loader" refers to:
- A. shotguns and pistols
 - B. rifles, shotguns, and pistols
 - C. Hawken rifles
 - D. smokeless powder shotguns
20. In muzzle loading terms, a misfire occurs when:
- A. the target is missed
 - B. the game is only wounded
 - C. the gun explodes
 - D. the powder in the barrel fails to ignite
21. As with other firearms, muzzle loaders should be zeroed in.
- T F
22. Muzzle loading rifles can be generally classified as:
- A. flintlocks and percussion cap
 - B. centerfire and rimfire
 - C. lever action and bolt action
 - D. Hawken and Kentucky
23. When crossing a fence, ditch, log, or stream with a muzzle loader, the following safety measure should be taken:
- A. fire the shot into a nearby tree before crossing
 - B. remove the cap from a percussion cap or dump the powder from the flashpan of a flintlock
 - C. keep the gun pointed up in the air, holding it with both hands
 - D. attach a rope to the gun and pull it across after you have crossed safely

24. Black powder of size FFFFg should be used in muzzle loading rifles of .45 caliber or greater.
T F
25. Black powder is a mixture of the following three substances:
 A. charcoal, sulphur, and salt peter
B. ammonia, carbon, and calcium
C. hydrogen, petroleum, and graphite
D. copper sulfate, nitrogen, and coal dust
26. The firing mechanism on a muzzle loading firearm is called a:
A. action
 B. pin
C. lock
D. hammer
27. Pounding the ramrod to push the ball down a muzzle loader will flatten the ball and cause:
A. the ball spin faster
 B. a bad shot
C. the gun to explode
D. the powder to burn slower
28. Most muzzle loading shotguns are 12 gauge.
 T F
29. Black powder is corrosive to gun metal.
 T F
30. Percussion caps are coated with an explosive material.
 T F

Bow Hunting

1. A 50 pound bow weighs 50 pounds.
T F
2. The stiffness of an arrow shaft is called its:
A. weight
B. strength
C. flexibility
D. spine
3. Target arrows should weigh the same as your hunting arrows.
 T F
4. Shots with a bow should be limited to a distance of:
A. 15 yards or less
B. 40 yards
C. 75 yards
D. 100 yards
5. The most recent design or type of bow is the:
A. compound
B. recurve
C. cross
D. straight
6. In Virginia, crossbows may be used for hunting deer during the last day of the season.
T F
7. The weight of a bow refers to the:
A. actual weight of the bow in pounds
B. weight of an arrow the bow can propel
C. amount of energy required to draw back the bow
D. size of a person required to draw back the bow
8. The riser of a bow is the:
A. tip
B. broadhead
C. pulley
D. handle
9. The safest way to string a recurve or long bow is:
A. the push-pull method
B. the step through method
C. by using a bow stringer
D. by using a vise and pulley

10. When practicing for a hunt, use the same broadhead arrows that will be used during the hunt.
T F
11. When certain that your arrow wounded a deer, the first thing to do is:
 A. wait 20 to 30 minutes before following the deer
B. nock another arrow and chase down the deer
C. move to another area and hunt other deer
D. run for the nearest stream since wounded deer seek out water
12. The size of the game should determine the size of the bow chosen for hunting.
T F
13. The same safety rules used in hunting with guns should be used for bow hunting.
 T F
14. An arrow may be shot straight up into the air if you wear a protective football or motorcycle helmet.
T F
15. The feathers on an arrow are called the:
A. crest
B. nock
C. shaft
 D. fletching
16. Bows may be used to bag some types of fish in Virginia.
 T F
17. Bow hunters may hunt without a hunting license in Virginia.
T F
18. Most bow hunting accidents are self-inflicted.
 T F
19. Regarding bows, the quiver is:
A. a device used for carrying arrows
B. the shaky movement of an arrow in flight
C. the unsteady movement of the hand when drawing back the bow
D. a measure of the distance to the target developed by the American Indians

20. The legal type of arrowhead for big game hunting in Virginia is called a:
- A. field point
 - B. flu flu
 - C. game getter
 - D. broadhead
21. Bow hunting equipment should be carried tightly when climbing into or out of a tree stand.
- T F
22. An arrow should always be nocked at the same spot on the bowstring.
- T F
23. Wooden arrows are recommended for shooting with a compound bow.
- T F
24. Beginning archers tend to buy bows with too much power.
- T F
25. The nock of an arrow is:
- A. that portion which fits on the bowstring
 - B. the sound made by an arrow in flight
 - C. the distance from the point to the fletching
 - D. the feather opposite the cock feather
26. Releasing the string on a bow without an arrow nocked is a good way to practice indoors.
- T F
27. The three recommended methods for aiming a bow are the:
- A. fast draw, horizontal hold, and jump shot
 - B. instinctive, point of aim, and bow sight
 - C. sighting in, zeroing, and peep sight
 - D. open sight, slow release, and push-pull
28. Arrow length is determined by the height of the shooter.
- T F

29. Unlike guns, bows require little or no maintenance.
T F
30. Virginia law requires that broadhead arrow points be
7/8 inch in diameter.
 T F
31. Dull hunting arrows may be used with a heavy weight bow.
T F
32. Split or fractured wooden arrows may be used in a light
weight bow.
T F
33. A legal sized bow in Virginia is one that can cast an
arrow:
A. 50 yards
 B. 125 yards
C. 100 feet
D. 125 feet

Outdoor Skills

1. The key to survival in the outdoors is often:
 - A. having extra ammunition
 - B. planning in advance
 - C. having a .357 magnum pistol
 - D. making quick decisions

2. A survival shelter should be built so that _____ will be reflected and not blown into it.
 - A. snow
 - B. heat
 - C. wind
 - D. rain

3. A condition called hypothermia occurs when a:
 - A. person becomes lost
 - B. person is deprived of nourishment
 - C. person becomes dehydrated
 - D. person's inner body temperature is reduced

4. Two of the many signs of dehydration are:
 - A. stomach cramps and vomiting
 - B. dark orange urine and absence of saliva
 - C. fever and chills
 - D. loss of vision and hearing

5. The following colors of wild berries are generally safe to eat:
 - A. black and blue
 - B. red and white
 - C. green and white
 - D. yellow and green

6. Alcohol, merthiolate, or other antiseptics should be used to clean wounds.

T F

7. Use a tourniquet only when all other methods to stop bleeding have failed.

T F

8. Rubbing the affected area is the best treatment for frostbite.

T F

9. The rule for field dressing game is, "the warmer the day, the quicker the game must be dressed."

T F

10. When lost in the woods, the best thing to do is:

- A. remain in one spot and start a fire
 B. keep moving in the same direction
 C. walk in a big circle and yell for help
 D. try to trace your footsteps back to a familiar spot

11. Mushrooms can be a good source of food when you are lost in the woods.

T F

Appendix II. Pilot tests A, B, C and D utilized in developing a new student examination for Virginia's Hunter Education Program.

VIRGINIA HUNTER EDUCATION PROGRAM
STUDENT FIREARM SAFETY EXAMINATION

INSTRUCTIONS

Before starting the examination, make sure you have one complete copy of the test, a General Purpose - NCS - answer sheet, and a No. 2 pencil. If you do not have either of these test materials, raise your hand and the instructor will provide them for you. Please write your full name on the space provided at the top, left-hand corner of the answer sheet.

Be sure to use only side one of the answer sheet. Please read each of the 50 questions carefully before marking your answer. You have 50 minutes in which to complete the test. Try to answer all 50 questions. Each question on the exam has a corresponding number (1 through 50) on the answer sheet. To the right of each question number on the answer sheet are five circles.

For the TRUE-FALSE questions, blacken the circle with the T for TRUE and blacken the circle with F for FALSE. Blacken the entire circle according to the example found at the top, left-hand corner of the answer sheet. Be sure to use only a No. 2 pencil. DO NOT use INK to mark your answers!

For the MULTIPLE-CHOICE questions, blacken the circle under "A" for answer A, the circle under B for answer B, the circle under C for answer C, and the circle D for answer D. Each question should have one and only one circle blackened on the answer sheet.

If you have any problems understanding the testing procedure or the test questions, please raise your hand and the instructor will assist you.

Remember, for each question, there is only one correct answer.

When you have finished the test, please turn in the answer sheet and the test to your instructor.

EXAM A

1. Mud or snow lodged in the barrel may cause a gun to blow up when fired.
T F
2. With respect to accuracy, handguns have a greater range than rifles.
T F
3. Which of the following types of chokes on shotguns shoots the widest pattern?
 - A. full
 - B. partial
 - C. modified
 - D. improved cylinder
4. While cleaning your gun, keep some ammunition nearby for use in checking the gun's action after cleaning.
T F
5. When lost in the woods, the best thing to do is:
 - A. remain in one spot and start a fire
 - B. keep moving in the same direction
 - C. walk in a big circle and yell for help
 - D. try to trace your footsteps back to a familiar spot
6. Before traveling over slippery or unsure footing, the firearm should be unloaded and the action kept open.
T F
7. Lining up the front and rear sights on a gun is called:
 - A. zeroing in
 - B. signing in
 - C. sight alignment
 - D. sight picture
8. The first thing to do when you pick up a gun is to check the safety.
T F
9. Wildlife is one of the few natural resources that can be stockpiled.
T F

Exam A, Page 2

10. Accuracy with a handgun is limited because of:
- A. a short sight radius
 - B. difficulty in holding the handgun steady
 - C. the heavier trigger pull required
 - D. the lower powered ammunition used
11. In muzzle loading terms, a misfire occurs when:
- A. the target is missed
 - B. the game is only wounded
 - C. the gun explodes
 - D. the powder in the barrel fails to ignite
12. A good safety rule for hunting is, "Point a gun only at what you intend to shoot."
- T F
13. The maximum number of shells that a shotgun can legally hold is:
- A. five
 - B. four
 - C. three
 - D. two
14. Most gun repair is best performed by a professional gunsmith.
- T F
15. Safety should be the first principle in handling a firearm.
- T F
16. Two of the many signs of dehydration are:
- A. stomach cramps and vomiting
 - B. dark orange urine and absence of saliva
 - C. fever and chills
 - D. loss of vision and hearing
17. The feathers on an arrow are called the:
- A. crest
 - B. nock
 - C. shaft
 - D. fletching
18. The rule for camping while hunting is "leave an area as you found it."
- T F

Exam A, Page 3

19. The conical shaped bullet used in muzzle loading rifles is called a:
- A. mini ball
 - B. shot
 - C. rocket nose
 - D. projectile
20. Written permission must be obtained before hunting on posted land.
- T F
21. The main purpose of a sling is to:
- A. steady the gun for shooting
 - B. aid in carrying a heavy gun
 - C. enhance the appearance of the gun
 - D. soften the recoil of the gun
22. When going hunting, your gun should be loaded:
- A. in the field at the hunting site
 - B. at home before leaving to hunt
 - C. in the car if you are driving on country roads
 - D. in the parking lot at the hunting site
23. Rifles have greater accuracy because:
- A. the sights allow better aiming
 - B. the bullet spins as it leaves the barrel
 - C. less gas escapes from the chamber
 - D. the ammunition contains more powder
24. The best overall black powder for use in muzzle loaders is:
- A. Fg
 - B. GGF
 - C. AAA
 - D. FFFg
25. Gauge is the number of lead balls of the same diameter as the gun barrel equalling one pound in weight.
- T F
26. A loaded gun is most dangerous when:
- A. the safety is not working
 - B. the barrel is very short
 - C. someone is holding the gun
 - D. it is stored in a corner or closet

Exam A, Page 4

27. Regarding bows, the quiver is:
- A. a device used for carrying arrows
 - B. the shaky movement of an arrow in flight
 - C. the unsteady movement of the hand when drawing back the bow
 - D. a measure of the distance to the target developed by the American Indians
28. An arrow may be shot straight up into the air if you wear a protective football or motorcycle helmet.
- T F
29. Shots with a bow should be limited to a distance of:
- A. 15 yards or less
 - B. 40 yards
 - C. 75 yards
 - D. 100 yards
30. Use only your master eye when aiming a rifle or pistol.
- T F
31. A good marksman can use his favorite gun to hunt any North American game species.
- T F
32. A survival shelter should be built so that _____ will be reflected and not blown into it.
- A. snow
 - B. heat
 - C. wind
 - D. rain
33. When your hunting companions are out of sight, the most important factor to consider is:
- A. what lies beyond your target
 - B. the distance your shot will travel
 - C. the positive identification of your target
 - D. what obstacles could cause your bullet to ricochet
34. When crossing a fence, ditch, log, or stream with a muzzle loader, the following safety measure should be taken:
- A. fire the shot into a nearby tree before crossing
 - B. remove the cap from a percussion cap or dump the powder from the flashpan of a flintlock
 - C. keep the gun pointed up in the air, holding it with both hands
 - D. attach a rope to the gun and pull it across after you have crossed safely

Exam A, Page 5

35. Which of the following is an unethical hunting practice?
- A. using a shotgun that only holds three shells
 - B. shooting quail on the ground
 - C. reporting game law violations
 - D. cleaning game too soon after it is killed
36. An over and under double barrel shotgun has the following type of action:
- A. lever
 - B. hinge
 - C. bolt
 - D. pump
37. Firearms and ammunition in the home should be:
- A. stored together in a locked cabinet
 - B. stored separately under lock and key
 - C. stored in a gun rack
 - D. stored out of sight of children
38. If you see a game law violation, you should
- A. report the violation to the local game warden
 - B. ignore the violation and try to forget it happened
 - C. tell the violator that he should obey the game laws
 - D. tell the landowner to keep other hunters off his land
39. After completing a hunt on private land, the hunter should:
- A. leave by the back way to avoid disturbing the landowner
 - B. drive by slowly and wave at the landowner
 - C. call the landowner after getting home and thank him
 - D. drive to the landowner's home, thank him, and offer to share the game killed
40. The legal type of arrowhead for big game hunting in Virginia is called a:
- A. field point
 - B. flu flu
 - C. game getter
 - D. broadhead
41. Hunting is a basic right in America.
- T F

Exam A, Page 6

42. The maximum range of any rifle is:
- A. the actual range of a rifle when fired at 30° elevation
 - B. from one to five miles depending on the caliber
 - C. almost 500 yards, depending on the marksmanship of the hunter
 - D. farther in the Western states due to the flat terrain
43. When road hunting, only one gun should be loaded in the car.
- T F
44. When shooting a shotgun, most of your body weight should be on the rear leg.
- T F
45. Black powder is a mixture of the following three substances:
- A. charcoal, sulphur, and salt peter
 - B. ammonia, carbon, and calcium
 - C. hydrogen, petroleum, and graphite
 - D. copper sulfate, nitrogen, and coal dust
46. Rifles are usually named by caliber and shotguns by gauge.
- T F
47. A firearm transported in a vehicle should be:
- A. pointed out the window
 - B. unloaded and cased
 - C. hidden behind the seat
 - D. stored in the trunk or a gun rack
48. Wildlife management in Virginia is paid for by:
- A. hunters and fishermen
 - B. the general public
 - C. the state government
 - D. the federal government
49. Which of the following methods of deer hunting is the safest?
- A. surround a small area with hunters and send one hunter in to chase out the deer
 - B. plan the hunt so that every hunter knows the position of all other hunters
 - C. surround an area and fire a few shots into the brush to scare the deer out
 - D. start a big fire in the woods upwind of the hunting area to smoke out the deer

Exam A, Page 7

50. When carrying a gun in the field, your finger should be on the trigger when you are:
- A. ready to fire
 - B. working the action
 - C. checking the safety
 - D. chasing down game

EXAM B

1. A good safety rule is, "Be sure of your target and beyond."
T F
2. At close range, a shotgun is safer than a rifle.
T F
3. Because modern guns usually hold several rounds of ammunition, marksmanship is not as important to a hunter as it was years ago.
T F
4. In Virginia, more firearm accidents involve shotguns than rifles or pistols.
T F
5. A pistol, having a shorter barrel, is safer than a rifle or shotgun.
T F
6. The rule for field dressing game is, "the warmer the day, the quicker the game must be dressed."
T F
7. Zeroing a rifle is the process of adjusting the sights for accuracy.
T F
8. The zone of fire refers to the distance firearms will shoot.
T F
9. For hunting purposes in Virginia, a bow must be capable of casting an arrow 125 yards.
T F
10. In target and field shooting, positions are basically identical.
T F
11. Shotguns have barrels with a smooth interior and rifles have barrels with lands and grooves.
T F

Exam B, Page 2

12. During a hunt, a deer walks behind a clump of bushes and pauses. You believe you can still see him. You should:
- A. shoot into the bushes to scare the deer out
 - B. shoot where you last saw the deer
 - C. yell loudly and shoot when the bushes move
 - D. shoot when positive identification is made
13. Handguns may be used for hunting in Virginia if:
- A. the local game warden has been notified
 - B. the barrel is longer than six inches
 - C. they are visibly carried and of legal size
 - D. you have never been arrested for a game law violation
14. Hunting can be done legally on one's own property on Sunday.
- T F
15. The "action" of a gun refers to:
- A. the manner in which the gun recoils
 - B. the portion of a gun through which the bullet is propelled
 - C. the type of metal used in making the barrel
 - D. the set of moving parts which chamber and fire the ammunition
16. If mud or snow are stuck in your gun barrel, the gun should be:
- A. shaken vigorously to loosen the mud or snow
 - B. fired in the air to blow out the mud or snow
 - C. tapped lightly against a tree while held upside down
 - C. unloaded and freed of mud or snow
17. The following colors of wild berries are generally safe to eat:
- A. black and blue
 - B. red and white
 - C. green and white
 - D. yellow and green
18. Permission to hunt on private land must be obtained whether or not the property is posted.
19. Wildlife populations are most affected by:
- A. hunting and trapping
 - B. forestry and farming practices
 - C. diseases and parasites
 - D. poachers and market hunters
20. Firearms and ammunition can be stored together if every person in the household has taken the Hunter Safety course.
- T F

Exam B, Page 3

21. Telescopic sights are particularly useful when hunting in heavy brush and timber.
T F
22. Dull hunting arrows may be used with a heavy weight bow.
T F
23. The best breathing pattern while shooting is to:
A. hold your breath until the shot is fired
B. exhale fully before pulling the trigger
C. inhale fully before pulling the trigger
D. take slow and easy breaths while pulling the trigger
24. When carrying a gun in the field, one hand should be on:
A. the trigger guard
B. the action
C. the trigger
D. the safety
25. The safest way to string a recurve or long bow is:
A. the push-pull method
B. the step through method
C. by using a bow stringer
D. by using a vise and pulley
26. Everyone who hunts in Virginia must have a valid hunting license.
T F
27. The most recent design or type of bow is the:
A. compound
B. recurve
C. cross
D. straight
28. A muzzle loading firearm is loaded through the:
A. breech
B. lock
C. action
D. barrel
29. A shotgun is pointed and a rifle is aimed.
T F

Exam B, Page 4

30. The same safety rules used in hunting with guns should be used for bow hunting.
- T F
31. To properly sight in a rifle, a group of at least _____ shots should be fired.
- A. six
B. five
C. two
D. three
32. The maximum range of a shotgun is:
- A. 50 yards
B. 150 yards
C. 175 yards
D. greater than 150 yards
33. A condition called hypothermia occurs when a:
- A. person becomes lost
B. person is deprived of nourishment
C. person becomes dehydrated
D. person's inner body temperature is reduced
34. Split or fractured wooden arrows may be used in a light weight bow.
- T F
35. A muzzle loader can be fired with only a primer load in the flashpan or percussion cap when:
- A. it's a close shot and the game is standing still
B. oil in the nipple and breech plug needs burning away
C. the ramrod becomes jammed in the barrel
D. the gun failed to fire the first time
36. The best back stop for shooting is:
- A. the side of an old building
B. a hill free of rocks
C. a large tree
D. a stone wall
37. Older guns, especially muzzle loaders, should be fired using smokeless powder.
- T F

Exam B, Page 5

38. Guns can be transported safely in a boat when:
- A. wrapped in plastic and placed on the bottom of the boat
 - B. fully cased and strapped to the sides of the boat
 - C. carried by the hunter and pointed in a safe direction
 - D. unloaded, action open, and pointed in a safe direction
39. The majority of hunting accidents occur within:
- A. 5 yards
 - B. 20 yards
 - C. 50 yards
 - D. 75 yards
40. For the beginning hunter, the following type of rifle or shotgun is generally considered the safest:
- A. semi-automatic
 - B. pump action
 - C. lever action
 - D. hinge action
41. The best way to store guns is in:
- A. a holster or gun case away from heat
 - B. a hidden gun rack mounted on a wall
 - C. a horizontal position in a closet
 - D. a locked cabinet separated from ammunition
42. Many kinds of North American game animals are in danger of being overharvested by hunters.
- T F
43. There are two basic types of rifle ammunition, centerfire and rimfire.
- T F
44. The best grip to use when shooting a handgun is:
- A. the two-handed grip
 - B. the one-handed grip
 - C. the reinforced forearm grip
 - D. the three-fingered grip
45. The safety on a gun should be released only when you are ready to shoot.
- T F

Exam B, Page 6

46. Devices such as walkie-talkies and CB radios are very useful to good sportsmen.
- T F
47. After each shot with a muzzle loader, a good safety practice is to:
- A. cool down the barrel with water
 - B. disassemble the lock and wipe it clean
 - C. wipe the bore with a damp patch
 - D. oil the flashpan or nipple
48. The key to survival in the outdoors is often:
- A. having extra ammunition
 - B. planning in advance
 - C. having a .357 magnum pistol
 - D. making quick decisions
49. Shooting over the bag limit is stealing wildlife from other sportsmen.
- T F
50. The two basic types of black powder firearms most commonly used today are:
- A. the flintlock and the percussion cap
 - B. the Hawken and the Kentucky rifle
 - C. the Damascus steel shotguns and rifles
 - D. the flashpan and the ramrod

EXAM C

1. The landowner or tenant has the right to check your hunting license.
T F
2. Firearm safety rules prevent accidents.
T F
3. The firing mechanism on a muzzle loading firearm is called a:
A. action
B. pin
C. lock
D. hammer
4. Pistols should be carried concealed while hunting.
T F
5. The three main parts of ammunition are the primer, case, and bullet.
T F
6. Most hunting accidents involve:
A. teenagers
B. city folks
C. elderly hunters
D. deer hunters
7. A truly semi-automatic action firearm continues to fire as long as the trigger is pulled back and the ammunition lasts.
T F
8. The best thing to do if you stumble while hunting is to:
A. hold on to the gun and control the muzzle
B. throw the gun out of the way
C. use the gun stock to catch your fall
D. point the gun toward the sky and pull the trigger
9. Due to better visibility, safer and more accurate shots can be obtained across flat, open water.
T F

Exam C, Page 2

10. Alcohol, merthiolate, or other antiseptics should be used to clean wounds.

T F

11. When leaving the woods after hunting, a good hunter should:

- A. unload his gun and leave the action open
- B. mark some trees with an axe in order to find the same spot
- C. empty his gun by firing into a nearby tree
- D. carve his initials and the date into a tree for historical purposes

12. In Virginia, crossbows may be used for hunting deer during the last day of the season.

T F

13. Handguns, being much smaller, are safer than shotguns or rifles.

T F

14. Dull hunting arrows may be used with a heavy weight bow.

T F

15. The trigger pull on a rifle or handgun should be slow and easy so that each shot is a surprise.

T F

16. The three recommended methods for aiming a bow are the:

- A. fast draw, horizontal hold, and jump shot
- B. instinctive, point of aim, and bow sight
- C. sighting in, zeroing, and peep sight
- D. open sight, slow release, and push-pull

17. The arc-like path of a bullet is called the pressure curve.

T F

18. The "choke" helps control the pattern of a shotgun.

T F

19. The pattern of a shotgun is:

- A. its overall shape
- B. the checkering on the stock
- C. the shot concentrations and gaps
- D. the mold from which the gun was made

Exam C, Page 3

20. You may assume that a gun just removed from a locked gun rack is unloaded.
- T F
21. Releasing the string on a bow without an arrow nocked is a good way to practice indoors.
- T F
22. The nock of an arrow is:
- A. that portion which fits on the bowstring
 - B. the sound made by an arrow in flight
 - C. the distance from the point to the fletching
 - D. the feather opposite the cock feather
23. Target arrows should weigh the same as your hunting arrows.
- T F
24. The action of a gun should be kept open when not being used for hunting.
- T F
25. When preparing for the first hunt of the season, take your gun out of storage and:
- A. walk outside to fire a few practice rounds
 - B. chamber a few shells to see if the action is working
 - C. wipe off the stock and outer metal parts
 - D. control the muzzle, open the action, and clean the gun thoroughly
26. Your gun should be loaded when:
- A. returning to the automobile or house
 - B. walking around barns and houses
 - C. hunting in the field
 - D. crossing old fences
27. In America, the wildlife belongs to the landowner.
- T F
28. The best way to cool a deer carcass is by transporting it home on the hood of a car.
- T F

Exam C, Page 4

29. Elimination of habitat is the most serious threat to Virginia's wildlife.
- T F
30. One of the main concerns of an ethical hunter is:
- A. killing the limit of game
 - B. carrying a good supply of ammunition
 - C. developing good marksmanship
 - D. learning to reload ammunition
31. Leaving an airspace between the ball and powder when loading a muzzleloader provides a margin of safety.
- T F
32. A muzzle loader can be fired with only a primer load in the flashpan or percussion cap when:
- A. it's a close shot and the game is standing still
 - B. oil in the nipple and breech plug needs burning away
 - C. the ramrod becomes jammed in the barrel
 - D. the gun failed to fire the first time
33. When hunting three abreast:
- A. hunters should shoot in established zones of fire
 - B. the first hunter to see the game should shoot
 - C. hunters should take turns in shooting at game
 - D. hunters should shoot at the same time if possible
34. Caliber is determined by measuring the interior diameter of a rifle or pistol barrel.
- T F
35. A deer is wounded by a hunter. The hunter should:
- A. shoot more rounds at the spot where the deer was last seen
 - B. reload quickly and try to chase the deer until he gets another shot
 - C. remember the spot where the deer was shot, sit and wait for 20 minutes, and then try to track the animal
 - D. move to another hunting spot and try to shoot another deer
36. The recommended way to determine if a muzzleloader is loaded is to:
- A. pull the trigger
 - B. check the bore with a marked ramrod
 - C. disassemble the lock and barrel
 - D. blow gently into the barrel

EXAM C, Page 5

37. Lands and grooves are:
- A. the raised and lowered surfaces inside a rifle barrel
 - B. two types of open sights found on rifles
 - C. found on checkered shotgun and rifle stocks
 - D. small hills and valleys indicated on a topographical map
38. Both a 20 gauge and a 12 gauge shell can be inserted into the same barrel of a 12 gauge shotgun.
- T F
39. The choke on a shotgun determines the spread of the shot pattern.
- T F
40. Black powder of size FFFFg should be used in muzzle loading rifles of .45 caliber or greater.
- T F
41. When "mounting the shotgun," the gun should be brought up to the cheek first and then back to the shoulder in one continuous motion.
- T F
42. When placing a firearm in a vehicle, it should be:
- A. unloaded, action open, and in a case if possible
 - B. pointed down at the floorboard and keep the safety on
 - C. handled by the stock end and pointed at the roof
 - D. handled with both hands and placed in a rack
43. Physical conditioning (exercise) helps create safer hunters.
- T F
44. Mushrooms can be a good source of food when you are lost in the woods.
- T F
45. One of the best management practices for wildlife is:
- A. habitat manipulation
 - B. stocking game
 - C. killing predators
 - D. posting land

Exam C, Page 6

46. Which of the following gauges of shotgun is the largest?
- A. 28 gauge
 - B. 12 gauge
 - C. 20 gauge
 - C. 16 gauge
47. Shooting from a vehicle is recommended only after coming to a complete stop.
- T F
48. Which of the following devices are recommended as aids in target identification while hunting?
- A. mounted rifle or shotgun scopes
 - B. hand-held radar guns
 - C. contact lens or prescription glasses
 - D. spotting scopes or binoculars
49. When shooting a shotgun, the eyes should focus on the front bead of the gun.
- T F
50. Buckshot, when combined with the correct caliber of rifle, is an excellent type of ammunition for deer hunting.
- T F

EXAM D

1. A shotgun is dangerous at distances greater than 150 yards.
T F
2. When taken in moderate amounts in the field, alcohol helps sharpen a hunter's aim and reflexes.
T F
3. Rubbing the affected area is the best treatment for frostbite.
T F
4. A good safety rule is to always check your gun barrel:
 - A. after the first shot
 - B. after a fall
 - C. after shooting a magnum round
 - D. after using black powder
5. In Virginia, crossbows may be used for hunting deer during the last day of the season.
T F
6. If you have purchased a Virginia hunting license, the license must be carried with you while hunting in Virginia.
T F
7. The bore of a gun should be cleaned through the breech end where possible.
T F
8. Even though a shotgun shell's pellets spread over a large area, follow through is necessary.
9. Game should be field dressed as soon as possible in order to:
 - A. make the carcass easier to carry
 - B. keep from spoiling the meat
 - C. avoid making a mess at home
 - D. provide extra food for other animals in the woods

Exam D, Page 2

10. According to state law, no hunter can shoot within 100 feet of a public road.
T F
11. The rule for field dressing game is, "the warmer the day, the quicker the game must be dressed."
T F
12. In some areas, coyotes, wolves, and mountain lions kill many deer each year, and these predators should be eliminated.
T F
13. The least steady shooting position is:
A. kneeling
B. prone
C. standing
D. sitting
14. The rule for sight adjustment is to move the _____ sight in the direction you want to move the hits on the target.
A. rear
B. front
C. telescopic
D. peep
15. The arc-like path of a bullet is called the:
A. trajectory
B. flight pattern
C. elevation
D. maximum range
16. Gun safety rules should be followed by:
A. hunters
B. deer hunters
C. trained hunters
D. everyone
17. A gun kept in the home should be:
A. locked up
B. unloaded
C. kept behind a door
D. hidden in a closet

Exam D, Page 3

18. The weight of a bow refers to the:
- A. actual weight of the bow in pounds
 - B. weight of an arrow the bow can propel
 - C. amount of energy required to draw back the bow
 - D. size of a person required to draw back the bow
19. The new color coding of shotgun ammunition allows the hunter to carry different gauges of shotgun shells safely in the same pocket or pouch.
- T F
20. Over half of the firearm fatalities in the United States occur:
- A. at firing ranges
 - B. while hunting
 - C. in the home
 - D. while traveling to the hunting site
21. When certain that your arrow wounded a deer, the first thing to do is:
- A. wait 20 to 30 minutes before following the deer
 - B. Mock another arrow and chase down the deer
 - C. move to another area and hunt other deer
 - D. run for the nearest stream since wounded deer seek out water
22. A gun can be safely carried with one hand.
- T F
23. The main reason for teaching the hunter education course in Virginia is to:
- A. prevent accidents
 - B. sell more hunting licenses
 - C. sell more guns and ammunition
 - D. get more kids involved in hunting
24. Firing a gun while holding the barrel under water is a good way to:
- A. test the strength of the barrel
 - B. cause the gun to blow up
 - C. shock and stun fish
 - D. clean the burned powder out of the barrel
25. Muzzle loading rifles can be generally classified as:
- A. flintlocks and percussion cap
 - B. centerfire and rimfire
 - C. lever action and bolt action
 - D. Hawken and Kentucky

Exam D, Page 4

26. When you are certain the safety is working, a gun can be carried with one finger on the trigger.
- T F
27. Muzzle control refers to:
- A. how well a person can point or aim a gun
 - B. keeping the muzzle end of a gun pointed in a safe direction
 - C. the amount of powder placed in a muzzle loading rifle
 - D. a device placed over the mouths of hunting dogs to prevent biting
28. Bow hunting equipment should be carried tightly when climbing into or out of a tree stand.
- T F
29. In those areas in Virginia where rifles are legal, handguns with 350 foot-pounds of muzzle energy may be used to hunt non-migratory game birds and game animals.
- T F
30. It would take 410 balls of lead the same size as the diameter of a .410 shotgun barrel to weigh one pound.
- T F
31. The first thing to do when you pick up a gun is:
- A. point the gun at a window and snap the trigger
 - B. ask someone if the gun is loaded
 - C. wipe off any rust or dirt
 - D. point the gun away from anyone present and open the action
32. Pounding the ramrod to push the ball down a muzzle loader will flatten the ball and cause:
- A. the ball to spin faster
 - B. a bad shot
 - C. the gun to explode
 - D. the powder to burn slower
33. Gauge of a shotgun refers to:
- A. the weight of the gun
 - B. the thickness of the barrel
 - C. the inside diameter of the barrel
 - D. the size of shot used

Exam D, Page 5

34. The "zone of fire" is the region from the gun's muzzle to the target.
T F
35. When loading a muzzle loader, the ball should be started down the barrel using the:
A. short starter
B. long starter
C. ramrod
D. patch knife
36. To avoid being mistaken as a game animal, hunters should wear some blaze orange colored outer garment.
T F
37. All types of hunters should wear blaze orange while hunting because all game animals in Virginia are color blind.
T F
38. The term "muzzle loader" refers to:
A. shotguns and pistols
B. rifles, shotguns, and pistols
C. Hawken rifles
D. smokeless powder shotguns
39. Immediately after bagging a deer, bear, or turkey, a hunter must attach the appropriate kill-tag and take the animal to an official game checking station.
T F
40. Good marksmanship is important primarily to beginning hunters.
T F
41. The three main parts of any firearm are:
A. magazine, sights, and muzzle
B. butt, receiver, and chamber
C. bolt, barrel, and stock
D. stock, action, and barrel
42. Guns were primarily designed for:
A. hunting
B. self-defense
C. killing
D. target shooting

Exam D, Page 6

43. The muzzle of a gun is the:
- A. end placed against the shoulder when firing
 - B. place where the stock attaches to the barrel
 - C. place where telescopic sights are mounted
 - D. end of the barrel where bullets or shot come out
44. Use a tourniquet only when all other methods to stop bleeding have failed.
- T F
45. While loading, powder for a muzzle loading firearm should be poured:
- A. directly into the barrel from the powder horn
 - B. into a measure and then into the barrel
 - C. into the patch and then pushed down the barrel
 - D. into the barrel using a small funnel
46. The type of action determines if a firearm is a rifle or a shotgun.
- T F
47. Open sights are the simplest and least expensive.
- T F
48. The correct trigger pull technique for shotguns is best described as a slap, similar to striking a manual typewriter key.
- T F
49. Wooden arrows are recommended for shooting with a compound bow.
- T F
50. Fully automatic firearms, such as machine guns, can be used for hunting in Virginia.
- T F

Appendix III. New student examination utilized in the pre-
post testing phase of the comprehensive
evaluation of Virginia's Hunter Education Program.

STUDENT FIREARM SAFETY EXAMINATION

1. When going hunting, your gun should be loaded:
 1. in the field at the hunting site
 2. at home before leaving to hunt
 3. in the car if you are driving on country roads
 4. in the parking lot at the hunting site
2. The rule for camping while hunting is, "leave an area as you found it or better."
 1. True
 2. False
3. A good safety rule is, "Be sure of your target and beyond."
 1. True
 2. False
4. Which of the following methods of deer hunting is the safest?
 1. surround a small area with hunters and send one hunter in to chase out the deer
 2. plan the hunt so that every hunter knows the position of all other hunters
 3. surround an area and fire a few shots into the brush to scare the deer out
 4. start a big fire in the woods upwind of the hunting area to smoke out the deer
5. Zeroing a rifle is the process of adjusting the sights for accuracy.
 1. True
 2. False
6. Gun safety rules should be followed by:
 1. hunters
 2. deer hunters
 3. trained hunters
 4. everyone
7. If you have purchased a Virginia hunting license, the license must be carried with you while hunting in Virginia.
 1. True
 2. False

PAGE 2

8. It is legal to hunt in Virginia with a shotgun that holds five shells.
 1. True
 2. False
9. Leaving an airspace between the ball and powder when loading a muzzleloader provides a margin of safety.
 1. True
 2. False
10. The same safety rules used in hunting with guns should be used for bow hunting.
 1. True
 2. False
11. Game should be field dressed as soon as possible in order to:
 1. make the carcass easier to carry
 2. keep from spoiling the meat
 3. avoid making a mess at home
 4. provide extra food for other animals in the woods
12. The recommended way to determine if a muzzleloader is loaded is to:
 1. pull the trigger
 2. check the bore with a marked ramrod
 3. disassemble the lock and barrel
 4. blow gently into the barrel
13. The best way to store guns is in:
 1. a holster or gun case away from heat
 2. a hidden gun rack mounted on a wall
 3. a horizontal position in a closet
 4. a locked cabinet separated from ammunition
14. In Virginia, the wildlife belongs to the landowner.
 1. True
 2. False
15. When carrying a gun in the field, one hand should be on:
 1. the trigger guard
 2. the action
 3. the trigger
 4. the safety

16. Even though a shotgun shell's pellets spread over a large area, follow through is necessary.
 1. True
 2. False
17. While cleaning your gun, keep some ammunition nearby for use in checking the gun's action after cleaning.
 1. True
 2. False
18. The best back stop for shooting is:
 1. the side of an old building
 2. a hill free of rocks
 3. a large tree
 4. a stone wall
19. Use a tourniquet only when other methods to stop bleeding have failed.
 1. True
 2. False
20. Predators are a major danger to wildlife in Virginia, and they should be eliminated.
 1. True
 2. False
21. The bore of a gun should be cleaned through the breech end where possible.
 1. True
 2. False
22. The best thing to do if you stumble and fall is to:
 1. hold on to the gun and control the muzzle
 2. throw the gun out of the way
 3. use the gun stock to catch your fall
 4. point the gun toward the sky and pull the trigger
23. Safety should be the first principle in handling a firearm.
 1. True
 2. False

24. A deer is wounded by a hunter. The hunter should:
1. shoot more rounds at the spot where the deer was last seen
 2. reload quickly and try to chase the deer until he gets another shot
 3. remember the spot where the deer was shot, sit and wait for 20 minutes, and then try to track the animal.
 4. move to another hunting spot and try to shoot another deer
25. A firearm transported in a vehicle should be:
1. pointed out the window
 2. unloaded and cased
 3. hidden behind the seat
 4. stored in the trunk or a gun rack
26. A good marksman can use his favorite gun to hunt any Virginia game species.
1. True
 2. False
27. The "choke" helps control the pattern of a shotgun.
1. True
 2. False
28. Shooting over the bag limit is stealing wildlife from other sportsmen.
1. True
 2. False
29. Due to better visibility, safer and more accurate shots can be obtained across flat, open water.
1. True
 2. False
30. Releasing the string on a bow without an arrow nocked is a good way to practice.
1. True
 2. False
31. One of the main concerns of an ethical hunter is:
1. killing the limit of game
 2. carrying a good supply of ammunition
 3. developing good marksmanship
 4. learning to reload ammunition

32. After completing a hunt on private land, the hunter should:
1. leave by the back way to avoid disturbing the landowner
 2. drive by slowly and wave at the landowner
 3. call the landowner after getting home and thank him
 4. go to the landowner's home, thank him, and offer to share the game killed
33. Shotguns have barrels with a smooth interior and rifles have barrels with lands and grooves.
1. True
 2. False
34. To avoid being mistaken as a game animal, hunters should wear some blaze orange colored outer garment.
1. True
 2. False
35. The most recent design or type of bow is the:
1. compound
 2. recurve
 3. cross
 4. straight
36. The "action" of a gun refers to:
1. the manner in which the gun recoils
 2. the portion of a gun through which the bullet is propelled
 3. the type of metal used in making the barrel
 4. the set of moving parts which chamber and fire the ammunition
37. With the safety on, a gun positively will not fire.
1. True
 2. False
38. Guns can be transported safely in a boat when:
1. wrapped in plastic and placed on the bottom of the boat
 2. fully cased and strapped to the sides of the boat
 3. carried by the hunter and pointed in a safe direction
 4. unloaded, action open, and pointed in a safe direction
39. Rifles are usually named by caliber and shotguns by gauge.
1. True
 2. False

40. Mud or snow in a barrel may cause a gun to blow up when fired.
1. True
 2. False
41. The trigger pull on a rifle or handgun should be steady and constant so that each shot is a surprise.
1. True
 2. False
42. The action of a gun should be kept open when not being used for hunting.
1. True
 2. False
43. The rule for field dressing game is, "the warmer the day, the quicker the game must be dressed."
1. True
 2. False
44. The first thing to do when you pick up a gun is:
1. point the gun at a window and snap the trigger
 2. ask someone if the gun is loaded
 3. wipe off any rust or dirt
 4. point the gun away from anyone present and open the action
45. Mushrooms can be a good source of food when you are lost in the woods.
1. True
 2. False
46. Handguns, being much smaller, are safer than shotguns or rifles.
1. True
 2. False
47. The best grip to use when shooting a handgun is:
1. the two-handed grip
 2. the one-handed grip
 3. the reinforced forearm grip
 4. the three-fingered grip

48. The major cause of firearm accidents is:
1. a defective safety
 2. carelessness
 3. high powered shells
 4. poor marksmanship
49. Many hunters are mistaken for game. What does this indicate?
1. that safety training is of little value
 2. hunters should be sure of their target
 3. many hunters have poor eyesight
 4. good marksmanship is unimportant
50. If you see a game law violation, you should:
1. report that violation to the local game warden
 2. ignore the violation and try to forget it happened
 3. tell the violator that he should obey the game laws
 4. tell the landowner to keep other hunters off his land

HUNTER SAFETY TEACHER EVALUATION

Instructions: We are interested in getting your opinion about your Hunter Safety teacher. Please answer questions 51 through 56 on your test answer sheet.

NOTE: You will NOT be GRADED on your answers to these questions. If the Hunter Safety teacher did not present the course in person (that is, only pre-recorded films were used), do not answer questions 51 through 56. If more than one instructor was present, rate the team of instructors as you would a single instructor using the questions below.

51. The teacher's apparent knowledge of hunter safety was:
1. Excellent
 2. Good
 3. Fair
 4. Poor
52. The teacher's success in explaining hunter safety principles and rules was:
1. Excellent
 2. Good
 3. Fair
 4. Poor

53. The extent to which the teacher made the Hunter Safety course interesting was:
1. Excellent
 2. Good
 3. Fair
 4. Poor
54. The teacher's apparent concern and respect for students as individuals was:
1. Excellent
 2. Good
 3. Fair
 4. Poor
55. The teacher's enthusiasm in teaching the Hunter Safety course was:
1. Excellent
 2. Good
 3. Fair
 4. Poor
56. Your overall rating for this teacher is:
1. Excellent
 2. Good
 3. Fair
 4. Poor

Appendix IV. Dove hunter depreciative behavior data card
used by observers at Elm Hill and Amelia
Wildlife Management Areas.

Observer Name

Subject No.

Start Time

No. of shots fired

End Time

BEHAVIOR

FREQUENCY

- A. Ethics -- Landowner
1. Drive, vehicle, env. damage _____
 2. Defacing property _____
 3. Littering _____
 4. Leaving spent shells _____
- B. Ethics -- Wildlife
1. Sky blasting - shoot beyond range _____
 2. Shoot sitting doves _____
 3. Shoot to flush doves from trees or wires _____
 4. Leave dead or wounded doves _____
- C. Ethics -- Other Hunters
1. Wear bright - inappropriate clothes _____
 2. Encroach on another's stand _____
 3. Steal another's stand _____
 4. Move around - disturb _____
 5. Shoot too soon - greed _____
 6. Shoot falling doves _____
 7. Steal downed birds _____
- D. Game Law Violations
1. Kill over 12-bird limit _____
 2. Shoot songbirds or out-of-season game _____
 3. Gun holds more than 3 shells _____
- E. Safety
1. Loaded gun in car _____
 2. Action closed - gun in or near car _____
 3. Remove gun from car by muzzle _____
 4. Place gun on car or unsafe surface _____
 5. Load gun near car _____
 6. Transfer gun wrong _____
 7. Wrong carry position _____
 8. Horseplay _____
 9. Muzzle on foot or hand _____
 10. Trigger guard control _____
 11. Jump ditch - gun loaded _____
 12. Running - gun loaded _____

E. Safety

- 13. Stumble - gun loaded _____
- 14. Talk - others - no unload _____
- 15. Mock firing _____
- 16. Shoot low-flying doves _____
- 17. Shoot outside zone of fire _____
- 18. Point gun at self or others _____
- 19. Drinking _____
- 20. Other _____

Identifying Characteristics _____

Appendix V. Dove hunter interview data card used by the six interviewers at Elm Hill and Amelia Wildlife Management Areas.

Dove Hunting Interview Form

NAME _____

ADDRESS _____
Street or Route No.

_____ City and State

_____ Zip Code

PHONE NUMBER (Home) _____ (Work) _____

IDENTIFICATION CODE _____

SPECIALIZATION CODE _____

Appendix VI. Dove count dummy data card used by observers at Elm Hill Wildlife Management Areas in case of discovery.

DOVE COUNT - ELM HILL

	<u>Time</u>	<u>Number of Doves Seen</u>
<u>Day 1</u>	1200-1300	_____
	1300-1400	_____
	1400-1500	_____
	1500-1600	_____
	1600-1700	_____
	1700-1800	_____
	1800-1900	_____
	1900-2000	_____
<u>Day 2</u>	1200-1300	_____
	1300-1400	_____
	1400-1500	_____
	1500-1600	_____
	1600-1700	_____
	1700-1800	_____
	1800-1900	_____
	1900-2000	_____

Appendix VII. Cover letter, questionnaire, and follow-up letter mailed to observed dove hunters at Elm Hill and Amelia Wildlife Management Areas.



COLLEGE OF AGRICULTURE AND LIFE SCIENCES

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Blacksburg, Virginia 24061 USA

SCHOOL OF FORESTRY AND WILDLIFE RESOURCES

Dear

During the 1981 dove hunting season, we contacted you while hunting on the Elm Hill Wildlife Management Area near Kerr Reservoir and asked you to participate in a study of Virginia dove hunters. As you know, dove hunting is a popular sport in Virginia. However, relatively little is known about the people who hunt doves, what kind of hunting they want, and whether or not they are satisfied with the dove hunting available in Virginia.

To better understand and manage dove hunting in Virginia, public resource agencies need information from you, the dove hunter. We would greatly appreciate your help in taking the half-hour or so necessary to carefully complete the enclosed questionnaire. The questions deal with your own involvement with dove hunting and hunting in general. In addition, some questions provide us with information about the hunting knowledge of Virginia dove hunters. Your answers to the questions will be held in the strictest confidence.

We want information about a representative group of Virginia dove hunters and so we have scientifically chosen a sample of hunters. But, the sample will be good only if all the hunters we have contacted respond. The questionnaire has an identification number for mailing purposes only. Your response will be held in the strictest confidence. All results will be analyzed in such a way that your answers on any single question cannot be identified with you.

This is a good opportunity for you to help improve dove hunting in Virginia. Please send the completed questionnaire back to us in the self-addressed, postage-paid envelope as soon as possible. If you would like a copy of the results, print your name and address on the back of the return envelope.

Your help in this study is greatly appreciated.

Sincerely,

Ed L. Hampton
Research Assistant
Division of Fisheries, Forestry and Wildlife

ct

Enclosures



COLLEGE OF AGRICULTURE AND LIFE SCIENCES

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Blacksburg, Virginia 24061 USA

SCHOOL OF FORESTRY AND WILDLIFE RESOURCES

During the 1982 dove hunting season, we contacted you while hunting on the Amelia Wildlife Management Area and asked you to participate in a study of Virginia dove hunters. As you know, dove hunting is a popular sport in Virginia. However, relatively little is known about the people who hunt doves, what kind of hunting they want, and whether or not they are satisfied with the dove hunting available in Virginia.

To better understand and manage dove hunting in Virginia, public resource agencies need information from you, the dove hunter. We would greatly appreciate your help in taking the half-hour or so necessary to carefully complete the enclosed questionnaire. The questions deal with your own involvement with dove hunting and hunting in general. In addition, some questions provide us with information about the hunting knowledge of Virginia dove hunters. Your answers to the questions will be held in the strictest confidence.

We want information about a representative group of Virginia dove hunters and so we have scientifically chosen a sample of hunters. But, the sample will be good only if all the hunters we have contacted respond. Your response will be held in the strictest confidence. All results will be analyzed in such a way that your answers on any single question cannot be identified with you.

This is a good opportunity for you to help improve dove hunting in Virginia. Please send the completed questionnaire back to us in the self-addressed, postage-paid envelope as soon as possible. If you would like a copy of the results, print your name and address on the back of the return envelope.

Your help in this study is greatly appreciated.

Sincerely,

Ed L. Hampton
Research Assistant
School of Forestry and Wildlife

ct

Enclosures



COLLEGE OF AGRICULTURE AND LIFE SCIENCES

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Blacksburg, Virginia USA

SCHOOL OF FORESTRY AND WILDLIFE RESOURCES

You should recently have received a questionnaire sent to a sample of Virginia dove hunters. You were scientifically selected for this study, and your participation is essential if the results are to be useful in better managing dove hunting in Virginia.

As a dove hunter, you may be affected by management decisions made on the basis of this study. Wildlife managers need to know more about the feelings and knowledge level of hunters in order to better understand the dove hunter's needs and expectations. This study is a good opportunity for you to express some of your views and provide vital information about dove hunting in the state.

As of today, we have not received your completed questionnaire. We hope that it is in the mail or that you will take the time to complete the questionnaire and return it. If you would like to see the results of this study, please print your name and address on the back of the return envelope.

Sincerely,

Ed L. Hampton
Research Assistant
School of Forestry and Wildlife

ct

A SURVEY OF
VIRGINIA
DOVE HUNTERS



 HUNTING AT AMELIA WILDLIFE MANAGEMENT AREA

1. How many years have you hunted doves at Amelia Wildlife Management Area? _____
2. How would you rate your level of satisfaction with dove hunting at Amelia?
 - Not at all satisfied
 - Somewhat satisfied
 - Reasonably satisfied
 - Very satisfied
 - Extremely satisfied
3. Will you return to Amelia to hunt doves again? NO YES
 Why? _____

 YOUR HUNTING EXPERIENCE

4. How many years have you hunted? _____
5. How many years have you hunted doves? _____
6. At about what age did you first go hunting? _____
7. At about what age did you first go dove hunting? _____
8. Who first introduced you to the sport of hunting?
 - Parent Friend No One
 - Spouse Other Relatives
9. Have you ever taken a course in Hunter Safety/Education? NO YES
 If yes, in what year did you complete the course? _____
 Did you receive a certificate for successful completion of the course?
 NO YES
 Did you take the course in Virginia? NO YES

 YOUR LEVEL OF HUNTING SKILL

10. On the average, how many shots does it take you to bag one dove?

- 1 to 2 shots per dove
 3 to 4 shots per dove
 5 to 6 shots per dove
 7 to 8 shots per dove
 9 to 10 shots per dove
 More than 10 shots per dove

11. On the average, how far away can you successfully shoot and bag a flying dove?

- 20 yards 70 yards
 30 yards 80 yards
 40 yards 90 yards
 50 yards 100 yards or greater
 60 yards

12. On the average, how many doves do you usually bag each hunting trip?

- 1 to 3 doves per trip
 4 to 6 doves per trip
 7 to 9 doves per trip
 10 to 12 doves per trip

13. What brand, action type, and gauge of shotgun (only one) do you normally use when shooting doves? (Please check the appropriate boxes below).

Brand

- | | | |
|--|---|------------------------------|
| <input type="checkbox"/> Browning | <input type="checkbox"/> Single-shot | <input type="checkbox"/> 410 |
| <input type="checkbox"/> Remington | <input type="checkbox"/> Bolt | <input type="checkbox"/> 28 |
| <input type="checkbox"/> Fox | <input type="checkbox"/> Lever | <input type="checkbox"/> 20 |
| <input type="checkbox"/> Winchester | <input type="checkbox"/> Side-by-side | <input type="checkbox"/> 16 |
| <input type="checkbox"/> Savage | <input type="checkbox"/> Over-and-under | <input type="checkbox"/> 12 |
| <input type="checkbox"/> Stevens | <input type="checkbox"/> Pump | <input type="checkbox"/> 10 |
| <input type="checkbox"/> Ithaca | <input type="checkbox"/> Semi-Automatic | |
| <input type="checkbox"/> Other (please list _____) | | |

14. What type of ammunition do you normally use when shooting doves? (Please check the appropriate boxes).

- | <u>Shot Size</u> | <u>Power</u> |
|------------------------------------|--|
| <input type="checkbox"/> No. 4 | <input type="checkbox"/> Field Grade (low brass) |
| <input type="checkbox"/> No. 5 | <input type="checkbox"/> High Brass |
| <input type="checkbox"/> No. 6 | <input type="checkbox"/> Magnum |
| <input type="checkbox"/> No. 7 1/2 | |
| <input type="checkbox"/> No. 8 | |
| <input type="checkbox"/> No. 9 | |

 YOUR TIME COMMITMENT TO HUNTING

15. How many days (or portions of days) each year do you usually spend in the field: A. Hunting _____ B. Dove Hunting _____
16. How long does a typical day of hunting usually last for you? _____ Hours (actual hunting in the field).
17. How long does a typical day of dove hunting usually last for you? _____ Hours (actual hunting in the field).
18. When do you usually go hunting?
 On workdays
 On weekends or other off days
 During vacation
19. When do you usually go dove hunting?
 On workdays
 On weekends or other off days
 During vacation
20. Considering all the hunting you did during last season (1981) about how many days (or portions of days) did you spend hunting each of the following game animals?
- | | | |
|-------------------------------------|---|--|
| <input type="checkbox"/> Bear | <input type="checkbox"/> Rabbit | <input type="checkbox"/> Turkey(Spring'81) |
| <input type="checkbox"/> Bobcat | <input type="checkbox"/> Squirrel | <input type="checkbox"/> Turkey(Fall'81) |
| <input type="checkbox"/> Deer (gun) | <input type="checkbox"/> Woodchuck | <input type="checkbox"/> Dove(early season) |
| <input type="checkbox"/> Deer (bow) | <input type="checkbox"/> Crow | <input type="checkbox"/> Dove(late season) |
| <input type="checkbox"/> Fox | <input type="checkbox"/> Pheasant (ring-necked) | <input type="checkbox"/> Duck and Coot |
| <input type="checkbox"/> Opossum | <input type="checkbox"/> Quail | <input type="checkbox"/> Goose |
| <input type="checkbox"/> Raccoon | <input type="checkbox"/> Ruffed Grouse | <input type="checkbox"/> Marsh hen(clapper rail) |
| | | <input type="checkbox"/> Jack snipe |
| | | <input type="checkbox"/> Woodcock |

 YOUR INVESTMENT IN HUNTING EQUIPMENT

21. How many firearms do you currently own? (include shotguns, rifles, pistols, muzzleloaders and bows) _____
22. Do you own and operate a vehicle that is used primarily for hunting and other related activities? NO YES

23. Which of the following items used for hunting (other than guns or bows) do you currently own? (Please check the appropriate boxes).

Clothing

- Complete camouflage suit (hat, pants, and shirt)
 Camouflage shirt only
 Camouflage pants only
 Camouflage hat only
 Raingear
 Hunting boots
 Hunting coat
 Hunting vest
 Insulated underwear

Hunting Gear

- | | |
|--|---|
| <input type="checkbox"/> Folding stool | <input type="checkbox"/> Boat(s) |
| <input type="checkbox"/> Hunting knife | <input type="checkbox"/> Camouflage netting |
| <input type="checkbox"/> Decoys | <input type="checkbox"/> Cooler |
| <input type="checkbox"/> Game calls | |

Shooting Gear

- | | |
|---|---|
| <input type="checkbox"/> Reloader | <input type="checkbox"/> Gun rack |
| <input type="checkbox"/> Hand trap | <input type="checkbox"/> Spotting scope |
| <input type="checkbox"/> Foot trap | <input type="checkbox"/> Binoculars |
| <input type="checkbox"/> Shooting bench | <input type="checkbox"/> Ear Protectors |
| <input type="checkbox"/> Gun cabinet | |

Dogs

- Retriever
 Bird Dog
 Hound

THE IMPORTANCE OF HUNTING IN YOUR LIFE

24. To how many hunting clubs do you currently belong?

- None
 One
 Two
 Three
 Four or more

25. How many books on hunting, bowhunting, or muzzleloading do you own?

- None
 1 to 4
 5 to 7
 8 to 10
 More than 10

26. Which of the following hunting magazines do you subscribe to or read regularly?
- Field and Stream
 - Outdoor Life
 - Sports Afield
 - The American Hunter (NRA)
 - The American Rifleman (NRA)
 - Virginia Wildlife
 - Other (Please list) _____
 - None
27. Have you ever been a member of a competitive shooting team or club?
- NO YES
28. Do you reload most of your own ammunition? NO YES
29. About how many of your close friends hunt?
- None
 - Some
 - Most
 - Don't know
30. About how many of your co-workers hunt?
- None
 - Some
 - Most
 - Don't know
31. Which of the following groups do you hunt with most often?
- Family
 - Friends
 - Family and friends
 - Co-workers
 - Business associates
 - Hunting club members
 - I usually hunt alone
32. Which member of the hunting group (if you hunt with a group) usually comes up with the idea to go hunting?
- Yourself
 - Another member of the group
 - Both yourself and another member of the group

33. FOLLOWING IS A LIST OF STATEMENTS ABOUT THE IMPORTANCE OF HUNTING TO YOU. PLEASE INDICATE THE EXTENT TO WHICH YOU AGREE OR DISAGREE WITH EACH STATEMENT BY CIRCLING THE APPROPRIATE NUMBER.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Hunting is my major form of outdoor recreation.	1	2	3	4	5
I try to hunt with people who are at about the same skill level as I am.	1	2	3	4	5
I get greater satisfaction out of hunting than I do my work	1	2	3	4	5
I find that a lot of my life is organized around hunting.	1	2	3	4	5
My choice of career was (or will be) based in part on considerations related to my hunting	1	2	3	4	5
One of the major reasons I now live where I do is that it has opportunities for hunting	1	2	3	4	5
Most of my friends are in some way connected with hunting.	1	2	3	4	5

34. BELOW IS A LIST OF REASONS WHY PEOPLE GO HUNTING. PLEASE CIRCLE THE NUMBER THAT INDICATES HOW IMPORTANT EACH ITEM IS TO YOU AS A REASON FOR HUNTING. BE SURE TO GIVE EACH REASON A NUMBER RATING.

Reason:	Not At All Important	Slightly Important	Moderately Important	Very Important	Extremely Important
To be outdoors.	1	2	3	4	5
For relaxation.	1	2	3	4	5
To get away from the regular routine.	1	2	3	4	5
For the challenge or sport.	1	2	3	4	5
To be with my family.	1	2	3	4	5
To obtain wild meat for eating.	1	2	3	4	5
For physical exercise	1	2	3	4	5
To be with my friends	1	2	3	4	5
For the experience of the kill; bagging game.	1	2	3	4	5
To obtain a trophy.	1	2	3	4	5
To use my guns or other hunting equipment	1	2	3	4	5
To enjoy nature	1	2	3	4	5
To develop my hunting skills.	1	2	3	4	5
To develop my shooting skills	1	2	3	4	5
For the sense of accomplishment it brings	1	2	3	4	5

YOUR KNOWLEDGE OF HUNTING

The following questions TEST YOUR hunting knowledge. Some of the questions are difficult, but please try to do your best and answer all the questions. Topics range from gun handling to outdoor skills. PLEASE ANSWER THE QUESTIONS WITHOUT GETTING HELP FROM ANYONE OR LOOKING UP THE ANSWERS IN A BOOK. Your score is confidential and will not be associated with your name. IT IS VERY IMPORTANT THAT YOU COMPLETE THE ENTIRE TEST. PLEASE CIRCLE THE CORRECT ANSWER BELOW EACH QUESTION. MARK ONLY ONE ANSWER FOR EACH QUESTION.

35. If you have purchased a Virginia hunting license, the license must be carried with you while hunting in Virginia.
- A. True
 - B. False
36. Wildlife is one of the few natural resources that can be stockpiled.
- A. True
 - B. False
37. The maximum number of shells that a shotgun can legally hold is:
- A. Five
 - B. Four
 - C. Three
 - D. Two
38. Which of the following is an unethical hunting practice:
- A. Using a shotgun that holds only three shells
 - B. Shooting quail on the ground
 - C. Reporting game law violations
 - D. Cleaning game too soon after it is killed
39. Many kinds of North American game animals are in danger of being overharvested by hunters.
- A. True
 - B. False

40. The best way to cool a deer carcass is by transporting it home on the hood of a car.
- A. True
 - B. False
41. Firearms and ammunition in the home should be:
- A. Stored together in a locked cabinet
 - B. Stored separately under lock and key
 - C. Stored in a gun rack
 - D. Stored out of sight of children
42. The "zone of fire" refers to the distance firearms will shoot.
- A. True
 - B. False
43. The action of a gun should be kept open when not being used for hunting.
- A. True
 - B. False
44. Both a 20 gauge and a 12 gauge shell can be inserted at the same time into the same barrel of a 12 gauge shotgun.
- A. True
 - B. False
45. Which of the following devices are recommended as aids in target identification while hunting?
- A. Mounted rifle or shotgun scopes
 - B. Optical range-finders
 - C. Contact lens or prescription glasses
 - D. Spotting scopes or binoculars
46. A good safety rule is to always check your gun barrel:
- A. After the first shot
 - B. After a fall
 - C. After shooting a magnum round
 - D. After using black powder
47. Which of the following types of chokes on shotguns shoots the widest pattern?
- A. Full
 - B. Partial
 - C. Modified
 - D. Improved cylinder
48. Which of the following gauges of shotguns is the largest?
- A. 28 gauge
 - B. 20 gauge
 - C. 16 gauge
 - D. 12 gauge

49. The arc-like path of a bullet is called the:
- A. Trajectory
 - B. Flight pattern
 - C. Elevation
 - D. Maximum range
50. The least steady shooting position is:
- A. Kneeling
 - B. Prone
 - C. Standing
 - D. Sitting
51. The rule for sight adjustment is to move the _____ sight in the direction you want to move the hits on the target:
- A. Rear
 - B. Front
 - C. Telescopic
 - D. Peep
52. A loaded gun is most dangerous when:
- A. The safety is not working
 - B. The barrel is very short
 - C. Someone is holding the gun
 - D. It is stored in a corner or closet
53. The best thing to do if you stumble while hunting is to:
- A. Hold on to the gun and control the muzzle
 - B. Throw the gun out of the way
 - C. Use the gun stock to catch your fall
 - D. Point the gun toward the sky and pull the trigger
54. Muzzle control refers to:
- A. How well a person can point or aim a gun
 - B. Keeping the barrel end of a gun pointed in a safe direction
 - C. The amount of powder placed in a muzzle loading rifle
 - D. A device placed over the mouths of hunting dogs to prevent biting
55. When placing a firearm in a vehicle, it should be:
- A. Unloaded, action open, and in a case if possible
 - B. Pointed down at the floorboard and keep the safety on
 - C. Handled by the stock end and pointed at the roof
 - D. Handled with both hands and placed in a rack
56. While loading, powder for a muzzle loading firearm should be poured:
- A. Directly into the barrel from the powder horn
 - B. Into a measure and then into the barrel
 - C. Into the patch and then pushed down the barrel
 - D. Into the barrel using a small funnel

57. The weight of a bow refers to the:
- Actual weight of the bow in pounds
 - Weight of an arrow the bow can propel
 - Amount of energy required to draw back the bow
 - Size of a person required to draw back the bow
58. When lost in the woods, the best thing to do is:
- Remain in one spot and start a fire
 - Keep moving in the same direction
 - Walk in a big circle and yell for help
 - Try to trace your footsteps back to a familiar spot
59. Mushrooms can be a good source of food when you are lost in the woods.
- True
 - False

Finally, in order to make comparisons among the many kinds of Virginia hunters, we would like some general information about you. ALL INFORMATION is CONFIDENTIAL and WILL NOT BE IDENTIFIED WITH YOUR NAME.

60. Your age:
- 12 to 19 years old
- 20 to 29 years old
- 30 to 39 years old
- 40 to 49 years old
- 50 to 59 years old
- 60 years or older
61. What is the highest level of education you have attained so far? (Please circle the appropriate number).
- | <u>Elementary School</u> | <u>High School</u> | <u>College</u> |
|--------------------------|--------------------|------------------------|
| 8 (or less) | 9 10 11 12 | 13 14 15 16 17 or more |
62. Which of the following best describes the area in which you lived as a youth?
- Rural
- Village or town under 20,000 people
- City of 20,000 to 99,999 people
- Urban Area of 100,000 to 250,000 people
- Metropolitan area of over 250,000 people
63. Which of the following best describes the area in which you now live?
- Rural
- Village or town under 20,000 people
- City of 20,000 to 99,999 people
- Urban area of 100,000 to 250,000 people
- Metropolitan area of over 250,000 people

This completes all the questions. Thank you! Your contribution to the study is greatly appreciated. If you would like a summary of the results, print your name and address on the back of the return envelope (NOT ON THIS QUESTIONNAIRE). We will be happy to send you a copy of the results.

Department of Fisheries and Wildlife
Virginia Polytechnic Institute and
State University
Blacksburg, Virginia 24061



Appendix VIII. Development of the 33 variables used in the multiple correlational analysis of the Elm Hill and Amelia Wildlife Management Areas' dove hunter observational and questionnaire data.

The dozens of variables contained in the questionnaire (Appendix VII), the dove hunter observer card (Appendix IV) and the interviewer data card (Appendix V) had to be reduced in a logical manner in order to maintain a reasonable, though not ideal, ratio of variables to sample size. Ideally, the ratio should be at least 10 observations per variable (Nunnally 1978). However, with the present study, the constraints did not permit the maintenance of the ideal ratio. The author feels that the statistical analysis was still valid and fulfilled the requirements of the study.

The following two tables indicate the name, explanation, and source of the variables used in the multiple correlation analysis. In addition, the variable SPEC, recorded on the interviewer card is explained on a separate page of this appendix.

Table 1. Name, explanation, and source of 26 variables derived from the dove hunter questionnaire (Appendix VII).

Name	Explanation	Source (Question Number)
EXPER	Hunting Experience	4,5,6 (reversed),7
PARENT	Person who introduced subject to hunting	8
FRIEND	Person who introduced subject to hunting	8
OTHEREL	Person who introduced subject to hunting	8
COURSE	Completion of hunter education training	9
SKILL	Self-estimated hunting/shooting skill	10 (reversed),11,12
GUNQUAL	Quality of guns used by the observed dove hunters	13
NBAR	Type of action on guns used by observed dove hunters	13
GAGE	Gauge of shotgun used by observed dove hunters	13
SIZE	Shot size of ammunition used by observed dove hunters	14
POWER	Powder load of ammunition used by observed dove hunters	14
TIME	Time invested in hunting (self-estimated)	15,16,17,20
WHEN	When hunting usually occurs, e.g. weekends	18
INVEST	Monetary investment in guns, gear, clothing	21,22,23
IMPORT	Importance of hunting in lives of observed dove hunters	24,25,26,27,28,33
FRNDHNT	Number of close friends who hunt	29
COWORK	Number of co-workers who hunt	30
HUNTFAM	Group hunted with most often: family	31
HUNTFRN	Group hunted with most often: friends	31
INSTIG	Member of group who usually initiates hunt	32
MOTIVE	Motivations for hunting	34
KNOWL	Knowledge of hunting, hunter safety, ethics, etc.	35-59
AGE	Age of respondent	60
EDUC	Highest level of education attained	61
YOUTH	Type of area residence as a youth	62
PRESRES	Current type of area residence	63

Table 2. Name, explanation, and source of six behavioral variables derived from the dove hunter observer card (Appendix IV).

Name	Explanation	Source (Question Number)
SHOTS	Number of shots fired by the observed dove hunter	Recorded on card
ETHIC	Number of ethical depreciative behaviors exhibited by the observed dove hunter	A 1-4, B 1-4, C 1-7, D 1-3
SAFETY	Number of safety related depreciative behaviors exhibited by the observed dove hunter	F 1-19
TOTAL	Combination of ethical and safety depreciative behaviors exhibited by the observed dove hunter	A 1-4, B 1-4, C 1-7, D 1-3, F 1-20
SHOOTING	Number of depreciative behaviors exhibited by the observed dove hunter that were directly related to discharging a firearm	B 1, 2, 3; C 5, 6; D 2; F 15,16,17
NONSHOO	Number of depreciative behaviors exhibited by the observed dove hunters that were not directly related to discharging a firearm	A 1-4; B 4; C 1-4, 7; D 1,3; F 1-14, 18-20

Explanation of SPEC Variable

The variable, SPEC, referred to hunting specialization level of the observed dove hunters as estimated by the trained interviewer. Values of SPEC ranged from one to five, with five being the highest level of specialization. A hunter who was rated five by an interviewer would most likely have had the following characteristics: (1) a high quality gun such as a Browning semi-automatic shotgun; (2) a complete camouflage outfit; (3) a cooler for storing dead birds; (4) a retriever; (5) camouflage netting; and (6) a vehicle used primarily for hunting. A hunter rated as one on the SPEC variable would most likely have had the following characteristics: (1) a poor quality single-shot shotgun; (2) no camouflage clothing or hunting boots; (3) no hunting knife or stool; and (4) no cooler. This hunter might also be wearing bright inappropriate clothing or be positioned in an open field with no nearby natural cover. Other values of SPEC ranged in between these two extremes.

Appendix IX. Interview questions utilized for various groups of respondents in the naturalistic inquiry phase of the comprehensive evaluation of Virginia's Hunter Education Program.

INTERVIEW QUESTIONS FOR ADMINISTRATORS OF THE
VIRGINIA COMMISSION OF GAME AND INLAND FISHERIES

- A. Opening Statement
- B. Permission to Tape Record
- C. Questions
 - 1. As a senior administrator of the Commission, how long have you been responsible for the Hunter Education Program?
 - 2. In your opinion, what is the primary purpose of the Hunter Education Program?
 - 3. What kind of person does it take to be an effective hunter education instructor?
 - 4. What kind of person does it take to be an effective hunter education lieutenant?
 - 5. What kind of person does it take to be an effective coordinator?
 - 6. What is your opinion of the performance of volunteer instructors versus game wardens?
 - 7. From your perspective, what are the strengths of the Virginia Hunter Education Program?
 - 8. What are the weaknesses of the program?
 - 9. What do you think about the effectiveness of the program?
 - 10. What is your opinion of the relationship between professionals in Law Enforcement and professionals in the Education Division with regards to the program?
 - 11. How well does the Hunter Education Program represent the Commission to the general public?
 - 12. How could the program be improved?
 - 13. How would you react to having mandatory hunter education in Virginia?

D. Summary and Closing Statement

That completes all the questions I have for you. Your answers have been quite interesting and informative. Before we close, is there anything else you would like to say about the Hunter Education Program?

INTERVIEW QUESTIONS FOR THE CHIEF OF EDUCATION

- A. Opening Statement
- B. Permission to Tape Record
- C. Questions
 1. How long have you supervised Hunter Education for the Commission?
 2. What is it like to be Education Chief in terms of the Hunter Education Program?
 3. What kind of person does it take to be the Chief of Education as far as the Hunter Education Program is concerned?
 4. Now I'd like to get your thoughts on some general aspects of the Hunter Education Program. First, in your opinion, what is the primary purpose of the program?
 5. What do you think about the effectiveness of the program?
 6. Some people think the effects of the program might wear off over time. What is your opinion on this?
 7. What are the strengths of the program?
 8. What are the weaknesses of the program?
 9. What do you like most about the program?
 10. What do you dislike most about the program?
 11. What is the most important experience you've had in the program?
 12. Now I'd like to ask you some questions about the management of the program. First, what are your thoughts on the administration and management of the program?
 13. How is your performance evaluated in regard to the Hunter Education Program?
 14. What is your opinion of the reward and incentive system for the Education Chief's position in relation to Hunter Education?
 15. What kinds of conflicts have occurred among the staff and managers of the Program?

17. What is your relationship with other members of the Hunter Education staff?
17. What kinds of misuse of funds have occurred in the program?
18. Now I'd like to ask you some questions about the settings in which Hunter Education is taught. What do you think about having Hunter Education taught in public schools?
19. What kinds of reactions do you get from public school officials from having the program in their schools?
20. Over the past several years there has been an emphasis on using volunteer instructors. What contributions do volunteer instructors currently make to the program?
21. What do you think about the effectiveness of the volunteer instructors?
21. What problems are created by having volunteer instructors teach the hunter education classes?
23. I'd like to ask you one final, general question before moving on to some specific questions. How could the current Hunter Education Program be improved?
24. Now, I want to ask you some questions about specific components of the program. Could you comment on the appropriateness of the student manual?
25. What do you think of the current instructor's manual?
26. What do you think about the new basic exam?
27. What is your opinion of the films shown during the course?
28. What do you think about the slide program?
29. What is your opinion of the training aids such as guns, bows and so forth?
30. What do you think about the use of video in presenting the Hunter Education program?
31. What is your opinion of the current basic course content?
32. How would you react to having mandatory hunter education in Virginia?

D. Summary and Closing Statement

That completes all the questions I have for you. Your answers have been quite interesting and informative. Before we close, is there anything else you would like to say about the Hunter Education Program?

INTERVIEW QUESTIONS FOR THE HUNTER SAFETY OFFICER

- A. Opening Statement
 - B. Permission to Tape Record
 - C. Questions
1. How long have you supervised Hunter Education for the Commission?
 2. What is it like to be a Safety Officer in the Hunter Education Program?
 3. What kind of person does it take to be a Safety Officer as far as the program is concerned?
 4. Now I'd like to get your thoughts on some general aspects of the Hunter Education Program. First, in your opinion, what is the primary purpose of the program?
 5. What do you think about the effectiveness of the program?
 6. Some people think the effects of the program might wear off over time. What is your opinion about this?
 7. What are the strengths of the program?
 8. What are the weaknesses of the program?
 9. What do you like most about the program?
 10. What do you dislike most about the program?
 11. What is the most important experience you've had in the program?
 12. Now I'd like to ask you some questions about the management of the program. First, what are your thoughts on the administration and management of the program?
 13. How is your performance evaluated in regard to the Hunter Education Program?
 14. What is your opinion of the reward and incentive system for the Safety Officer position in relation to Hunter Education?
 15. What kinds of conflicts have occurred among the staff and managers of the program?

16. What is your relationship with the other staff members in the program?
17. What kinds of misuse of funds have occurred in the program?
18. Now I'd like to ask you some questions about the settings in which Hunter Education is taught. What do you think about having Hunter Education taught in public schools?
19. What kinds of reactions do you get from public school officials from having the program in their schools?
20. Over the past several years there has been an emphasis on using volunteer instructors. What contributions do volunteer instructors currently make to the program in your region?
21. What do you think about the effectiveness of the volunteer instructors?
22. What problems are caused by having volunteer instructors teach the hunter education classes?
23. I'd like to ask you one final general question before moving on to some specific questions. How could the current Hunter Education Program be improved?
24. Now, I want to ask you some questions about specific components of the program. Could you comment on the appropriateness of the student manual?
25. What do you think of the current instructor's manual?
26. What do you think about the new basic exam?
27. What is your opinion of the films shown during the course?
28. What do you think of the slide program?
29. What is your opinion of the training aids such as guns, bows, and so forth?
30. What do you think about the use of video in presenting the Hunter Education program?
31. What is your opinion of the current basic course content?
32. How would you react to having mandatory hunter education in Virginia?

D. Summary and Closing Statement

That completes all the questions I have for you. Your answers have been quite interesting and informative. Before we close, is there anything else you would like to say about the Huner Education Program?

INTERVIEW QUESTIONS FOR EDUCATION LIEUTENANTS

- A. Opening Statement
- B. Permission to Tape Record
- C. Questions
 1. How long have you supervised Hunter Education for the Commission?
 2. What is it like to be an Education Lieutenant in the program?
 3. What kind of person does it take to be an Education Lieutenant as far as the Hunter Education Program is concerned?
 4. Now I'd like to get your thoughts on some general aspects of the Hunter Education Program. First, in your opinion, what is the primary purpose of the program?
 5. What do you think about the effectiveness of the program?
 6. Some people think the effects of the program might wear off over time. What is your opinion about this?
 7. What are the strengths of the program?
 8. What are the weaknesses of the program?
 9. What do you like most about the program?
 10. What do you dislike most about the program?
 11. What is the most important experience you've had in the program?
 12. Now I'd like to ask you some questions about the management of the program. First, what are your thoughts on the administration and management of the program?
 13. How is your performance evaluated in regard to the Hunter Education Program?
 14. What is your opinion of the reward and incentive system for Lieutenants in relation to Hunter Education?
 15. What kinds of conflicts have occurred among the staff and managers of the program?

16. What is your relationship with the other Education Lieutenants?
17. What kinds of misuse of funds have occurred in the program?
18. Now I'd like to ask you some questions about the settings in which Hunter Education is taught. What do you think about having Hunter Education taught in public schools?
19. What kinds of reactions do you get from public school officials from having the program in their schools?
20. Over the past several years there has been an emphasis on using volunteer instructors. What contributions do volunteer instructors currently make to the program in your region?
21. What do you think about the effectiveness of the volunteer instructors?
22. What problems are caused by having volunteer instructors teach the hunter education classes?
23. I'd like to ask you one final general question before moving on to some specific questions. How could the current Hunter Education Program be improved?
24. Now, I want to ask you some questions about specific components of the program. Could you comment on the appropriateness of the student manual?
25. What do you think of the current instructor's manual?
26. What do you think about the new basic exam?
27. What is your opinion of the films shown during the course?
28. What do you think of the slide program?
29. What is your opinion of the training aids such as guns, bows and so forth?
30. What do you think about the use of video in presenting the Hunter Education program?
31. What is your opinion of the current basic course content?
32. How would you react to having mandatory hunter education in Virginia?

D. Summary and Closing Statement

That completes all the questions I have for you. Your answers have been quite interesting and informative. Before we close, is there anything else you would like to say about the Hunter Education Program?

INTERVIEW QUESTIONS FOR WARDENS

- A. Opening Statement
- B. Permission to Tape Record
- C. Questions
 1. How long have you been a warden with the Commission?
 2. What is it like to be a warden in the Hunter Education Program?
 3. What kind of person does it take to be a warden as far as the Hunter Education Program is concerned?
 4. Now I'd like to get your thoughts on some general aspects of the Hunter Education Program. First, in your opinion, what is the primary purpose of the program?
 5. What do you think about the effectiveness of the program?
 6. Some people think the effects of the program might wear off over time. What is your opinion about this?
 7. What are the strengths of the program?
 8. What are the weaknesses of the program?
 9. What do you like most about the program?
 10. What do you dislike most about the program?
 11. What is the most important experience you've had in the program?
 12. Now I'd like to ask you some questions about the management of the program. First, what are your thoughts on the administration and management of the program?
 13. How is your performance evaluated in regard to the Hunter Education Program?
 14. What is your opinion of the reward and incentive system for wardens in relation to Hunter Education?
 15. What kinds of conflicts have occurred among the staff and managers of the program?
 16. What is your relationship with your Education Lieutenant?

17. What kinds of misuse of funds have occurred in the program?
18. Now I'd like to ask you some questions about the settings in which Hunter Education is taught. What do you think about having Hunter Education taught in public schools?
19. What kinds of reactions do you get from public school officials from having the program in their schools?
20. Over the past several years there has been an emphasis on using volunteer instructors. What contributions do volunteer instructors currently make to the program?
21. What do you think about the effectiveness of the volunteer instructors?
22. What problems are caused by having volunteer instructors teach the hunter education classes?
23. I'd like to ask you one final general question before moving on to some specific questions. How could the current Hunter Education Program be improved?
24. Now, I want to ask you some questions about specific components of the program. Could you comment on the appropriateness of the student manual?
25. What do you think of the current instructor's manual?
26. What do you think about the new basic exam?
27. What is your opinion of the films shown during the course?
28. What do you think of the slide program?
29. What is your opinion of the training aids such as guns, bows and so forth?
30. What do you think about the use of video in presenting the Hunter Education program?
31. What is your opinion of the current basic course content?
32. How would you react to having mandatory hunter education in Virginia?

D. Summary and Closing Statement

That completes all the questions I have for you. Your

answers have been quite interesting and informative.
Before we close, is there anything else you would like to
say about the Hunter Education Program?

INTERVIEW QUESTIONS FOR VOLUNTEER INSTRUCTORS

- A. Opening Statement
- B. Permission to Tape Record
- C. Questions
 1. How long have you been a volunteer instructor for the Hunter Education Program?
 2. What is it like to be a volunteer instructor in the program?
 3. What kind of person does it take to be a volunteer instructor in the program?
 4. Now I'd like to get your thoughts on some general aspects of the Hunter Education Program. First, in your opinion, what is the primary purpose of the program?
 5. What do you think about the effectiveness of the program?
 6. Some people think the effects of the program might wear off over time. What is your opinion about this?
 7. What are the strengths of the program?
 8. What are the weaknesses of the program?
 9. What do you like most about the program?
 10. What do you dislike most about the program?
 11. What is the most important experience you've had in the program?
 12. Now I'd like to ask you some questions about the management of the program. First, what are your thoughts on the administration and management of the program?
 13. How is your performance evaluated in regard to the Hunter Education Program?
 14. What is your opinion of the reward and incentive system for volunteer instructors in the program?
 15. How could the program be improved?
 16. Now I want to ask you some questions about specific components of the program. Could you comment on the

appropriateness of the student manual?

17. What do you think of the current instructor's manual?
18. What do you think about the new basic exam?
19. What is your opinion of the films shown during the course?
20. What do you think of the slide program?
21. What is your opinion of the training aids such as guns, bows and so forth?
22. What do you think about the use of video in presenting the Hunter Education program?
23. What is your opinion of the current basic course content?
24. How would you react to having mandatory hunter education in Virginia?

D. Summary and Closing Statement

That completes all the questions I have for you. Your answers have been quite interesting and informative. Before we close, is there anything else you would like to say about the Hunter Education Program?

INTERVIEW QUESTIONS FOR HUNTER EDUCATION STUDENTS

- A. Opening Statement
 - B. Permission to Tape Record
 - C. Questions
1. How did you become a student in the Virginia Hunter Education Course?
 2. What did you like most about the course?
 3. What did you dislike most about the course?
 4. What did you learn in the Hunter Education Course?
 5. What do you do now when you hunt that you didn't do before you took the course?
 6. What was the most important experience you had in the course?
 7. How could the Hunter Education Course be improved?
 8. If a friend asked you about the value of taking the Hunter Education Course, what would you tell him?
 9. You've given us your opinions on some general things about the course and they've been quite interesting. Now I'd like to ask you some specific questions about your experiences with the Hunter Education Course. First, when did you take the course?
 10. Where did you take the course?
 11. How old were you when you took the course?
 12. Who was your teacher?
 13. Did you receive a certificate for successful completion of the course?
 14. What did you think about the test you took at the end of the course in order to get a certificate?
 15. What is your opinion of the student manual (your textbook) used in the course?
 16. That completes all the questions I have for you. Your answers have been quite interesting and helpful. Before we close, is there anything else you'd like to say about the Hunter Education Course?

INTERVIEW QUESTIONS FOR PUBLIC SCHOOL OFFICIALS

- A. Opening Statement
- B. Permission to Tape Record
- C. Questions
 1. How long have you worked with the Virginia Hunter Education Program in your school?
 2. What is your reaction to having the Hunter Education Program in your school?
 3. From an educator's viewpoint, what do you think about the educational value of the Hunter Education Program?
 4. In your opinion, what is the primary purpose of the Hunter Education Program?
 5. What effect does the program have on students?
 6. What kinds of reactions do you get from students after having taken the course?
 7. What's the most important experience you've had with the program?
 8. What do you like most about having the program in your school?
 9. What do you dislike most about having the program in your school?
 10. What changes would you like to see made in the program as it is taught in your school?
 11. What conflicts does the Hunter Education Program create in your school?
 12. What kinds of interactions do you have with the Hunter Education teachers and officials?
 13. That completes all the questions I have for you. Your answers have been quite interesting and informative. Before we close, is there anything else you would like to say about the Hunter Education Program?

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