Review of Montana's bowhunter education program with recommendations for improvement

W. Kirk Kuehl
The University of Montana

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Review of Montana’s Bowhunter Education Program
With Recommendations for Improvement

By
W. Kirk Kuehl

B.A. University of Montana, 1997

Presented in partial fulfillment of the requirements
for the degree of

Masters of Arts
in Sociology

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Approved By:

[Signature]
Chairperson

[Signature]
Dean, Graduate School

5-15-01
Date
EXECUTIVE SUMMARY

This paper provides an evaluation of the Montana Bowhunter Education Courses offered by the Montana Fish, Wildlife, and Parks (FWP). Long-term goals of the FWP include teaching hunter ethics and responsibility to hunters. Montana Bowhunter Education Course classes were surveyed to determine the extent to which students gained knowledge concerning hunter ethics, hunter responsibility, and safety.

Student pre and post-test surveys were mailed to 48 Bowhunter Education classes. Of these 48 classes, 33 sets of pre and post-test surveys were returned, a 68 percent response rate. The questionnaire contained true/false questions and scenario questions which when combined, provided a measure of student knowledge concerning bow safety, hunter ethics, and hunter responsibility. These scored questions had a maximum score of 75 points. The data on the 33 classes returned showed an aggregate improvement of test scores in all 33 classes. The improvement of test scores between time one (pre-test) and time two (post-test) is statistically significant. The average improvement for all 33 classes was 5.84 points. Improvement of test scores for the 33 classes ranged from a high of 12.83 points to a low of 2.75 points. There was no control group.

The modal age of students was 12, with a mean age of 29. Females comprised 10 percent of the combined student survey and males comprised almost 90 percent.

Analysis of covariance (ANCOVA) was run on the data to find significant predictors of high test scores and to determine if there were interaction effects between independent variables. The analysis showed that age, education, instructor rating, knowledge gained, and sex significantly predicted test score performance. There were no significant interaction effects between independent variables.

Multiple regression analysis was run on the data to determine the strongest predictors of high test scores. Within the regression model, instructor rating, education, sex, and knowledge proved to be the strongest significant predictors of high test scores. They entered the model in the above order, with instructor rating entering first as the strongest predictor.

Instructor rating was the best predictor of high test scores. Students who rated their instructor as prepared, easy to get along with, one who encouraged them to target shoot, and one who answered questions in a kind and helpful way, had higher test scores.

Two hundred and fifteen of the 410 instructors that were sent instructor surveys returned them, providing a 52 percent response rate. Instructors were predominantly male (205) with only 11 female instructors. A total of 95 percent of instructors approved of new teaching methods beyond traditional lecture methods that Montana Fish, Wildlife, and Parks are attempting to implement. New teaching methods included guest speakers, role-playing, class discussion, demonstrations, field trips, visual aids, and bow handling.
Instructors stated the greatest strength of the Bowhunter Education program was the dedicated, experienced, and knowledgeable volunteer instructors. Instructors also felt that teaching of hunter ethics, hunter responsibility, hunter safety, giving students a good start in bowhunting, and teaching students what is expected of them was extremely important.

The greatest weakness of the program according to instructors was lack of time to teach everything they are expected to teach, lack of quality instructors and/or a system to check up on and follow up on county programs to insure high standards of instruction, lack of shooting instruction and the inability to teach shooting proficiency, and lack of general hands-on instruction in the field.

Test score performance was significantly correlated with several key variables.

- Classes of younger instructors showed greater improvement on test scores.
- Classes in which lead instructors had bow hunted less than 100 times showed greater improvement on test scores as compared with classes in which lead instructors had bowhunted for big game more than 100 times.
- Classes with more instructors showed greater improvement on test scores.
- The favorable attitude of the lead instructor about having three to four instructors for teaching a single class in a community was associated with improvement on test scores.

A number of recommendations are offered which draw upon these research findings.
ABSTRACT

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Review Of Montana's Bowhunter Education Program With Recommendations For Improvement

Director: Dr. James Burfeind

This report is an evaluation of the Montana Bowhunter Education Courses offered by the Montana Fish, Wildlife, and Parks. Long-term goals of the FWP include teaching hunter ethics and responsibility to hunters. Montana Bowhunter Education Course classes were surveyed to determine the extent to which students gained knowledge concerning hunter ethics, hunter responsibility, and safety. Bowhunter Education instructors were surveyed in order to gain knowledge pertaining to teaching techniques, instructor demographics, and instructor opinions regarding various aspects of the program.

Student pre and post-test surveys were mailed to 48 Bowhunter Education classes. Of these 48 classes, 33 sets of pre and post-test surveys were returned (68% response rate). The scored section of the surveys had a maximum score of 75 points. The data on the 33 classes returned showed an aggregate improvement of test scores in all 33 classes. The improvement of test scores between time one (pre-test) and time two (post-test) is statistically significant. The average improvement for all 33 classes was 5.84 points. Improvement of test scores for the 33 classes ranged from a high of 12.83 points to a low of 2.75 points. It can be concluded that the bowhunter education course successfully taught bowhunter ethics and bowhunter responsibility to the students.
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INTRODUCTION

Hunting is a vital tool necessary for controlling big game numbers. The hunting tradition is also important to society because it teaches younger generations to respect game animals and the land. The cultural value of hunting is held dearly by many in our society as a way of teaching children the correct way of living with the land. The Montana Bowhunter Education Program is mandatory for all first-time bowhunters in Montana. It is designed to emphasize hunter ethics and responsibility as well as bow safety. This research evaluates the bowhunter education program offered by the Montana Department of Fish, Wildlife, and Parks, by assessing how bowhunter education instructors implement new teaching methods, how they feel about these new teaching methods, and the level of student acquisition of knowledge. The new teaching methods involve more interactive teaching and the infusion of information on hunter ethics and hunter responsibility.

The main purpose of the evaluation is to see how effectively hunter ethics and hunter responsibility are being taught to students, as well as how well bow safety is being taught. The evaluation of the program measured students' hunting knowledge and attitudes on bowhunting ethics and responsibility before and after they took the bowhunter education course and will provide insight into bowhunter education effectiveness. This evaluation also provides insight toward the changes in teaching methods and the infusion of hunter ethics and
responsibility into the bowhunter education course by measuring instructor attitudes and student knowledge concerning these areas.

The following section provides a review of the literature on attitudes toward hunting and the impact of hunter education on the future of hunting in general and bowhunting in particular. Following the literature review, a detailed description of methods and procedures for this study is provided. Results, summary and conclusions, and recommendations sections follow the methods section.

**LITERATURE REVIEW**

The existing literature on bowhunter education programs is limited since very few studies of state bowhunter education programs have been done. Virtually nothing has been written on "learning" in bowhunter education classes. Studies of opinions of Americans specifically toward archery hunting are almost nonexistent (Beattie and Thomas 1995). There is however, considerable literature on public attitudes towards hunting which demonstrates the need for effective hunter education programs. Literature on hunting in general is provided first, followed by bowhunter specific literature.
HUNTING IN GENERAL


Rohlfing (1978) found that non-hunters were not opposed to hunting but had concerns about the hunter. He noted that the top 20 problems were related to perceptions of hunters, not hunting itself. Five of the top seven problems Rohlfing identified dealt with hunter performance such as wounding and not subsequently recovering big game animals. Rohlfing (1978:410) stated that “…the public believes that if all hunters were well-trained and behaved responsibly, there would be little needless wounding and suffering of animals…the only solution is…to demonstrate to the public that hunters are both well-trained and responsible.”

current trends and effects, will show much lower levels of participation. It is not out of the question that there will be no sport hunting, or a dramatic change in the character of sport hunting in the U.S. by mid century."

Social factors affecting the future of hunting according to Heberlein (1991:529) are numerous:

There is increasing urbanization (Fuguitt, Brown, and Beale 1989) and a continued decline of numbers of people in agriculture (U.S. Bureau of the Census 1990). Women are increasingly influential in public life (Sapiro 1981). The population is aging (Dychtwald and Flower 1989). There are increasing female-headed households (Garfinkel and McClanahan 1986). Nearly one child in five lives in a household below the poverty line (U.S. House of Representatives 1990). These forces all reduce the recruitment potential for hunters. The net effect is that hunter numbers will decline and sport hunting increasingly will be viewed as an antisocial act among the most numerous groups in society. We may wish this away, but it will not go away.

The future of hunting is in question. Decker et al. (1993:24, 37-38) reports:

- The future for hunting looks bleak given prevailing social values coupled with recent and projected trends in American demographics.
- Nearly every published report of hunting trends indicates that the number of participants has declined during the decade of the 1980s and forecasts continued declines into the future.
- Virtually every important variable associated with hunting is working against the population segment of hunting Americans maintaining its current size.
- The future of hunting lies not in the number of participants actively afield in pursuit of wildlife, which will be a dwindling minority, but in the social significance place on hunting.

In discussing anti-hunting tactics, Samuel, Peyton, McAninch, Gladfelter, and Guynn (1991:380) conclude:
Today the anti-bowhunting issue is basically a smaller segment of the anti-hunting issue. Bows apparently are targeted because they are viewed as primitive and lacking the ability to kill in a humane fashion. It is apparent that anti-bowhunting activity will continue and that other planned expansions of bow and firearm seasons will come under heavy scrutiny.

**BOWHUNTING SPECIFIC LITERATURE**

Although surveys of U.S. residents' opinions specifically toward archery hunting are almost nonexistent, the lack of non-hunter acceptance of hunting in general is a major issue affecting bowhunting in the future (Beattie and Thomas 1995). Non-hunters who have no strong feelings for or against the sport are important to the future of bowhunting simply because they vote. In order to continue their sport, bowhunters need voter support.

It is imperative that bowhunters behave ethically and responsibly in order to save bowhunting for future generations. The International Bowhunter Education Manual (1995:68) reports:

During the past few years a number of well-meaning, well-financed, but misguided organizations have mounted an unrelenting attack against sport hunting. Although these groups are a small percentage (the 10% discussed in Unit 1) of the entire population, their goal is to reach the 80% who we know do not hunt but haven't made up their minds about hunting.

Beattie and Thomas (1995) surveyed board members of state and national bowhunting organizations, bowhunter education instructors, graduates of a bowhunter education course, state wildlife agency hunter education coordinators and NBEF (National Bowhunter Education Foundation) state
be hunters, archery product manufacturers. Major issues

Beattie and Thomas (1995) found affecting bowhunting in the future are: 1) anti-hunting efforts, 2) non-hunter perceptions of bowhunting and bowhunters, 3) availability of land on which to bowhunt, 4) bowhunter ethics and law obedience, 5) high-tech bowhunting equipment, and 6) wounding of big game.

Beattie and Thomas suggest the following changes are needed for bowhunting to survive: 1) more non-hunter acceptance of bowhunting and bowhunters, 2) fewer successes by anti-hunters, 3) higher ethical standards among bowhunters, 4) higher bowhunter compliance with bowhunting regulations, 5) education of more bowhunters, 6) unity among bowhunters and firearm hunters (Beattie and Thomas 1995).

Beattie and Thomas (1995:79) found that: “Respondents identified changes that will be needed in the future if bowhunting as we now know it is to survive. The most important change reported by all six groups (surveyed) was the need to increase non-hunter acceptance of bowhunting and to curtail the successes of anti-hunters.” A higher ethical standard among bowhunters was next in order of importance. With anti-hunters actively seeking to stop hunting and hunter numbers dwindling for a variety of reasons, it is vital for bowhunters to behave in an ethical and responsible manner.

With so many social variables working against hunting, the Montana Fish, Wildlife, and Parks is concerned about the future of bowhunting and hunting in general. One of the agency’s long-term goals is to teach hunters to behave in a more ethical and responsible manner. Agency officials believe the cultural value
of hunting as well as the social significance placed on hunting need to be portrayed in a positive light to non-hunters. They hope this will give anti-hunters less ammunition in their fight to stop legal hunting (Dolsen 1998). Bowhunting is in even more danger because some opponents of hunting have targeted this form of hunting as lacking the ability to kill in a humane fashion. A large factor necessary for bowhunting to survive is for bowhunters to exemplify ethical and responsible behavior. Bowhunters also need to know important facts concerning the legitimate need for hunting (International Bowhunter Education Manual 1995:68).

The main purpose of this evaluation is to see how effectively hunter ethics and hunter responsibility are being taught to students, as well as how well bow safety is being taught. Conclusions from this study will help to evaluate if the long-term goal of teaching hunters to behave more ethically and responsibly can be attained through innovative bowhunter education classes.

METHODS AND MEASURES

The Montana Department of Fish, Wildlife and Parks' project officers, Dana Dolsen and Tim Pool hired Kirk Kuehl in the spring of 1998 to conduct this study on their bowhunter education program. Kirk Kuehl was instructed by Dana Dolsen and Tim Pool to revise the three survey instruments created by Blaine
Bradshaw in his study on the Montana Hunter Education Program (Bradshaw 1999).

SURVEY INSTRUMENT

After a thorough literature review, Blaine Bradshaw’s survey questionnaires were revised to apply to bowhunter education. Dr. James Burfeind and Dr. Daniel Doyle from The University of Montana reviewed the survey instrument. Dana Dolsen and Tim Pool also shared their expertise during the revision of the survey instruments and gave their approval to the final version of the three surveys. The three survey instruments included two student surveys: one pre-test student survey (Appendix A) and one post-test student survey (Appendix B), and an instructor survey (Appendix C). The pre-test student survey was given to students before the Bowhunter Education course and the post-test student survey was given to students after they had completed the course.

In addition to demographic questions, the student questionnaires included questions about hunting experience, bow safety, hunter ethics, and hunter responsibility. The student post-test is identical to the student pre-test except the post-test has two additional pages of questions dealing with students’ opinions about their instructors, the course, videos, teaching methods, and what they learned. The first section included questions pertaining to the individual’s age, gender, level of education, hunting experience, reasons for taking the hunter education course. The second section contained true/false questions, most of
which were used to measure student knowledge pertaining to bowhunting responsibility, bowhunting laws, and ethical bowhunting. Section 3 consisted of brief scenario questions in which students were asked to judge the behavior of hunters. These questions dealt with hunter ethics and hunter responsibility. Section 4 included the post-test opinion questions pertaining to the Bowhunter Education course. Opinion questions covered the course instructors, course materials, and opinions about the course itself. Students were asked to respond by choosing either, "strongly disagree," "disagree," "neutral," "agree," or "strongly agree."

Responses from most of the questions in Section 2 and all of the questions in Section 3 were combined to provide a measure of student knowledge concerning bow safety, hunter ethics, and hunter responsibility. The maximum score possible was 75 points.

DATA COLLECTION

The student surveys (pre and post-tests) were mailed to the lead instructors who responded to repeated requests for them to report back with the date and size of their classes. Initially, lead instructors were slow in responding. All 410 instructors were sent three separate reminders during the spring, asking them to respond and inform the team when they would be a lead instructor so they could be sent enough surveys for their students. When there was inadequate response, Tim Pool was asked to help. He e-mailed all regional information officers asking them to fax a schedule of bowhunter education
classes and lead instructors to Kirk Kuehl. Tim Pool also gave his permission to call these lead instructors at work and at home to ask if they would accept student surveys. The lead instructors are all volunteers with outside work and family obligations that keep them busy. By the time the best way to contact them was devised, some classes were already in progress and could not be surveyed. The majority of the completed student surveys come from classes held during May, June, and July 1998.

When lead instructors were contacted, they estimated the size of their upcoming class. They often had fewer students actually attend than they had estimated. In addition, they were sent extra pre and post-test student surveys to cover any additional unanticipated students that might attend. Extra surveys were sent to almost all of the lead instructors in an attempt to obtain as much data as possible. It was known this would lower the total response rate for surveys.

Student pre and post-test surveys were mailed to 48 classes. Of these 48 classes, 33 sets of pre and post-test questionnaires were returned. This is a response rate of 69 percent for the number of classes that were sent survey questionnaires.

While instructors could only estimate the number of students, a total of 1,585 pre and post-test questionnaires were sent to these 48 classes. Actual class size was not provided by the instructors; therefore response rates cannot be calculated. The total number of pre-tests returned was 647 while the total number of post-tests returned was 556.
The instructor survey was mailed to the 410 Montana volunteer bowhunter education instructors in the spring of 1998. Two hundred and fifteen completed surveys were returned by instructors for a response rate of 52 percent. The instructor responses were kept confidential, and were numbered in order to link the instructors with their students.

Before the data analysis began, 6,011 pages of data were entered into SPSS (Statistical Package for Social Science, version 10.0) format. A scanner with the Remark Office 4.0 program was used. This task took quite some time as the Remark Office 4.0 program was set to stop the scanning process when any mistakes (more than one circle blacked out, etc.) were found on the questionnaires. It was then possible to examine each mistake and make the appropriate decision concerning that mistake. The scanning program was also stopped if even questionable marks were found on a questionnaire. Complete sets of scanned questionnaire answers were selected at random intervals and compared to the original questionnaire answers. No mistakes were found in these comparisons. During the data analysis, a few surveys had to be omitted because some students left entire pages blank.

RESEARCH STRATEGY AND MEASURES

Students' level of knowledge pertaining to bow safety, bowhunter ethics, and bowhunter responsibility is best portrayed by the variable “test score.” How well a student understood hunting laws, bow safety, responsible bowhunting behavior, and ethical bowhunting practices was accurately reflected by “test
score.” For this reason, “test score” was chosen as the main dependent variable in this analysis because the FWP wanted to know if hunter ethics and hunter responsibility could be taught to Bowhunter Education students.

The major independent variables were chosen in order to determine what teaching techniques, type of instructor, course materials, or student opinion of knowledge gained contributed to higher test scores. Initially, variables highly correlated to test score were considered. Through factor analysis, analysis of covariance (ANCOVA), and multiple linear regression, the strongest predictors of higher test scores could be determined. Factor analysis made it possible to find variables which were acting in concert and combine them to form new variables. ANCOVA tested for interaction effects between independent variables as they influenced the dependent variable. Multiple linear regression made it possible to hold constant the effects of all the variables in the model while determining their prediction strength.

The independent variable “instructor rating” (factor 1T) measures student’ opinions about their instructor. It is measured by four statement questions whose subjects are: my instructors were prepared for each class (question 69), my instructors encouraged me to target shoot (question 70), my instructors answered my questions in a kind and helpful way (question 71), and I got along with my instructors (question 72). Student responses ranged from “strongly agree” to “strongly disagree.”

“Fair chase” (factor 2T) is an independent variable that measures student’ opinions about course reading materials. Measurement consists of answers to
two statement questions which are: Reading the student manual and *Beyond Fair Chase* (Posewitz 1994) helped me to understand what was taught in class (question 84) and Reading *Beyond Fair Chase* and the student manual helped me understand how to be an ethical and responsible hunter (question 83). Answer options ranged from “strongly agree” to “strongly disagree.” The student manual is the International Bowhunter Education Manual and *Beyond Fair Chase* is a book about hunter ethics and responsibility.

The independent variable “videos” (factor 3T) measures student’ opinions pertaining to videos seen during the course. It is measured by four statement questions in which students rated whether or not the videos seen in class were helpful for learning bow safety (question 88), understanding hunting ethics (question 89), about wildlife and wildlife conservation (question 90), and using the land wisely (question 91).

“Knowledge gained” (factor 4T) measures student’ opinions about what they learned about the importance of managing hunters (question 94), dealing with people such as landowners (question 95), bowhunting safely (question 96), and whether they felt comfortable going bowhunting after taking the course (question 97). It also consists of four statement questions with answers ranging from “strongly agree” to “strongly disagree.”

The independent variable “hunter education” measures whether a student has already taken the Montana Hunter Education course (gun course) by using a simple yes or no answer to the question: Have you taken the state’s Hunter Education course (question 4)?
“Education” is an independent variable that measures student' education level. Students were asked the highest level of schooling they had completed (question 3) and they could choose from “sixth grade” to “college graduate or more.”

“Test score 1” measures how well the student did on 36 true/false questions worth one point each. “Test score 2” measures how the student fared on 13 scenario questions worth up to three points each.

Analysis was conducted on an aggregate class level rather than an individual level of change. It was possible to obtain sufficient data at the aggregate class level thereby eliminating the monumental if not virtually impossible task of requiring instructors to administer the same numbered questionnaires to the same individual students before and after the Bowhunter Education Course. Thus, while it is impossible to measure the extent to which any given student has improved his or her test score, we can measure test score improvement for each class as a whole. Each class of students was given the pre-test questionnaires with the range of numbers recorded for that class. Then, after the course, the class was given the post-test questionnaires. It was then possible to determine the aggregate amount of class improvement on test scores.

It was known that adults could possibly answer a number of the scored questions correctly prior to taking the bow hunter education course, due to their greater level of hunting experience and the simple and straightforward nature of some of the questions. This would have the effect of reducing the amount of
apparent improvement on test scores between time one and time two. The average age of students that took the student survey was 28.7 years of age.

The results of the student questionnaire are reported next, followed by results from the instructor questionnaire. Included in the results of the instructor questionnaire, results from a new data set are presented. The new data set is made up of instructor questionnaire answers matched with their corresponding student class aggregate improvement scores from the student pre-test to the post-test.

RESULTS

STUDENT SURVEY

There were 647 pre-tests with an average test score of 59.89 out of a possible 75 (these figures include the 24 pre-tests for one class that did not have a post-test returned and were included to maximize data usage even though there would be no improvement for this class). There were 556 post-tests with an average test score of 65.51 out of a possible 75. It is important to note that the figures and tables included in this report may not show the sample size being 647 for the pre-test, 556 for the post-test, or 1203 for the combined student survey because there were missing data. The percentage of students answering a certain way will be based on the actual number of students who responded to that particular question.
Problems. In the optimal procedure, the students would be given the pre-test at registration, before they read the course manual, the book *Beyond Fair Chase*, and before attending the first bowhunter education class. By measuring student knowledge before any exposure to the bowhunter education class, it would be possible to accurately measure any positive influence that the course had on students' knowledge concerning bow safety, hunter ethics, and hunter responsibility. Unfortunately, it was realized that giving the pre-test at registration was not always possible. Lead instructors often gave the pre-test to students at the beginning of the first class, before instruction began. However, some students had read the course materials (the course manual and *Beyond Fair Chase*). When asked on the pre-test, 32.6 percent of student respondents answered they had read the book *Beyond Fair Chase*. In addition, 26.3 percent of students said they had read the course manual. It is likely that this could reduce the amount of improvement on test scores between time one and time two. Even given all these problems, the improvement in test scores for all 33 classes between time one and time two was statistically significant. No matter if students took the pre-test at registration or at the first class, on average students left the course knowing more than when they entered the course.

The 33 classes for which pre and post-tests were returned were self-selected in that the instructors for these classes took the time and trouble to administer and return the tests. Many lead instructors did not make their classes available for testing and 15 of the 48 instructors who consented to receive and administer the tests did not return them. It is possible that participating lead
instructors are not representative of lead instructors as a whole. When trying to generalize the findings of this paper to all Montana Bowhunter Education courses, one needs to keep in mind that this is a self-selected sample of instructors in the state for the period of May, June, and July 1998.

Since it was not possible to survey a control group, it cannot be assessed whether other intervening variables besides the bowhunter education course produced the improvement on test scores between time one and time two. With the large number of students surveyed and the amount of improvement on test scores being statistically significant, it is likely the bowhunter education course had a positive effect on students' knowledge concerning bow safety, hunter ethics, and hunter responsibility and therefore was the variable which caused the improvement. It is highly unlikely that something other than the bowhunter education course produced the improvement in test scores.

Questions arise as to what impact increased knowledge regarding bowhunter ethics/responsibility could have on the public image of hunting. Further study is needed to determine whether increased student knowledge about bowhunter ethics/responsibility translates into ethical/responsible student bowhunting behavior and subsequently into a more positive image of hunting on the part of the public.

The following provides a description of the sample. The description of the sample is followed by analysis of performance.

Descriptives. Figure 1 shows that students taking the bowhunter education course were predominantly young. The average age of students in the
student survey was 29 years, with a range from 10 to 82 years. However, the most striking aspect of Figure 1 is the spike occurring from ages 12 through 15. This shows a large portion of students are probably first time bowhunters taking the course because it is a mandatory prerequisite for obtaining a bow stamp. About 22 percent of students were 12 to 15 years of age (N=1178). These older students are probably first time bowhunters or bowhunters who had bowhunted in the past but lost any proof of a prior archery stamp. The broad range of ages reflects the legal requirement for obtaining an archery stamp. Older bowhunters may have taken the course just because they needed an archery stamp.

**Figure 1.** Range of Bowhunter Education Students' Age In Years.
The majority of the students in the combined student survey were males. Males comprised 89.6 percent and females comprised 10.4 percent of the student survey. Figure 2 below, shows the percentages of student gender.

Figure 2. Percentages of Male and Female Students.

Figure 3 shows the range of student education. This figure reflects the large number of older students. Although 22 percent of students were 15 or younger, the majority of students had finished high school.
What is the highest level of schooling you have completed?

Figure 3. Range of Student Education Levels.

In Figure 4 below, it is apparent most of the students have shot a bow more than 100 times. However, most students have had very little or no previous bowhunting experience as shown in Figure 5. The approximately 300 students who have gone big game bowhunting with others may again be older bowhunters who had bowhunted in the past and now need the course to secure an archery stamp due to the change in Montana law.
How many times have you shot a bow and arrow?

Figure 4. Number of Times Students Have Shot a Bow and Arrow.
How many times have you been big game bowhunting?

Figure 5. Number of Times Students Have Gone Big Game Bowhunting With Others (not actually hunting for game themselves).

Class Test Score Improvement. Improvement of test scores (increase between time one and time two) for all 33 classes ranged from a high of 12.83 points to a low of 2.75 points. The highest improvement of 12.83 points corresponds to an increase of 17 percent. The lowest improvement of 2.75 points is almost 4 percent improvement in test scores. The average improvement for all 33 classes was 5.84 points, which is approximately equal to an increase in test scores of 7.8 percent.
Student statements about Bowhunter Education instruction. The student opinion section of the post-test provided valuable insights about instructors, the course, what students felt they had learned, and course materials. The majority of students, about 55 percent as shown in Table 1 below, felt their instructors lectured most of the time. Most students, 53.1 percent answered their instructors had class members role-play in front of the class. In all, 48 percent of students stated that hunter ethics/responsibility was taught more than bowhunting safety by their instructors. The vast majority of students, 94.9 percent felt they had learned to bowhunt safely. The majority of students, 93.3 percent felt comfortable actually participating in bowhunting after having taken the course. Table 1 below shows the distribution of their answers.

Table 1. Bowhunter Education Student Opinions Regarding Statements About Their Instructors.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>My instructor lectured most of the time during class.</td>
<td>20.6% (110)</td>
<td>34.3% (183)</td>
<td>24.9% (133)</td>
<td>14.6% (78)</td>
<td>5.6% (30)</td>
</tr>
<tr>
<td>My instructors would have class members role-play (act out a hunting situation) in front of the class.</td>
<td>29.6% (158)</td>
<td>24% (128)</td>
<td>18% (96)</td>
<td>19.9% (106)</td>
<td>8.6% (46)</td>
</tr>
<tr>
<td>My instructors spent more time on bowhunting safety than hunter ethics/responsibility.</td>
<td>4.3% (23)</td>
<td>7.1% (38)</td>
<td>40.4% (216)</td>
<td>37.1% (198)</td>
<td>11% (59)</td>
</tr>
<tr>
<td>I learned to bowhunt safely.</td>
<td>54.5% (291)</td>
<td>40.6% (217)</td>
<td>4.5% (24)</td>
<td>.4% (2)</td>
<td>0% (0)</td>
</tr>
<tr>
<td>Having taken this course, I now feel comfortable going bowhunting.</td>
<td>57.9% (309)</td>
<td>35.6% (190)</td>
<td>5.1% (27)</td>
<td>.7% (4)</td>
<td>.7% (4)</td>
</tr>
</tbody>
</table>

Analysis and comparisons of “test score” with independent variables. The scored questions on the survey were kept simple to prevent ambiguity. And some of the questions were easy enough that many adults in the
class could answer these questions correctly prior to taking the bowhunter education course. About 26 percent of the students had read the book *Beyond Fair Chase* prior to taking the pre-test. Almost 32 percent of the students had read the bowhunter student manual before taking the pre-test. All of these factors could reduce improvement on test scores. Even so, after attending the bowhunter education course, the class aggregate improvement on test scores that measure student knowledge pertaining to bowhunter ethics, responsibility, laws, and safety, between the pre-test and the post-test was statistically significant in all 33 classes.

It is important to note that the data on the 33 classes returned showed an aggregate improvement of test scores in all 33 classes. This improvement of test scores between time one (pre-test) and time two (post-test) is statistically significant. The data, in a T-test significance analysis, show the amount of improvement is statistically significant. Again, the students came away from the course with more knowledge than they had had before taking the course.

**Factor analysis.** Factor analysis is used to assess the degree to which certain items in the survey constitute an index or factor. These factors are a combination of variables that hold a high degree of shared variance or inter-item correlation. Factor loadings from the factor analysis indicate which items go together best. The alpha reliability feature in SPSS allows one to determine the reliability of a scale composed of the items in a factor. Factors with sufficient alphas can be added together to form new variables. Through this factor analysis, a large amount of data is “boiled down” to a smaller size that can be
analyzed using the newly created independent variables. See Table 2 below for the four factors and their final Eigenvalues. The closer to one, the Eigenvalues are, the stronger they are.

Table 2. Factor Analysis of Student Opinion Questions

<table>
<thead>
<tr>
<th>Factor</th>
<th>Questions</th>
<th>Eigenvalues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instructor Rating (Factor 1T)</td>
<td>69. My instructors were prepared for each class.</td>
<td>.719</td>
</tr>
<tr>
<td></td>
<td>70. My instructors encouraged me to target shoot.</td>
<td>.709</td>
</tr>
<tr>
<td></td>
<td>71. My instructors answered my questions in a helpful and kind way.</td>
<td>.849</td>
</tr>
<tr>
<td></td>
<td>72. I got along with my instructors.</td>
<td>.864</td>
</tr>
<tr>
<td>Fair Chase (Factor 2T)</td>
<td>83. Reading &quot;Beyond Fair Chase&quot; and the student manual helped me understand how to be an ethical and responsible hunter.</td>
<td>.857</td>
</tr>
<tr>
<td></td>
<td>84. Reading the student manual and &quot;Beyond Fair Chase&quot; helped me understand what was taught in class.</td>
<td>.880</td>
</tr>
<tr>
<td>Videos (Factor 3T)</td>
<td>88. The videos I watched in class helped me learn bow safety.</td>
<td>.742</td>
</tr>
<tr>
<td></td>
<td>89. The videos I watched in class helped me understand hunting ethics.</td>
<td>.759</td>
</tr>
<tr>
<td></td>
<td>90. The videos I watched in class helped me learn about wildlife and wildlife conservation.</td>
<td>.727</td>
</tr>
<tr>
<td></td>
<td>91. The videos I watched in class helped me understand how to use the land wisely.</td>
<td>.738</td>
</tr>
<tr>
<td>Knowledge Gained (Factor 4T)</td>
<td>94. I learned that managing hunters is just as important as managing wildlife numbers.</td>
<td>.627</td>
</tr>
<tr>
<td></td>
<td>95. I learned how to deal with people (such as landowners) when hunting.</td>
<td>.731</td>
</tr>
<tr>
<td></td>
<td>96. I learned how to bowhunt safely.</td>
<td>.840</td>
</tr>
<tr>
<td></td>
<td>97. Having taken this course, I now feel comfortable going bowhunting.</td>
<td>.788</td>
</tr>
</tbody>
</table>

A factor analysis was run on the student survey data producing four significant factors. All four factors had sufficient alphas. The factor analysis confirms common sense observations about the data. These factors were made up of numerous opinion questions on the student post-test. Factor 1 consists of questions 69, 70, 71, and 72. It is named "instructor rating." These questions deal with students' opinions about their instructor. These four questions asked if instructors were prepared for each class, encouraged students to target shoot,
answered questions in a kind and helpful way, and if they got along with students. Factor 2 includes questions 83 and 84. It is labeled "fair chase." These two questions sampled students' opinions about whether reading *Beyond Fair Chase* and the student manual helped them understand how to be an ethical and responsible hunter.

Factor 3, made up of questions 88, 89, 90, and 91, is named "videos." These four questions pertain to students' opinions about the videos they watched in class. The questions in this factor asked if the videos helped students learn bow safety, understand hunting ethics, learn about wildlife and wildlife conservation, and understand how to use the land wisely. Factor 4 is, labeled "knowledge gained," consists of questions 94, 95, 96, and 97. It paints a clear picture of what students felt they learned about the importance of managing hunters, dealing with people such as landowners while hunting, bowhunting safely, and whether or not they felt comfortable going bowhunting after taking the course. These factors indicate that the different areas concerning student opinions about the Bowhunter Education Program classes were covered well and by a variety of questions.  

The factor analysis found several groups of questions that were acting in concert. By combining these groups of questions, it was possible to form new variables that could better predict high test scores. As mentioned earlier, "test

---

1 Only "fair chase" (factor 2T) was additive after the initial factor analysis run. It had a Cronbach Alpha of .7895. Hotelling's T-squared and non-additivity were not significant in the reliability analysis. This indicates it was additive as it was and did not need to be standardized. For the other three factors, it was necessary to compute their Z scores and then convert them to T scores to standardize them, thereby allowing them to be additive. This made it possible to include them in the data analysis.
“score” was selected as the dependent variable due to its accurate reflection of students' levels of knowledge regarding bowhunter ethics, bowhunter responsibility, bow safety, and hunting laws. Since the FWP wanted to know if hunter ethics and hunter responsibility could be taught to Bowhunter Education students, “test score” was the optimal candidate for dependent variable.

The next two sections, ANCOVA and regression, address analysis of the dependent variable test score and the direct effect various independent variables have upon test score. In a later section entitled, a new data set, the amount of change or improvement in test scores from time one to time two will be addressed.

**Analysis of covariance.** Analysis of covariance (ANCOVA) is a multivariate statistical technique that allows one to measure whether variables have a significant effect on a dependent variable. It is also capable of finding interaction effects between dichotomous (0 or 1, yes or no type answers) independent variables as they influence the dependent variable. These dichotomous independent variables could be considered categories rather than variables in this model. The ANCOVA model controlled for main effects of metric independent variables, in addition to detecting interaction effects among categorical or dichotomous variables. Therefore, the model would show no interaction effects between metric variables. Only interaction effects between dichotomous variables such as gender or whether students had taken the Hunter Education (gun) course would appear in the model. Analysis revealed that only slight interaction effects between some dichotomous independent variables
occurred, however they were not significant and were disregarded. For example, there was an insignificant interaction effect between sex and whether the student had taken the Hunter Education course.

All the variables in an analysis of covariance are forced to enter the analysis model in order to see which ones are significant. This is different from regression in that only significant variables enter a regression model. The reason for using analysis of covariance is to assess the relationship between a number of independent or "causal" variables and a dependent variable or the effect. Again, analysis of covariance allows a researcher to examine the independent effect of each of the variables on the dependent variable (unique explained variance). Analysis of covariance and multiple regression produce similar results since the r-squared measures are similar, as are the sum of squares calculations.

An analysis of covariance was run using "test score" from the student post-tests as the dependent variable and age, education, "instructor rating" (factor 1T), "fair chase" (factor 2T), "videos" (factor 3T), "knowledge gained" (factor 4T), sex, and hunter education (the mandatory gun course for 12 year olds) as the independent variables. The "test score" from the post-tests was used here because only the post-tests had the opinion/attitude questions necessary for this analysis. These variables were highly correlated with "test score." This was determined using chi-squares and cross tabs. The analysis of covariance showed that age, education, "instructor rating" (factor 1T), "knowledge gained" (factor 4T), and sex had a significant effect on test scores as
shown in Table 3 below. These results indicate that students’ test scores were higher if they were older, more educated, rated their instructor favorably, felt they had gained sufficient knowledge from the course, and were female. This model accounts for approximately 32 percent of the variance in test scores.

The EDUC variable is the student’s highest level of schooling completed. The HUNTEDUC variable is whether or not the student had taken the state Hunter Education course (gun course). There was a slight interaction effect between sex and HUNTEDUC, but it was not significant.

Table 3. ANCOVA Model Results For Test Score

Tests of Between-Subjects Effects

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected Model</td>
<td>5458.018</td>
<td>9</td>
<td>606.446</td>
<td>24.468</td>
<td>.000</td>
</tr>
<tr>
<td>Intercept</td>
<td>754.159</td>
<td>1</td>
<td>754.159</td>
<td>30.427</td>
<td>.000</td>
</tr>
<tr>
<td>AGE</td>
<td>396.681</td>
<td>1</td>
<td>396.681</td>
<td>16.004</td>
<td>.000</td>
</tr>
<tr>
<td>EDUC</td>
<td>326.167</td>
<td>1</td>
<td>326.167</td>
<td>13.159</td>
<td>.000</td>
</tr>
<tr>
<td>FACTOR1T</td>
<td>981.642</td>
<td>1</td>
<td>981.642</td>
<td>39.605</td>
<td>.000</td>
</tr>
<tr>
<td>FACTOR2T</td>
<td>21.103</td>
<td>1</td>
<td>21.103</td>
<td>.851</td>
<td>.357</td>
</tr>
<tr>
<td>FACTOR3T</td>
<td>12.780</td>
<td>1</td>
<td>12.780</td>
<td>.516</td>
<td>.473</td>
</tr>
<tr>
<td>FACTOR4T</td>
<td>188.557</td>
<td>1</td>
<td>188.557</td>
<td>7.607</td>
<td>.006</td>
</tr>
<tr>
<td>SEX</td>
<td>320.267</td>
<td>1</td>
<td>320.267</td>
<td>12.921</td>
<td>.000</td>
</tr>
<tr>
<td>HUNTEDUC</td>
<td>6.127</td>
<td>1</td>
<td>6.127</td>
<td>.247</td>
<td>.619</td>
</tr>
<tr>
<td>SEX * HUNTEDUC</td>
<td>20.718</td>
<td>1</td>
<td>20.718</td>
<td>.836</td>
<td>.361</td>
</tr>
<tr>
<td>Error</td>
<td>11723.648</td>
<td>473</td>
<td>24.786</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>2142568.000</td>
<td>483</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>17181.665</td>
<td>482</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

R Squared = .318 (Adjusted R Squared = .305)

"Fair chase" (factor 2T) was not significantly related to test scores. Students who rated the book and video *Fair Chase* highly did not have higher test scores than those students who rated them poorly. Similarly, "Videos"
(factor 3T) was also not significantly related to test scores. Students, who rated the videos they watched in class highly, did not score higher on the scored portion of the survey than students who rated them poorly.

Finally, the analysis of covariance indicates that hunter education was not significant in this model. Students that took the Hunter Education course (gun course) did not score higher than students who had not taken it. This may seem illogical at first, but when you consider the average student age of about 28 years (and the effect age has on test scores) it makes more sense. Older students probably have not had hunter education but still score higher on the test.

The test scores were also split into two parts according to type of questions that were used. Test score 1 was the score for all the true/false questions that measured knowledge about hunting, ethics, and responsibility (questions 15 and 20-54) while test score 2 was the score for the scenarios (questions 55-67). As described earlier, the scenarios were short stories and the students were to decide if the stories were “very wrong,” “wrong,” “a little wrong,” or “not wrong.” An analysis of covariance was run on these two different test scores. The results showed that level of education was significant for the true/false questions but not for the scenarios. Please see Tables 4 and 5 below. The positive correlation indicates that the higher the level of education, the higher the students scored on the true/false section which contained some ethical questions, but also included numerous questions pertaining to bowhunting laws, bow safety, anti-hunting groups, and reasons for bowhunting. This did not hold true for the scenario section (questions 55-67), which was almost entirely
constructed with scenarios pertaining to bowhunter ethics and bowhunter responsibility. This may indicate that a higher level of education has no effect on a person’s perception of ethical behavior.

In the tables below (Table 4 and 5), the variable NUMSHOT is the number of times the student has shot a bow and arrow. The variable NUMWITH is the number of times the student has been big game bowhunting with friends or relatives, but did not actually hunt themselves. NUMOTH is the number of friends or family members taking the course at the same time as the student. These variables were included in the models for the true/false and scenarios because they were highly correlated with test score.
Table 4. ANCOVA Model Results for Test Score 1: Level of Student Knowledge on True/false Section.

Tests of Between-Subjects Effects

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected Model</td>
<td>607.547$^{a}$</td>
<td>12</td>
<td>50.629</td>
<td>11.307</td>
<td>.000</td>
</tr>
<tr>
<td>Intercept</td>
<td>.107</td>
<td>1</td>
<td>.107</td>
<td>.024</td>
<td>.877</td>
</tr>
<tr>
<td>AGE</td>
<td>27.282</td>
<td>1</td>
<td>27.282</td>
<td>6.093</td>
<td>.014</td>
</tr>
<tr>
<td>EDUC</td>
<td>89.442</td>
<td>1</td>
<td>89.442</td>
<td>19.975</td>
<td>.000</td>
</tr>
<tr>
<td>NUMSHOT</td>
<td>1.472</td>
<td>1</td>
<td>1.472</td>
<td>.329</td>
<td>.567</td>
</tr>
<tr>
<td>NUMWITH</td>
<td>12.165</td>
<td>1</td>
<td>12.165</td>
<td>2.717</td>
<td>.100</td>
</tr>
<tr>
<td>NUMOTHR</td>
<td>20.914</td>
<td>1</td>
<td>20.914</td>
<td>4.671</td>
<td>.031</td>
</tr>
<tr>
<td>FACTOR1 T</td>
<td>86.274</td>
<td>1</td>
<td>86.274</td>
<td>19.267</td>
<td>.000</td>
</tr>
<tr>
<td>FACTOR2 T</td>
<td>5.814</td>
<td>1</td>
<td>5.814</td>
<td>1.298</td>
<td>.255</td>
</tr>
<tr>
<td>FACTOR3 T</td>
<td>23.715</td>
<td>1</td>
<td>23.715</td>
<td>5.296</td>
<td>.022</td>
</tr>
<tr>
<td>FACTOR4 T</td>
<td>2.509</td>
<td>1</td>
<td>2.509</td>
<td>.560</td>
<td>.454</td>
</tr>
<tr>
<td>SEX</td>
<td>13.801</td>
<td>1</td>
<td>13.801</td>
<td>3.082</td>
<td>.080</td>
</tr>
<tr>
<td>HUNTEDUC</td>
<td>.379</td>
<td>1</td>
<td>.379</td>
<td>.085</td>
<td>.771</td>
</tr>
<tr>
<td>SEX * HUNTEDUC</td>
<td>12.863</td>
<td>1</td>
<td>12.863</td>
<td>2.873</td>
<td>.091</td>
</tr>
<tr>
<td>Error</td>
<td>2055.292</td>
<td>459</td>
<td>4.478</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>538412.000</td>
<td>472</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>2662.839</td>
<td>471</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$^{a}$ R Squared = .228 (Adjusted R Squared = .208)
Table 5. ANCOVA Model Results for Test Score 2: Level of Student Knowledge on Scenario Section.

Tests of Between-Subjects Effects

<table>
<thead>
<tr>
<th>Source</th>
<th>Type III Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrected Model</td>
<td>2545.866</td>
<td>12</td>
<td>212.155</td>
<td>11.809</td>
<td>.000</td>
</tr>
<tr>
<td>Intercept</td>
<td>701.330</td>
<td>1</td>
<td>701.330</td>
<td>39.039</td>
<td>.000</td>
</tr>
<tr>
<td>AGE</td>
<td>182.334</td>
<td>1</td>
<td>182.334</td>
<td>10.149</td>
<td>.002</td>
</tr>
<tr>
<td>EDUC</td>
<td>59.085</td>
<td>1</td>
<td>59.085</td>
<td>3.289</td>
<td>.070</td>
</tr>
<tr>
<td>NUMSHOT</td>
<td>20.400</td>
<td>1</td>
<td>20.400</td>
<td>1.136</td>
<td>.287</td>
</tr>
<tr>
<td>NUMWITH</td>
<td>.366</td>
<td>1</td>
<td>.366</td>
<td>.020</td>
<td>.887</td>
</tr>
<tr>
<td>NUMOTHR</td>
<td>33.193</td>
<td>1</td>
<td>33.193</td>
<td>1.848</td>
<td>.175</td>
</tr>
<tr>
<td>FACTOR1T</td>
<td>484.022</td>
<td>1</td>
<td>484.022</td>
<td>26.943</td>
<td>.000</td>
</tr>
<tr>
<td>FACTOR2T</td>
<td>1.909</td>
<td>1</td>
<td>1.909</td>
<td>.106</td>
<td>.745</td>
</tr>
<tr>
<td>FACTOR3T</td>
<td>3.457</td>
<td>1</td>
<td>3.457</td>
<td>.192</td>
<td>.661</td>
</tr>
<tr>
<td>FACTOR4T</td>
<td>114.954</td>
<td>1</td>
<td>114.954</td>
<td>6.399</td>
<td>.012</td>
</tr>
<tr>
<td>SEX</td>
<td>186.735</td>
<td>1</td>
<td>186.735</td>
<td>10.394</td>
<td>.001</td>
</tr>
<tr>
<td>HUNTEDUC</td>
<td>5.598</td>
<td>1</td>
<td>5.598</td>
<td>.312</td>
<td>.577</td>
</tr>
<tr>
<td>SEX * HUNTEDUC</td>
<td>9.867E-02</td>
<td>1</td>
<td>9.867E-02</td>
<td>.005</td>
<td>.941</td>
</tr>
<tr>
<td>Error</td>
<td>8245.878</td>
<td>459</td>
<td>17.965</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>516321.000</td>
<td>472</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corrected Total</td>
<td>10791.744</td>
<td>471</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\(^a\) R Squared = .236 (Adjusted R Squared = .216)

The ANCOVA determined there were no significant interaction effects between the strongest predictors of high test scores. There was no need to analyze interactions between independent variables as they affected the dependent variable. This was important as it allowed the data analysis to focus on direct effects of independent variables on the dependent variable "test score."

Regression analysis. Multiple linear regression, like analysis of variance, assesses the relationship between a number of independent or "causal" variables and a dependent variable or the effect. It is more inductive than multiple analysis of variance in that the data is showing what is most
powerful. The researcher had already looked at the significant correlations between variables by using chi-squares and cross tabs and had an idea as to what variables were exerting the most influence on the dependent variable. Multiple regression allows a researcher to hold constant the effects of all the variables the researcher thinks are influencing the dependent variable. It allows a researcher to examine the independent effect of each of the variables (unique explained variance). Multiple linear regression was used in this analysis to find the power of the main effects (independent variables). Stepwise multiple linear regression was used in this analysis to find the most powerful independent variables, by determining which ones entered the model, and the order in which they entered. This is the appropriate technique to use when there are no theoretical grounds for believing any given independent variable is more important than the others.

A regression analysis was run on several variables to see which variables entered and the strength of these variables in explaining variance in test score. Chi-square tests were used to identify independent variables highly correlated with test score but not exhibiting collinearity. Unlike the analysis of covariance, the variables in the regression were not forced to enter into the model. The variables included in the regression were: age, sex, education, whether the student had taken hunter education or not (gun course), the number of times they had shot a bow and arrow, the number of friends or family member taking the course with them, the number of times they had been big game bowhunting with
others, "instructor rating" (factor 1T), "fair chase" (factor 2T), "videos" (factor 3T), and "knowledge gained" (factor 4T).

"Instructor rating" (factor 1T) was the strongest variable in predicting test scores as it entered first. Holding all other variables constant, "instructor rating" (factor 1T) explained about 17 percent of the variance in test scores. Students who rated their instructor as prepared for class, one who encouraged them to target shoot, an instructor who answered their questions in a kind and helpful way, and one who got along with them had higher test scores. These instructors were able to impart more knowledge to their students. Table 6 below shows the order in which the variables entered the model and the amount of variance in test score explained by each. Table 7 shown next, also lists the order of entry, as well as the standardized coefficients in Beta form and significance.

Table 6. Stepwise Linear Regression Model Showing:
The Order Of Entry For All Five Variables Entering The Model. See R Square Change Column for Explained Variance for Each Variable.
Table 7. Step Five Showing Order Of Entry Into The Model, Standardized Coefficients In Beta Form, and Significance.

<table>
<thead>
<tr>
<th>Coefficients</th>
<th>Model</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>B</th>
<th>Std. Error</th>
<th>Beta</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>Step 5</td>
<td>-95.693</td>
<td>.212</td>
<td>.517</td>
<td>.850E-02</td>
<td>.290</td>
<td>6.340</td>
<td>.000</td>
</tr>
<tr>
<td>FACTOR1T</td>
<td></td>
<td>.280</td>
<td>6.340</td>
<td>.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>What is the highest level of schooling you have completed?</td>
<td></td>
<td>.280</td>
<td>6.340</td>
<td>.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>age in years</td>
<td></td>
<td>.197</td>
<td>3.985</td>
<td>.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sex</td>
<td></td>
<td>.196</td>
<td>4.008</td>
<td>.000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FACTOR4T</td>
<td></td>
<td>.128</td>
<td>2.945</td>
<td>.003</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The next variable to enter was education. Holding all other variables constant, education explained approximately ten percent of variance in test scores. The higher the education level of the student the higher they scored on the test. The first two variables had a combined R squared of .268, meaning that holding all other variables constant, "instructor rating" (factor 1T) and education explained about 27 percent of the variance in test scores.

Age was the third variable to enter the regression. Holding all other variables constant, age explained approximately two percent of variance in test scores. This was not surprising as older students were expected to score higher on the type of test questions used, which were unambiguous and somewhat simple. The first three variables had a combined R squared of .286, holding all other variables constant, almost 29 percent of variance in test scores was explained.
Sex entered the regression in the fourth position. Holding all other variables constant, sex explained about two percent of variance in test scores. Females scored higher on the test questions than males. The first four variables had a combined R squared of .302, which means that holding all other variables constant, they explain about 30 percent of variance in test scores.

The last variable to enter the regression was “knowledge gained” (factor 4T). Holding all other variables constant, “knowledge gained” (factor 4T) explained approximately one percent of variance in test scores. Students who felt they had learned the importance of managing hunters, dealing with people such as landowners while hunting, bowhunting safely, and whether or not they felt comfortable actually participating bowhunting after taking the course scored higher on the test questions. The five variables, which entered the regression model, had a combined R squared of .314, which accounts for 31 percent of the variance in test scores when all the other variables are held constant.

Based on this analysis, it is clear that the quality of instruction does have a significant impact on how much students learn in bowhunter education courses.

INSTRUCTOR SURVEY

Problems. As with the student survey, the sample for the instructor survey was self-selected because only instructors that returned their surveys are included in the data. These may be the more dedicated instructors since they took the time to complete and return their surveys. Thus, the findings of this paper should not be generalized to all Montana Bowhunter Education instructors.
Descriptives. Two hundred and fifteen of the 410 instructors who were sent surveys returned their surveys, for a response rate of 52 percent (N=215). The instructors ranged in age from 13 (junior instructors) to 76 years of age, with the average age being about 43. The striking image in Figure 6 below is the large group of instructors between the ages of 42 and 52. Instructors were predominantly male. See Figure 7 below for instructor gender. There were 11 female and 204 male instructors.

Figure 6. Range of Instructor Age In Years.
Figure 7. Instructor Gender.

The education level of instructors ranged from 12.1 percent with graduate or professional school to 1.4 percent completing junior high or less (junior instructors) as seen in Figure 8 below. Most of the instructors (66%) had at least some college.
What is the highest level of schooling you have completed?

Figure 8. Range of Instructor Education Levels From Completed Jr. High or Less to Graduate or Professional School.

The majority of the instructors (68.8%) answered that they had been big game hunting with a bow more than 100 times as shown in Figure 9 below. Nine point eight percent (9.8%) of the instructors answered they had been big game hunting with a bow 56 – 100 times.
How many times have you been big game hunting with a bow?

Figure 9. Instructor Frequency of Big Game Bowhunting.

A new data set. A new data set was created by matching improvement on test scores from each class with the corresponding lead instructor’s answers on the instructor survey. It is important to note that the correlations found in this section are the result of analysis involving the change or improvement in student test scores between time one and time two. Of the 33 classes returned, 26 had corresponding lead instructor surveys for their classes. This data set produced some interesting correlations.
There is a significant negative correlation between instructor age and class improvement on test scores, indicating younger instructors' classes have more improvement on test scores between pre-test and post-test. Younger instructors may be more willing to implement the new teaching methods suggested by the FWP than older instructors.

There is also a significant negative correlation between the number of times an instructor has been big game hunting with a bow and class improvement on test scores. This indicates that lead instructors who bow hunted less had more improvement on test scores in their class. This may be because the less experienced hunters may be more inclined to use the new teaching methods suggested.

There is a significant positive correlation between the number of instructors that co-teach a class and improvement on test scores in that class. This indicates that classes with more instructors have more improvement on test scores. A class with a larger number of instructors allows for more individual attention per student and may increase improvement on test scores.

There is a significant positive correlation between a lead instructor's attitude about having three to four instructors for teaching a single class in a community and improvement on test scores. If a lead instructor believed that there should be three to four instructors per class, his class had more improvement on test scores. Lead instructors with this belief may have as many instructors as they can obtain in class with them, thereby giving more individual attention to students. This may lead to increased improvement in test scores.
There is a significant negative correlation between a lead instructor's belief about parents and/or other family members of students who are minors taking an active role in the course and improvement on test scores. This indicates the less a lead instructor agrees with the statement, "Parents and/or other family members of students that are minors usually take an active role in the course," the more improvement their class has on test scores. However, this may simply be a reflection of a low number of parents and/or family members of students who are minors attended the courses.

There is a significant negative correlation between a lead instructor's belief about his students reading the course materials before coming to the first class and improvement on test scores. This indicates that the less a lead instructor agrees with the statement, "From observation, I think most of my students have read their manual and Beyond Fair Chase before coming to the first class," the more improvement his class has on test scores. This correlation is logical. If an instructor believes that his students have not read the course materials before coming to the first class and he gives them the pre-test at that first class, then they are likely to show more improvement on the post-test after reading the course manual, Beyond Fair Chase, and attending the classes.

**Teaching styles and methods.** The majority of instructors agreed that a combination of teaching techniques was the best way for them to teach Bowhunter Education. When instructors were asked to show how they felt about statements regarding teaching styles and methods, their answer options were “strongly disagree,” “disagree,” “neutral,” “agree,” “strongly agree,” or “does not
apply.” Their answers to several critical statements and questions are described below and can be seen in detail in Table 8.

The vast majority of instructors (81.8%) strongly agreed or agreed with the statement, “A demonstration is the best way for me to help students learn bow safety.” A total of 52.1 percent of instructors strongly disagreed or disagreed with the statement, “Lecturing is the best way for me to teach Bowhunter ethics.” In all, 87.5 percent of instructors strongly agreed or agreed with the statement, “Encouraging class participation (such as role-playing) is better than lecturing when teaching bowhunting safety.” A total of 81.8 percent of instructors strongly agreed or agreed with the statement, “Encouraging class participation (such as role-playing) is better than lecturing when teaching bowhunter ethics.” The majority of instructors (58.6%) strongly agreed or agreed with the statement, “Encouraging class participation (such as role-playing) is better than lecturing when teaching hunting laws and regulations.” A total of 81.9 percent of instructors strongly agreed or agreed with the statement, “Role-playing during class helps students learn hunter ethics and hunter responsibility.”

A total of 95.3 percent of instructors strongly agreed or agreed with the statement, “A combination of teaching techniques (guest speakers, role-playing, class discussion, demonstrations, field trips, visual aids & bow handling) is the best way for me to teach Bowhunter education.” Once again, according to the instructors’ answers, the majority of instructors approve of the new teaching methods the Montana Fish, Wildlife and Parks are attempting to implement. The largest percentage, 95.8 percent, of instructors strongly agreed or agreed with
the statement, "Using a combination of teaching techniques is the best way for me to teach Bowhunter ethics and responsibility." See Table 8 below.

### Table 8. Instructor’ Opinions About A Variety of Teaching Methods.

<table>
<thead>
<tr>
<th></th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>A demonstration is the best way for me to help students learn bow safety.</td>
<td>26.5% (57)</td>
<td>55.3% (119)</td>
<td>13.5% (29)</td>
<td>3.3% (7)</td>
<td>.9% (2)</td>
</tr>
<tr>
<td>Lecturing is the best way for me to teach bowhunter ethics.</td>
<td>2.8% (6)</td>
<td>16.3% (35)</td>
<td>28.4% (61)</td>
<td>40.9% (88)</td>
<td>11.2% (24)</td>
</tr>
<tr>
<td>Encouraging class participation (such as role-playing) is better than lecturing when teaching bowhunting safety.</td>
<td>34.9% (75)</td>
<td>52.6% (113)</td>
<td>11.2% (24)</td>
<td>.9% (2)</td>
<td>0% (0)</td>
</tr>
<tr>
<td>Encouraging class participation (such as role-playing) is better than lecturing when teaching Bowhunter ethics.</td>
<td>35.8% (77)</td>
<td>46% (99)</td>
<td>14.4% (31)</td>
<td>3.7% (8)</td>
<td>0% (0)</td>
</tr>
<tr>
<td>Encouraging class participation (such as role-playing) is better than lecturing when teaching hunting laws and regulations.</td>
<td>18.6% (40)</td>
<td>40% (86)</td>
<td>31.2% (67)</td>
<td>7.9% (17)</td>
<td>1.4% (3)</td>
</tr>
<tr>
<td>Role-playing during class helps students learn hunter ethics and hunter responsibility.</td>
<td>25.6% (55)</td>
<td>56.3% (121)</td>
<td>14.4% (31)</td>
<td>2.8% (6)</td>
<td>.5% (1)</td>
</tr>
<tr>
<td>A combination of teaching techniques (guest speakers, role-playing, class discussion, demonstrations, field trips, visual aids and bow handling) is the best way for me to teach Bowhunter education.</td>
<td>57% (122)</td>
<td>38.3% (82)</td>
<td>3.7% (8)</td>
<td>0% (0)</td>
<td>.5% (1)</td>
</tr>
<tr>
<td>Using a combination of teaching techniques is the best way for me to teach Bowhunter ethics and responsibility.</td>
<td>51.6% (111)</td>
<td>44.2% (95)</td>
<td>2.8% (6)</td>
<td>.5% (1)</td>
<td>.5% (1)</td>
</tr>
</tbody>
</table>
These findings are important because the overwhelming majority of instructors feel a combination of teaching techniques and not merely lecturing is the best way for them to teach bowhunter education. This shows the majority of instructors agree with the new teaching techniques being implemented by the FWP.

**Instructor answers to training questions.** A total of 63.2 percent of instructors strongly agreed or agreed with the statement, “Instructor training workshops have helped me become a more effective instructor.” In all, 59.6 percent of instructors had attended one or more workshops in the last two years.

Instructors were also asked how many hours of instructor training they had received in the last two years (not including travel time). Fourteen percent (14%) of instructors left this question blank. Since a substantial number of instructors left this question blank, their percentage was included in the total. Most of this group may have been trying to answer that they had had zero hours of training. The largest group of instructors, 21.4 percent, reported they had received ten or more hours, less than 1 percent had nine hours, 11.6 percent answered eight hours, 2.3 percent had seven hours, 7.4 percent had six hours, 5.6 percent had five hours, 5.1 percent had four hours, 3.7 percent had three hours, 7 percent had two hours, and 20.5 percent answered one hour. A total of 85.6 percent of instructors responded they had received one or more hours of instructor training in the last two years (N=215). This percentage does not correspond with the previous question where only 59.6 percent of instructors said they had attended instructor-training workshops during the same period. The reasons for this
difference could be anything from not understanding the question(s) to exaggeration. One possible explanation for this discrepancy is that some instructors may have received informal training from other instructors or sources other than instructor training workshops and counted this as instructor training when answering.

**Instructor opinions on the strengths and weaknesses of the Montana Bowhunter Education Program.** Instructors were asked an open-ended question: “What is the greatest strength of the Bowhunter Education program?” The largest group of instructors, 49.2 percent, responded that the greatest strength was the dedicated, experienced, and knowledgeable volunteer instructors. The next largest group, (43.1% of instructors) said the greatest strength of the program was the teaching of hunter ethics, hunter responsibility, hunter safety, giving students a good start in bowhunting, and teaching students what is expected of them. Only 3.3 percent of instructors thought the greatest strength was that Bowhunter Education was mandatory for first time bowhunters. A few instructors, 2.8 percent, said the greatest strength of the program was the instruction materials. A mere 1.7 percent of instructors thought the greatest strength was that the program acquainted the public about the validity of bowhunting.

When asked, “What is the greatest weakness of the Bowhunter Education program (also open-ended),” 17.6 percent of instructors, the largest group, responded that it was lack of time to teach everything they are expected to teach and 17 percent said the greatest weakness was lack of quality instructors and/or
a system to check up on and follow up on county programs to insure high standards of instruction. Other answers in descending percentages were 13.8 percent of instructors thought the lack of shooting instruction and the fact that they were not able to teach shooting proficiency was the greatest weakness; 10.1 percent considered the greatest weakness to be the lack of general hands on instruction in the field; and 8.2 percent said it was that there was no follow up of student behavior because passing the mandatory test does not insure that students will bowhunt ethically and responsibly. Another 8.2 percent of instructors thought the greatest weakness was the fact that the Bowhunter Education program was not mandatory for all bowhunters. Only 5.7 percent of instructors said the greatest weakness was the instruction equipment such as teaching aids and videos. Two groups of equal size, 4.4 percent, indicated that the greatest weakness was the instructor manual and the other group answered the lack of instructor training because it was difficult to attend workshops. In the last three groups, 3.8 percent of instructors said the material was repetitive and/or a repeat of Hunter Education material; 1.3 percent answered lack of instruction on first aid, survival, danger of tree stands and bears; and .6 percent answered that the written test was the greatest weakness of the program.

Instructors feel they are the greatest strength of the program and teaching bowhunter ethics and responsibility is a close second. They are concerned however, by the lack of time to teach everything needed in the course. Also of concern was lack of more quality instructors, a method for insuring quality
instruction, lack of shooting instruction, and lack of general hands on instruction in the field.

RECOMMENDATIONS

The Montana Bowhunter Education course successfully taught students bowhunter ethics, bowhunter responsibility, and bow safety. All 33 classes in this study showed improvement on test scores after taking the course.

1. The FWP should seek instructors that will be prepared for class, will encourage students to target shoot, will answer student questions in a kind and helpful way, and who will get along with students. Students who felt their instructors possessed these skills had higher test scores.

2. Younger instructors need to be incorporated into the course. There was a statistically significant correlation in the data which showed younger instructors' classes had more improvement on test scores. This may have been because younger instructors were more willing to implement the new teaching techniques proposed by the FWP.

3. Continue to seek experienced instructors for the bowhunter education program. Almost 80 percent of instructors had been bowhunting over 55 times. Since all the classes surveyed improved, experienced instructors definitely played a major role in imparting knowledge to the students. Combined with the finding that classes of younger instructors showed
greater improvement on test scores, younger, but experienced instructors should be sought. The data showed a statistically significant correlation between instructors who had bowhunted 56-100 times and higher improvement on test scores in their classes.

4. Classes should be taught with several instructors. The data showed a significant correlation between more instructors per class and higher test scores. The FWP should also seek instructors who are willing to have other instructors co-teach in their classes. There was a significant correlation between instructors' positive attitudes about having several instructors per class and higher test scores. This also, may be a spurious relationship. The instructors who felt there should be more instructors per class may have taught in classes with several instructors and this correlation may be a result of the number of instructors per class and not instructor attitude about the number of instructors per class.

5. A focus on ethics and responsibility should be continued and expanded to insure the future of bowhunting. The future of bowhunting and hunting in general is still in doubt. Continued emphasis on bowhunter ethics and responsibility, according to the literature, may be the best way to insure the survival of the sport (Beattie and Thomas 1995).

6. More women should be encouraged to participate in the Bowhunter Education course as students and instructors. Only 10.4 percent of students surveyed were female. The literature supports the need for
more women to become involved in the sport as a way to insure bowhunting for future generations (Beattie and Thomas 1995).

7. Instructor training workshops should be highly encouraged or even made mandatory for all instructors. Sixty-three point two percent (63.2%) of instructors surveyed felt instructor training workshops had helped them become a more effective instructor, but 40.4 percent of instructors surveyed had not attended a workshop in the last two years.

8. The FWP might consider expanding the time allotted for teaching the Bowhunter Education course. Seventeen point six percent (17.6%) of instructors surveyed said lack of time to teach everything they are expected to teach was the greatest weakness of the program. This was the single most frequently mentioned answer. The FWP may want to consider including more field instruction into the program, which would also require more time to be added to the length of the course. Ten point one percent (10.1%) of instructors felt the greatest weakness of the program was the lack of general hands on instruction in the field. This was the fourth most mentioned answer.

9. Ongoing oversight of instructors to maintain high standards of instruction is very important. Seventeen percent (17%) of instructors felt the lack of quality instructors and/or a system to check up on and follow up on regional programs to insure high standards of instruction was the greatest weakness of the program. This was the second most mentioned answer. Instructors who were rated by students as being
prepared for class, who encouraged students to target shoot, got along with students, and answered questions in a kind and helpful manner turned out to be the instructors who had students with higher test scores.

10. More shooting instruction and the ability to teach shooting proficiency need to be included in the program. Bowhunting has been targeted as lacking the ability to kill in a humane manner (Samuel et al. 1991:380). Shooting proficiency is vital to ethical and responsible bowhunting. Thirteen point eight percent (13.8%) of instructors thought the lack of shooting instruction and the fact that they were not able to teach shooting proficiency was the greatest weakness of the program. This was the third most mentioned answer.

11. A follow up study needs to be undertaken to determine student behavior pertaining to bowhunter ethics and responsibility. The students taking the Bowhunter Education course gained knowledge about bowhunter ethics and bowhunter responsibility. It needs to be determined if this knowledge has been translated into action.

12. It would be helpful to any future researcher for the FWP if all the FWP employees and instructors were brought on board in advance. If it was made clear to all, that the study was sponsored, approved, and paid for by the FWP, it would certainly help the researcher.

13. The FWP might consider exploring every possible means of praising and rewarding the current group of dedicated volunteer instructors. For example, Bradshaw (1999) has suggested the FWP may want to give
incentives (such as more awards, special hunting privileges, etc.) to recruit sufficient numbers of quality instructors in every area of the state. Forty-nine point two percent (49.2%) of instructors felt the dedicated, experienced, and knowledgeable volunteer instructors were the greatest strength of the program. This was the single most frequently mentioned answer.

14. The FWP may want to consider maintaining student state evaluation test scores for future use. If these state evaluation test scores were maintained in a database, they could be combined with future research data.
REFERENCES


Appendix A

BOWHUNTER EDUCATION - STUDENT SURVEY
(PRE-TEST)

We want to make sure that our Montana's Bowhunter Education program is helping our students become good hunters. In order to do this, we want to ask you a few questions about yourself, bowhunting, and Bowhunter Education. Please use a number 2 pencil to answer every question. Fill-in a circle for every question and make dark marks that fill the circle completely. Erase cleanly any mark you wish to change. We do not need to know your name, so please do not write your name on this questionnaire. Please answer all the questions honestly. Answer all the questions the best you can. Your answers will not decide whether you pass or fail this course. If you do not find an answer that fits exactly, mark the one that comes closest. Please mark ONLY ONE answer for each question, unless the question asks for more. Ask one of your Bowhunter Education instructors to help you if you have any questions while filling out this questionnaire.

Section 1: Here are some questions about yourself.

1. How old are you now?
   - 0
   - 1
   - 2
   - 3
   - 4
   - 5
   - 6
   - 7
   - 8
   - 9

2. Are you:
   - Female
   - Male

3. What is the highest level of schooling you have completed?
   - Sixth Grade
   - High School or GED
   - Seventh Grade
   - Trade School
   - Eighth Grade
   - Some College
   - Some High School
   - College Graduate or More

4. Have you taken the state's Hunter Education course?
   - Yes
   - No

5. How did you find out about this particular Bowhunter Education course?
   - School
   - Parent and/or family
   - Friends
   - Posters around town
   - Newspaper
   - Television
   - Radio
   - Hunter Educ Instructor
   - Called Bowhunter Ed Office

6. Other than being required by law, who encouraged you the most to take this Bowhunter Education course? (Please fill-in only one circle.)
   - Yourself
   - School Teacher
   - Friend(s)
   - Parents
   - Other Relative(s)

7. How many times have you shot a bow & arrow?
   - 0
   - 10 or less
   - 11 to 100
   - More than 1000

8. How many of your friends and/or family members are taking this particular session of Bowhunter Education with you?
   - 0
   - 1
   - 2
   - 3
   - 4

9. How many times have you been big game bowhunting or been with others who were big game bowhunting? (Big game are antelope, deer, elk, moose, bear, bison, mountain lion, or sheep)
   - 0
   - 1
   - 2
   - 3
   - 4
   - 5
   - 6
   - 7
   - 8
   - 9
   - 10
   - 11
   - 12
   - 13
   - 14
   - 15
   - More

Section 2: The questions in this section are True/False statements on the Bowhunter Education Program and hunting.

<table>
<thead>
<tr>
<th>Statements</th>
<th>T</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>10. I took this course so I can bowhunt.</td>
<td>✓</td>
<td>❌</td>
</tr>
<tr>
<td>11. I took this course to learn bow safety.</td>
<td>✓</td>
<td>❌</td>
</tr>
<tr>
<td>12. At the end of this course, I plan to go bowhunting.</td>
<td>✓</td>
<td>❌</td>
</tr>
<tr>
<td>13. At the end of this course, I do not plan to go bowhunting.</td>
<td>✓</td>
<td>❌</td>
</tr>
<tr>
<td>14. My instructor(s) told me that I would have to read the student manual and Beyond Fair Chase before I could pass the class.</td>
<td>✓</td>
<td>❌</td>
</tr>
<tr>
<td>15. An arrow harvests game by causing shock.</td>
<td>✓</td>
<td>❌</td>
</tr>
<tr>
<td>16. I have read the book Beyond Fair Chase.</td>
<td>✓</td>
<td>❌</td>
</tr>
<tr>
<td>17. I have read the bowhunter course manual.</td>
<td>✓</td>
<td>❌</td>
</tr>
<tr>
<td>18. I am filling this survey out at registration for bowhunter education.</td>
<td>✓</td>
<td>❌</td>
</tr>
<tr>
<td>19. I am filling this survey out the first night of bowhunter education class.</td>
<td>✓</td>
<td>❌</td>
</tr>
<tr>
<td>20. The largest percentage of bowhunters claim harvesting meat as their reason for hunting.</td>
<td>✓</td>
<td>❌</td>
</tr>
<tr>
<td>Statements</td>
<td>T</td>
<td>F</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>21. If you wound a deer, and it runs off, you have to track it down.</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>22. Cultivating a profound respect for wildlife and the land will affect how we behave as hunters, how we act as citizen conservationists, and how the public perceives us.</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
<td>23. Never hurry your shot no matter what happens. Let the animal go if necessary.</td>
<td>O</td>
<td>O</td>
</tr>
<tr>
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62. You’re bowhunting alone and have a close shot at a legal buck. You are confident that you can make a good shot in the vital zone but you sprained your ankle on the hike in and know that you won’t be able to travel far if you wound the animal. You take the shot anyway.

63. Three bowhunting buddies went hunting on the opening day of hunting season. They all got their bucks early that first morning. They tagged and cleaned out their bucks and placed them in the back of their truck. Then they drove around town to show off their “kills”. They parked their truck at the bar on Main Street, and stayed there the rest of the day so they could brag about their success.

64. A hunter knew that his bow sight needed to be adjusted in order to be fully accurate. He forgot to do it before going hunting, but adjusted it after getting home from the day long hunt.

65. A bowhunter hits a deer which then enters posted land. He/she then leaves his/her equipment at the posted sign and enters immediately so the deer can be found.

66. An experienced bowhunter and his teenage nephew went out deer hunting and came across a buck. The teenager shot and wounded the animal. The animal fell down, but got back up and ran. They tracked the buck for a couple of hours, but they tired and went home.

67. You are out bowhunting with a friend. Your friend does not have a deer license, but you have your deer hunting license. During the hunt, both of you come across two bucks. You shoot a buck and your friends decides to shoot the other one. You say nothing and let your friend shoot the buck.

Section 3: In this section, mark whether the following actions are very wrong, wrong, a little wrong, or not wrong at all.

53. Since it is impossible to know if a wound is fatal or not, every animal hit must be pursued as if it were suffering a mortal wound.

54. Of the 90% of the US population who choose not to hunt, only about 10% are actually against hunting.
Appendix B

BOWHUNTER EDUCATION —STUDENT SURVEY

(POST-TEST)

We want to make sure that our Montana’s Bowhunter Education program is helping our students become good hunters. In order to do this, we want to ask you a few questions about yourself, bowhunting, and Bowhunter Education. Please use a number 2 pencil to answer every question. Fill-in a circle for every question and make dark marks that fill the circle completely. Erase cleanly any mark you wish to change. We do not need to know your name, so please do not write your name on this questionnaire. Please answer all the questions honestly. Answer all the questions the best you can. Your answers will not decide whether you pass or fail this course. If you do not find an answer that fits exactly, mark the one that comes closest. Please mark ONLY ONE answer for each question, unless the question asks for more. Ask one of your Bowhunter Education instructors to help you if you have any questions while filling out this questionnaire.

Section 1: Here are some questions about yourself.

1. How old are you now?
   O 0  
   O 1  
   O 2  
   O 3  
   O 4  
   O 5  
   O 6  
   O 7  
   O 8  
   O 9  

2. Are you:
   O Female 
   O Male

3. What is the highest level of schooling you have completed?
   O Sixth Grade 
   O Seventh Grade 
   O Eighth Grade 
   O Some High School 
   O College Graduate or More

4. Have you taken the state’s Hunter Education course?
   O Yes 
   O No

5. How did you find out about this particular Bowhunter Education course?
   O School 
   O Friends 
   O Newspaper 
   O Radio 
   O Called Bowhunter Ed Office

6. Other than being required by law, who encouraged you the most to take this Bowhunter Education course? (Please fill-in only one circle.)
   O Yourself 
   O School Teacher 
   O Friend(s) 
   O Parent(s) 
   O Hunter Ed. Instructor 
   O Brother/Sister 
   O Game Warden 
   O Other Relative(s)

7. How many times have you shot a bow & arrow?
   O 0 
   O 1 to 500 
   O 501 to 1000 
   O more than 1000

8. How many of your friends and/or family members are taking this particular session of Bowhunter Education with you?
   O 0  
   O 1  
   O 2  
   O 3  
   O 4  
   O 5  
   O 6  
   O 7  
   O 8  
   O 9 or more

9. How many times have you been big game bowhunting or been with others who were big game bowhunting? (Big game are antelope, deer, elk, moose, bear, bison, mountain lion, or sheep.)
   O 0  
   O 1  
   O 2  
   O 3  
   O 4  
   O 5  
   O 6  
   O 7  
   O 8  
   O 9 or more

Section 2: The questions in this section are True/False statements on the Bowhunter Education Program and hunting.

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</tr>
<tr>
<td>11. I took this course to learn bow safety.</td>
<td>O</td>
<td>O</td>
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<td>12. At the end of this course, I plan to go bowhunting a lot.</td>
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<td>O</td>
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<td>21. If you wound a deer, and it runs off, you have to track it down.</td>
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<td>22. Cultivating a profound respect for wildlife and the land will affect how we behave as hunters, how we act as citizen conservationists, and how the public perceives us.</td>
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55. A bowhunter lost his job during the deer hunting season and was running low on food, so he killed one more deer than the season limit (law) allowed.

61. A bowhunter accidentally killed a female black bear that had a cub. It is against the law to shoot a female bear (sow) with a cub. However, the cub was not with the sow when the hunter shot the sow. The hunter tagged the bear, dressed it out, and took the bear home. When leaving the woods, the hunter saw the bear cub, but did not report it to the game warden.

56. It is the last day of the deer season and you have yet to get a deer. A big buck enters the thicket about 45 yards from your stand and lies down. It is getting late and you cannot see a clear shot. Your buddy motes you to shoot and you do.

62. You’re bowhunting alone and have a close shot at a legal buck. You are confident that you can make a good shot in the vital zone but you sprained your ankle on the hike in and know that you won’t be able to travel far if you wound the animal. You take the shot anyway.

57. A hunter has just bought a new four-wheel drive truck. The hunter invites a friend to go hunting. The public road they are on does not take them to where they wanted to go, so they drive “off road” to find a good hunting spot.

63. Three bowhunting buddies went hunting on the opening day of hunting season. They all got their bucks early that first morning. They tagged and cleaned out their bucks and placed them in the back of their truck. Then they drove around town to show off their “kills”. They parked their truck at the bar on Main Street, and stayed there the rest of the day so they could brag about their success.

58. A bowhunter enjoys hunting and is thankful that he is able to hunt. His boss just reduced his salary so he needs some extra means of providing food for his family. As a way of solving his problem, he suggests his wife and daughter take the bowhunter education course and go hunting with him.

64. A hunter knew that his bow sight needed to be adjusted in order to be fully accurate. He forgot to do it before going hunting, but adjusted it after getting home from the day long hunt.

59. An older bowhunter killed a deer during hunting season. He tagged the deer, field dressed it, brought it home and hung it in his shed. After a day or two the hunter became very sick and did not get better for several weeks. Meanwhile, the deer meat spoiled because it was not cut up and frozen.

65. A bowhunter hits a deer which then enters posted land. He/she then leaves his/her equipment at the posted sign and enters immediately so the deer can be found.

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Section 4: Tell us if you strongly disagree (SD), disagree (D), are neutral (N), agree (A), or strongly agree (SA) with the following sentences.

Here are some statements about your bowhunter education instructors.

69. My Bowhunter Education instructors were prepared for each class.
   SD D N A SA

70. My instructors encouraged me to target shoot.
    SD D N A SA

71. My instructors answered my questions in a helpful and kind way.
    SD D N A SA

72. I got along with my Bowhunter Education instructors.
    SD D N A SA

73. My instructor lectured most of the time during class.
    SD D N A SA

74. It is a good idea to have more than one instructor for every Bowhunter Education class.
    SD D N A SA

75. My instructors were able to deal with students who caused problems.
    SD D N A SA

76. My instructors would have class members role-play (act out a hunting situation) in front of the class.
    SD D N A SA

77. During the course, guest speakers came to our class often to talk with us about hunting or other outdoor skills.
    SD D N A SA

78. My instructors spent more time on bowhunting safety than hunter ethics/responsibility.
    SD D N A SA

79. My instructors gave me a lot of praise and encouragement.
    SD D N A SA

These statements are about the Bowhunter Education materials.

80. I read the student manual and Beyond Fair Chase before attending the first Bowhunter Education class.
    SD D N A SA

81. The book, Beyond Fair Chase, was used throughout the course.
    SD D N A SA

82. Watching the video, Beyond Fair Chase, helped me understand my responsibilities as a hunter.
    SD D N A SA

83. Reading Beyond Fair Chase and the student manual helped me understand how to be an ethical and responsible hunter.
    SD D N A SA

84. Reading the student manual and Beyond Fair Chase helped me understand what was taught in class.
    SD D N A SA

85. Field trips (outdoors training) were a part of my Bowhunter Education course.
    SD D N A SA

86. My Bowhunter Education classroom had all the equipment needed such as a chalkboard, desks, TV/VCR, etc.
    SD D N A SA

87. The written test at the end of the course was a fair test of what I learned about bowhunting.
    SD D N A SA

88. The videos I watched in class helped me learn bow safety.
    SD D N A SA

89. The videos I watched in class helped me understand hunting ethics.
    SD D N A SA

90. The videos I watched in class helped me learn about wildlife and wildlife conservation.
    SD D N A SA

91. The videos I watched in class helped me understand how to use the land wisely.
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90. The videos I watched in class helped me learn about wildlife and wildlife conservation.
    SD D N A SA

91. The videos I watched in class helped me understand how to use the land wisely.
    SD D N A SA
These statements go over your opinion of the Bowhunter Education Program and in particular this course.

92. My Bowhunter Education classes were boring.
   SD  D  N  A  SA
   ○  ○  ○  ○  ○

93. In Bowhunter Education class, I learned how to "clean" or field dress animals.
   SD  D  N  A  SA
   ○  ○  ○  ○  ○

94. I learned that managing hunters (with laws and regulations) is just as important as managing wildlife numbers.
   SD  D  N  A  SA
   ○  ○  ○  ○  ○

95. I learned how to deal with people (such as landowners) when hunting.
   SD  D  N  A  SA
   ○  ○  ○  ○  ○

96. I learned how to bowhunt safely.
   SD  D  N  A  SA
   ○  ○  ○  ○  ○

97. Having taken this course, I now feel comfortable going bowhunting.
   SD  D  N  A  SA
   ○  ○  ○  ○  ○
Appendix C

BOWHUNTER EDUCATION—INSTRUCTOR SURVEY

You are giving your permission to participate in this study by completing this questionnaire. Use a number 2 pencil to answer all the questions. Please fill-in a circle for every question, make dark marks, and fill-in each circle completely. Also, erase cleanly any mark you wish to change. Mark ONLY ONE answer for each question, unless the question asks for more. Please answer all of the questions honestly and to the best of your ability. Fill out the questionnaire about yourself and give only your feelings. If you are a first time bowhunter education instructor, fill out the questionnaire on how you will teach your first class. There are questions on the front and back of each page.

Section 1.
In this section, we will be asking some questions about you and the other instructors in your community.

1. How old are you now?
   - 0 O
   - 1 O
   - 2 O 23 years old: 0 O
   - 3 O
   - 4 O
   - 5 O
   - 6 O
   - 7 O
   - 8 O
   - 9 O

2. Are you:
   - O Female
   - O Male

3. What is the highest level of schooling you have completed?
   - O Completed Jr. High School or Less
   - O Some High School
   - O Completed High School or GED
   - O Technical School
   - O Some College
   - O College Graduate (Bachelor’s Degree)
   - O Graduate or Professional School After College

4. Approximately how many times have you been big game hunting with a bow?
   - O Never
   - O 5 or less
   - O 6-10
   - O 11-15
   - O 16-20
   - O 21-25
   - O 26-35
   - O 36-45
   - O 46-55
   - O 56-100
   - O more than 100

5. How many times have you taught a Montana Bowhunter Education course? (do not include Hunter Education course)
   - O First Time This Year
   - O 1 to 3
   - O 4 to 6
   - O 7 to 9
   - O 10 to 12
   - O 13 to 15
   - O 16 to 27
   - O 28 or more

6. If you are also certified to teach Hunter Education, how many times have you taught a Montana Hunter Education course?
   - O Not Certified
   - O First Time This Year
   - O 1 to 5
   - O 6 to 10
   - O 11 to 20
   - O 21 to 30
   - O 31 to 40
   - O 41 or more

7. Not counting yourself, how many certified instructors usually teach a Bowhunter Education course in the classroom with you?
   - O 0
   - O 1
   - O 2
   - O 3
   - O 4
   - O 5
   - O 6
   - O 7
   - O 8
   - O 9 or more
   - O 10 or more

8. How many hours do you usually spend teaching during a Bowhunter Education course?
   - O 0
   - O 1
   - O 2
   - O 3
   - O 4
   - O 5
   - O 6
   - O 7
   - O 8
   - O 9
   - O 10
   - O 11
   - O 12
   - O 13
   - O 14
   - O 15
   - O 16 or more
   - O 17 or more
   - O 18 or more
   - O 19 or more
   - O 20 or more
   - O 21 or more
   - O 22 or more
   - O 23 or more
   - O 24 or more
   - O 25 or more
   - O 26 or more
   - O 27 or more
   - O 28 or more
   - O 29 or more
   - O 30 or more
   - O 31 or more
   - O 32 or more
   - O 33 or more
   - O 34 or more
   - O 35 or more
   - O 36 or more
   - O 37 or more
   - O 38 or more
   - O 39 or more
   - O 40 or more
   - O 41 or more
   - O 42 or more
   - O 43 or more
   - O 44 or more
   - O 45 or more
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   - O 56 or more
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   - O 58 or more
   - O 59 or more
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   - O 63 or more
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   - O 77 or more
   - O 78 or more
   - O 79 or more
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   - O 81 or more
   - O 82 or more
   - O 83 or more
   - O 84 or more
   - O 85 or more
   - O 86 or more
   - O 87 or more
   - O 88 or more
   - O 89 or more
   - O 90 or more
   - O 91 or more
   - O 92 or more
   - O 93 or more
   - O 94 or more
   - O 95 or more
   - O 96 or more
   - O 97 or more
   - O 98 or more
   - O 99 or more
   - O 100 or more

9. How many guest speakers (not other instructors) will participate in the next Bowhunter Education course that you will personally teach?
   - O 0
   - O 1
   - O 2
   - O 3
   - O 4
   - O 5
   - O 6
   - O 7
   - O 8
   - O 9
   - O 10
   - O 11
   - O 12
   - O 13
   - O 14
   - O 15
   - O 16
   - O 17
   - O 18
   - O 19
   - O 20
   - O 21
   - O 22
   - O 23
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   - O 43
   - O 44
   - O 45
   - O 46
   - O 47
   - O 48
   - O 49
   - O 50
   - O 51
   - O 52
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   - O 56
   - O 57
   - O 58
   - O 59
   - O 60
   - O 61
   - O 62
   - O 63
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   - O 87
   - O 88
   - O 89
   - O 90
   - O 91
   - O 92
   - O 93
   - O 94
   - O 95
   - O 96
   - O 97
   - O 98
   - O 99
   - O 100

9a-i. These questions ask about the backgrounds of your guest speakers who are participating in the next course session you teach. Please answer “no” to all if you will not have any guest speakers.

9a. Landowner(s)
   - O Yes
   - O No
   - O Don’t Know

9b. Game Warden(s)
   - O Yes
   - O No
   - O Don’t Know

9c. Another Certified Instructor(s)
   - O Yes
   - O No
   - O Don’t Know

9d. Other (please specify)
   - O Other
9d. Experienced Hunter(s)  
   O  Yes  O  No  O  Don't Know

9e. Hunting Guide(s)  
   O  Yes  O  No  O  Don't Know

9f. Member(s) of a search and rescue team  
   O  Yes  O  No  O  Don't Know

9g. Government leader(s)  
   O  Yes  O  No  O  Don't Know

9h. School Teacher(s)  
   O  Yes  O  No  O  Don't Know

9i. Wildlife Biologist(s)  
   O  Yes  O  No  O  Don't Know

Section 2.

Tell us if you strongly disagree (SD), disagree (D), are neutral (N), agree (A), or strongly agree (SA) with the following statements about the state's Bowhunter Education Program and the course you help teach. If the statement Does Not Apply (DNA) to you, please fill in the appropriate circle.

10. The courses that I help teach are effective.
   SD  D  
   O  N  A  SA  DNA

11. The state's Bowhunter Education Program is effective.
   SD  D  
   O  N  A  SA  DNA

12. Having three to four instructors would be preferable for teaching a single class in a community.
   SD  D  
   O  N  A  SA  DNA

13. There are usually too many students in my classroom because there are not enough instructors.
   SD  D  
   O  N  A  SA  DNA

14. The course I help teach, teaches bow hunting safety effectively.
   SD  D  
   O  N  A  SA  DNA

15. The course I help teach, teaches hunter ethics and responsibility effectively.
   SD  D  
   O  N  A  SA  DNA

16. The state's program needs more female instructors.
   SD  D  
   O  N  A  SA  DNA

These statements deal with students and their families.

17. I encourage females to take the Bowhunter Education course.
   SD  D  
   O  N  A  SA  DNA

18. Parents and/or other family members of students who are minors usually take an active role in the course.
   SD  D  
   O  N  A  SA  DNA

19. As an instructor, I have the ability to effectively handle students who cause problems.
   SD  D  
   O  N  A  SA  DNA

20. I feel uncomfortable handling problem students.
   SD  D  
   O  N  A  SA  DNA

Here are some statements about hunter ethics and bow hunting safety.

21. I encourage students to target shoot outside of class time.
   SD  D  
   O  N  A  SA  DNA

22. Hunter ethics and hunter responsibility are the same thing.
   SD  D  
   O  N  A  SA  DNA

23. Hunter ethics should be taught as much as bow safety.
   SD  D  
   O  N  A  SA  DNA

24. Students who pass the course, leave with the knowledge of how to be an ethical and responsible hunter.
   SD  D  
   O  N  A  SA  DNA

25. Instructors should spend more time teaching bow safety rather than hunter ethics/responsibility.
   SD  D  
   O  N  A  SA  DNA

26. Hunter ethics and responsibility should be taught throughout the course.
   SD  D  
   O  N  A  SA  DNA

These statements refer to teaching style, methods and training.

27. A demonstration is the best way for me to help students learn bow hunting safety.
   SD  D  
   O  N  A  SA  DNA
28. Lecturing is the best way for me to teach Bowhunter ethics.

29. Encouraging class participation (such as role-playing) is better than lecturing when teaching bow hunting safety.

30. Encouraging class participation (such as role-playing) is better than lecturing when teaching Bowhunter ethics.

31. Encouraging class participation (such as role-playing) is better than lecturing when teaching hunting laws and regulations.

32. Role-playing during class helps students learn to deal effectively with landowners.

33. Role-playing during class helps students learn hunter ethics and hunter responsibility.

34. All Bowhunter Education instructors should attend instructor training workshop(s) at least once every two years.

35. Instructor training workshops have helped me to teach bow hunting safety more effectively.

36. Instructor training workshops have helped me to teach hunter ethics/responsibility more effectively.

37. Instructor training workshops have helped me become a more effective instructor.

38. A combination of teaching techniques (guest speakers, role-playing, class discussion, demonstrations, field trips, visual aids & bow handling) is the best way for me to teach Bowhunter education.

39. Using a combination of teaching techniques is the best way for me to teach Bowhunter ethics and responsibility.

40. Field trips are a valuable teaching tool in Bowhunter education.

These statements refer to the instructor and student materials used in Bowhunter Education.

41. The written student test measures students’ knowledge adequately.

42. The written test is too easy for the students.

43. The written test covers the course material adequately.

44. The book, Beyond Fair Chase, is an effective tool for teaching hunter ethics and hunter responsibility.

45. From observation, I think most of my students have read their manual and Beyond Fair Chase before coming to the first class.

46. I feel that students should not be allowed to pass Bowhunter Education without reading the student manual and Beyond Fair Chase.

47. A follow-up or sequel to the book Beyond Fair Chase, which discusses ethics at a more advanced level, would be useful.

48. The Bowhunter Education instructor’s manual adequately prepares me for teaching classes.

49. My students have too much to read (the manual and Beyond Fair Chase) before attending the first bow hunting education class.
50. The student manual provides adequate information on all Bowhunter education subjects.

51. Hunting companions, family, and friends of students influence the student's hunting ethics far more than a Bowhunter education course.

52. I believe that the "five stages of the hunter" talked about in the student manual is correct.

53. Videos provided by the Montana Fish, Wildlife & Parks should be used often during course sessions.

These statements are about the classrooms where Bowhunter Education takes place in your community.

54. The classroom(s) that I use for the course are usually large enough for all of my students to meet in comfortably.

55. The classroom(s) I use usually have all the equipment that I need—chalkboard, desks, TV/VCR, etc.

56. My Bowhunter education classroom(s) provide good teaching and learning environments.

These statements refer to possible improvements to Montana's Bowhunter Education Program.

57. An effective way of teaching ethics and safety to students would be to assign each student a hunting "mentor." Each mentor would go hunting with their assigned student and teach him/her to hunt in a safe and ethical way.

57a. Is this feasible or not?
   Feasible
   Not Feasible

58. Bowhunter education courses would help students learn more if they were done more in the outdoors—in natural hunting settings.

59. There needs to be better communication between the instructors in my community.

Section 3

The next questions refer to the student manual. Indicate whether or not the student manual has enough information on the following topics:

60. Bow Safety
   ○ Yes
   ○ No

61. Ethics/Responsibility
   ○ Yes
   ○ No

62. Bow Hunting History
   ○ Yes
   ○ No

63. Wildlife and Habitat
   ○ Yes
   ○ No

64. Outdoors Survival
   ○ Yes
   ○ No

65. Preparation for hunting
   ○ Yes
   ○ No

66. Hunting Laws
   ○ Yes
   ○ No

67. Wildlife Conservation
   ○ Yes
   ○ No

68. Dealing with others
   ○ Yes
   ○ No
   (Hunters, landowners, other land users, etc.)

For this question, mark one of the five circles that best describes the way you teach. The middle circle means that you rely upon them equally.

69. When I teach I tend to draw upon...
   Experience
   ○ ○ ○ ○ ○
   Resource Materials
   ○ ○ ○ ○ ○

These questions ask about the way Bowhunter Education is currently taught in your community and the way you think it should be taught.

70. How long (in hours) is the course that you are usually involved in teaching?
   ○ 9 or less
   ○ 10 to 12
   ○ 13 to 15
   ○ 16 to 18
   ○ 19 to 21
   ○ 22 to 24
   ○ 25 to 27
   ○ 28 to 30
   ○ 31 or more

71. Currently, how many class sessions does it take to teach your Bowhunter Education course?
   ○ 2
   ○ 3
   ○ 4
   ○ 5
   ○ 6 or more
72. How many students usually attend your Bowhunter Education class?

- 5 or less
- 6 to 10
- 11 to 15
- 16 to 20
- 21 to 25
- 26 to 30
- 31 to 35
- 36 to 40
- 41 to 45
- 46 to 50
- 51 to 55
- 56 or more

73. How many students who cause problems usually attend your Bowhunter Education class?

- None
- 1 to 2
- 3 to 4
- 5 or less
- 6 to 10
- 11 to 15
- 16 to 20
- 21 to 25
- 26 to 30
- 31 or more

74. How many hours should the Bowhunter Education course be? (Not what is done now, please give your own beliefs.)

- 9 or less
- 10 to 12
- 13 to 15
- 16 to 18
- 19 to 21
- 22 to 24
- 25 to 27
- 28 to 30
- 31 or more

75. How many class sessions should it take to teach the Bowhunter Education course? (Not what is done now, please give your own beliefs.)

- 5 or less
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16 & up

76. How many instructor training workshops have you attended in the last two years?

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11 or more

77. Approximately how many hours of instructor training have you received in the last two years? (do not include travel time)

- 0
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10 or more

78. How many hours do you usually spend teaching about ethics and responsibility during a course? (Remember this question applies to you only and not other instructors in your community.)

- None
- Less than 1
- 1 to 3
- 4 to 8
- 9 to 13
- 14 to 17

79. How many hours do you usually spend teaching bow safety during a course? (Remember this question applies to you only and not other instructors in your community.)

- None
- 1 to 3
- 4 to 8
- 9 to 13
- 14 to 17

80. Approximately how many hours during the course do you usually spend going over material from the book, Beyond Fair Chase?

- None
- 1 to 3
- 4 to 8
- 9 to 13
- 14 to 17

The next few questions ask about how long you usually spend using different teaching techniques during Bowhunter Education courses. If you are a first time teacher, answer these questions based on how you will teach your first class.

81. What unit(s) do you usually teach out of the Bowhunter Education student manual? (Mark either "all" or any of the individual unit numbers that you teach.)

- All the units
- Units
- 1
- 2
- 3
- 4
- 5
- 6
- None
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17

82. How many hours do you usually spend lecturing (any kind of lecturing—with no, some, or lots of class participation) during an entire Bowhunter Education course?

- None
- 1 to 3
- 4 to 8
- 9 to 13
- 14 to 17

83. How many hours do you usually spend having interactive class discussions during an entire Bowhunter Education course?

- None
- 1 to 3
- 4 to 8
- 9 to 13
- 14 to 17

84. How many hours do you usually spend having interactive class discussions during an entire Bowhunter Education course?

- None
- 1 to 3
- 4 to 8
- 9 to 13
- 14 to 17

85. How many hours do you usually spend having interactive class discussions during an entire Bowhunter Education course?

- None
- 1 to 3
- 4 to 8
- 9 to 13
- 14 to 17

86. How many hours do you usually have students spend watching videos during an entire Bowhunter Education course?

- None
- 1 to 3
- 4 to 8
- 9 to 13
Please add your final comments.

104. What is the greatest strength of the Bowhunter Education program?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

105. What is the greatest weakness of the Bowhunter Education program?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________