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HUNTING SITE SELECTION: A PRELIMINARY INVESTIGATION WITH APPLICATION TO MICHIGAN'S PUBLIC ACCESS STAMP PROGRAM

Michigan State University PH.D. 1981

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HUNTING SITE SELECTION: A PRELIMINARY INVESTIGATION WITH APPLICATION TO MICHIGAN'S PUBLIC ACCESS STAMP PROGRAM

By

Richard Dennis Westfall

A DISSERTATION

Submitted to
Michigan State University
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ABSTRACT

HUNTING SITE SELECTION:
A PRELIMINARY INVESTIGATION WITH
APPLICATION TO MICHIGAN'S PUBLIC
ACCESS STAMP PROGRAM

By

Richard D. Westfall

Hunters and wildlife managers are concerned with the reduction in hunting opportunities on privately-owned, rural land in southern lower Michigan. In response to this concern, the Public Access Stamp (PAS) Program was established by Public Act 373 of 1976. The PAS Program authorizes the Michigan Department of Natural Resources (DNR) to require all who hunt in southern lower Michigan (DNR zone 3) to purchase a "Public Access Stamp." The revenues generated from the sale of such stamps is used to "lease" land from private landowners in zone 3 for public hunting.

The purposes of the study reported herein were to (1) determine the need for the PAS Program--were urban hunters without rural land contacts (PAS Program clients) dissatisfied with the number of hunting opportunities available to them, (2) profile zone 3 hunters on the basis of their characteristics and behavior and determine if PAS Program clients differ from other zone 3 hunters, (3) investigate

the hunting site selection (HSS) process of zone 3 hunters and determine if they could be segmented on the basis of how they select hunting sites, and (4) to evaluate the PAS Program in 1977-78 from the hunters' perspective.

Research literature on hunting, private lands and less than fee simple land acquisition techniques, hunter access program evaluations, and hunters was reviewed. This literature pointed to the need to generate information specific to zone 3 hunters and the PAS Program in order to meet the objectives of the study.

A HSS model was developed based on a consumer behavior approach to study the hunter's decision strategy in selecting a hunting site. The model consisted of five HSS decision strategies: "habit", "systematic", "recommended", "satisfice", and "important feature." Three decision strategies (systematic, recommended and a combination of satisfice and important feature) were hypothesized to be predictable using eight characteristic and behavior variables.

Three research hypotheses were postulated relating to the first three study objectives. To meet the study objectives and test the research hypotheses, a survey of zone 3 hunters was conducted in the Spring of 1978. Research methods consisted of (1) identifying the population to be surveyed and selecting a sample, (2) developing a survey instrument and pretesting it, (3) administering the survey instrument to the sample, and (4) data coding, transfer to

computer and analysis. The study population was all zone 3 hunters, estimated to number 515,000 in 1977, and the sample consisted of 1,078 hunters residing in or near zone 3 who had been previously surveyed by the DNR in one of its game surveys. The survey instrument was a self-administered, mailed questionnaire and three mailings were utilized to elicit a response by 641 hunters. The data were analyzed using computer programs available in the Statistical Package for the Social Sciences.

The results of the survey indicated that respondents (1) lived in a rural setting, (2) had considerable hunting experience, (3) hunted small game most often, (4) hunted all day on opening day and week-ends after opening day, but hunted afternoons on week days after opening day, (5) hunted within a 15 mile drive of their home, (6) hunted with one other hunter, (7) hunted for a variety of reasons (getting out-of-doors the most important and killing game the least important), (8) obtained information on places to hunt from others, (9) utilized a variety of types of information to select hunting sites, and (1) selected hunting sites on the basis of one important feature.

In terms of the PAS Program, respondents (1) first learned of the Program when they bought their hunting license, (2) did not attempt to find out about the Program, and (3) suggested the Program be discontinued.

Of the three research hypotheses postulated, two were accepted and one only partially accepted. The results of

testing the hypotheses indicated a need for the PAS Program and that hunters can be segmented on the basis of their HSS decision strategy as conceptualized in this study.

The analysis of the PAS Program emphasized the role of marketing the Program. It was recommended that in the future more land close to the PAS Program's client group--urban hunters--be leased. Providing lists of participating landowners for distribution at hunting license dealers was also recommended along with more evaluation of dealers' performance. Including information on the type of hunting opportunity available at a PAS Program property was suggested to minimize hunter inconvenience. Elimination or modification of the Hunter Access Tag requirement was recommended due to hunters' adverse reaction to it. It was suggested to alter the "disagreeable" aspects of the PAS Program rather than discontinue it entirely.

A number of recommendations regarding future research on the PAS Program and HSS were made. In terms of the PAS Program, a future duplication of this study, measurement of Program inputs and outputs and an investigation of the impact of the Program on its target market were recommended. In terms of HSS, the use of experimental research methods, more exact specification and measurement of variables related to HSS, substantiation of this study's findings with respect to HSS and the examination of other variables expected to be related to HSS were recommended.

ACKNOWLEDGMENTS

Completion of this dissertation would not have been possible without the generous assistance of many individuals. First, I would like to thank Dr. Donald Holecek for his support and encouragement throughout my graduate program. Dr. Holecek's willingness to actively participate in the development and execution of the study is appreciated. I would also like to recognize the contribution of the other members of my graduate committee, Dr. Robert Marty, Dr. Lee James and Dr. Anthony Koo.

A number of individuals in the Michigan Department of Natural Resources were instrumental in the study. Arlow Boyce, Marvin Cooley and John Urbain, Public Access Stamp Program administrators, were willing to involve the research team in the Program. Keith Heezen, Glen Belyea and Ed Langenau of the Rose Lake Wildlife Research Center assisted in determining the direction of the study. Joyce Meister, Larry Ryel and Louis Hawn of the Office of Surveys and Statistics contributed to the development of the survey sampling frame.

The efforts of the staff of Michigan State University's Department of Park and Recreation Resources' Recreation Research and Planning Unit are sincerely appreciated, particularly Jean Geis and Fran Piper.

Finally, I would like to thank the 641 respondents to the "MSU Hunter Study" for their cooperation and interest.

TABLE OF CONTENTS

Page

LIST OF TABLES

LIST OF FIGURES

CHAPTER I: INTRODUCTION

1.1 Introduction to the Problem

Growing numbers of hunters and wildlife managers are becoming concerned with the loss of hunting opportunities on privately-owned, rural land in southern lower Michigan. This decline is partly due to a reduction in the amount of game habitat but also results from a decrease in the quantity of land open to hunting.

Habitat losses have occurred primarily because of new farming practices designed to increase yields and farm income, i.e., consolidation of farms, single crop specialization, fall plowing, and advanced farming technology including the use of herbicides and pesticides. As one source describes it,

> Key habitat areas ... are disappearing, particularly wetlands and upland nesting and feeding areas. The past decade saw a 26 percent decline in the number of farms ... wildlife habitat experienced an even greater loss as the small field borders were eliminated and fall plowing left no winter habitat on thousands of acres (Michigan Department of Natural Resources 1975a).

The reduction in private land open to hunting is due to three major factors--urbanization, hunting restriction laws, and the closure and posting of private land.

According to a recent article in Michigan Out-of-Doors (Michigan United Conservation Clubs 1974), it is estimated that 1.5 million acres of rural land have been lost to urban sprawl. An additional 2.5 million acres have been closed to hunting as a result of the Hunting Safety Zone Act (Public Act 157 of 1968). It is estimated that over two million acres of private, rural land are posted against hunting.

Two recent studies of landowners in southern lower Michigan suggest that closure may be associated with landowners' high level of concern with such problems as damage, liability and control (Michigan Department of Natural Resources 1975b and Westfall 1975).

Of Michigan's roughly 36.5 million total acres, it is estimated that approximately 9.3 million acres, or one-quarter, is no longer available for public hunting (Michigan United Conservation Clubs 1974). This decrease in hunting opportunities on privately-owned, rural land in southern lower Michigan would be less serious if there was sufficient public hunting land available to hunters. In Michigan, however, the vast majority of public land open to hunting is in the northern lower Peninsula and the upper Peninsula, two to five hundred miles away from most Michigan hunters who reside in the southern portion of the lower peninsula, referred to as southern lower Michigan. Since the 1930's, the Michigan Department of Natural Resources (DNR) has administered a Game and Wildlife Area Acquisition

Program and currently there are 46 areas totalling 214,150 acres located in southern lower Michigan. Even this total is considered inadequate to meet the needs of Michigan's hunters (Michigan Department of Natural Resources 1975a). Furthermore, this southern lower Michigan public hunting land generally offers poor hunting conditions in comparison to privately-owned, rural land (Kesling 1974). Future increases in the quantity or quality of the Game and Wildlife Area system in southern lower Michigan are not expected to be great given the rising price of acquiring and maintaining prime game habitat.

1.2 Alternative Means of Maintaining Hunting Opportunities

Various organizations including Michigan's DNR have considered and in some instances tried several alternative means of maintaining hunter access to privately-owned, rural land in southern lower Michigan. Educational programs encouraging hunters to exhibit sportsmanlike conduct while hunting private land have been sponsored by various governmental agencies and private organizations to improve hunter-landowner relations. The programs have undoubtedly been beneficial, but they address only one source of the decline in hunting opportunities--landowner concerns. Such programs do not offer the landowner an economic incentive to maintain game habitat.

Cooperative arrangements between hunters and landowners represent another alternative. Since 1936, Michigan's DNR has administered a Hunting Club Program known as the "Williamston Plan." Under this plan, farm and other landowner groups join together and operate on a permit basis. Hunters obtain permits at no charge from membership farms to hunt and return them at the end of the hunt. The Hunting Club Program was most popular in 1940 when 116 clubs and 512,949 acres were involved. The popularity of the Program decreased to only ten clubs and 24,090 acres in 1973. Prospects for its continuation in the future are not considered bright (Michigan Department of Natural Resources 1975a). Like educational programs such cooperative arrangements fail to consider all factors contributing to the decrease in private land open to hunting.

Fee hunting has often been suggested as a viable means of maintaining hunter access to private land in southern lower Michigan. Fee hunting consists of a "free enterprise" agreement between willing buyers (hunters) and willing sellers (landowners). Under such agreements, hunters pay a daily or seasonal fee to hunt the landowner's property. In a variation of the basic transaction, hunters may collectively lease the landowner's property for their exclusive use. In a study of Michigan's "thumb" area landowners, Parker (1975) found less than 40 percent of the landowners he surveyed currently or potentially interested

in fee hunting. While fee hunting offers the landowner an economic incentive to allow hunting on his land and maintain game habitat, apparently few landowners show interest in this particular alternative.

Another alternative can be termed "hunter access programs" utilizing less than fee simple land acquisition techniques, e.g., leasing and easements. This approach is similar to the previous one, but involves a governmental agency as a "go between" from hunters to landowners. The agency collects money from hunters usually in the form of taxes or license fees and distributes it to landowners who agree to allow the public to hunt on their land. In Michigan, two such programs have been tried. In 1966 and 1967, the Agricultural Stabilization and Conservation Service (ASCS) of the U.S. Department of Agriculture under its Cropland Adjustment Program offered to pay farmers for removing agricultural land from crop production. Additional payments were offered to landowners who agreed to permit use of their land for hunting and other recreational uses. A total of 1,390 farms controlling 28,247 acres signed public access contracts under this program in Michigan. The ASCS also operated a "pilot Public Access Program" in ten counties in southern lower Michigan from 1972 to 1974 as part of its Set Aside Program. In 1974, 905 farms with 144,609 acres participated. Neither of these programs are expected to continue (Michigan Department of Natural Resources 1975a).

These types of programs appear to be attractive to landowners and hunters possibly due to the incorporation of economic incentives for landowners and agency involvement in coordinating the transaction between hunter and landowner.

1.3 Michigan's Public Access Stamp Program

A recent law in Michigan (Public Act 373 of 1976) has authorized a new and different hunter access program referred to as the "Public Access Stamp" (PAS) Program. In brief, Public Act 373 requires all persons who hunt in DNR zone 3 (southern lower Michigan) to purchase a $1.00 Public Access Stamp (for a complete text of the Act, see Appendix A). Income generated from the sale of Public Access Stamps is used to acquire and administer public access leases on private land in zone 3 for public hunting. The Wildlife Division (WD) of Michigan's DNR has assumed responsibility for program administration.

Unlike the two previous, federally-administered hunter access programs in Michigan mentioned in Section 1.2, the PAS Program is not limited to private land already in another program, i.e., the Cropland Adjustment or Set Aside Programs. In addition, the PAS Program is financed by those who benefit directly--southern lower Michigan hunters.

Three major factors contributed to the passage of Public Act 373 as follows:

1. Traditionally rural landowners have allowed the public hunting access to their land. As mentioned in Section 1.1, however, there is a general downward trend in the number of hunting opportunities available on privately-owned, rural land in southern lower Michigan. Michigan United Conservation Clubs originally suggested the concept of a private land leasing for public hunting programs and supported the resultant Public Act 373 largely due to a perceived reduction in hunting opportunities.
2. Traditionally access for hunting has for the most part been free. Today, however, it is realized by many that such access imposes a cost on the landowner, e.g., property damage, safety. Public Act 373 was envisioned in part as a means for hunters to reimburse farmers and other landowners for some of these costs. Michigan's Farm Bureau actively encouraged the passage of Public Act 373 for this reason.
3. The final important factor was the cancellation of the "Pilot Public Access Program" and the public access provisions of the Cropland Adjustment Program of the U.S. Department of Agriculture. In Michigan, many public officials associated with the administration of these programs along with

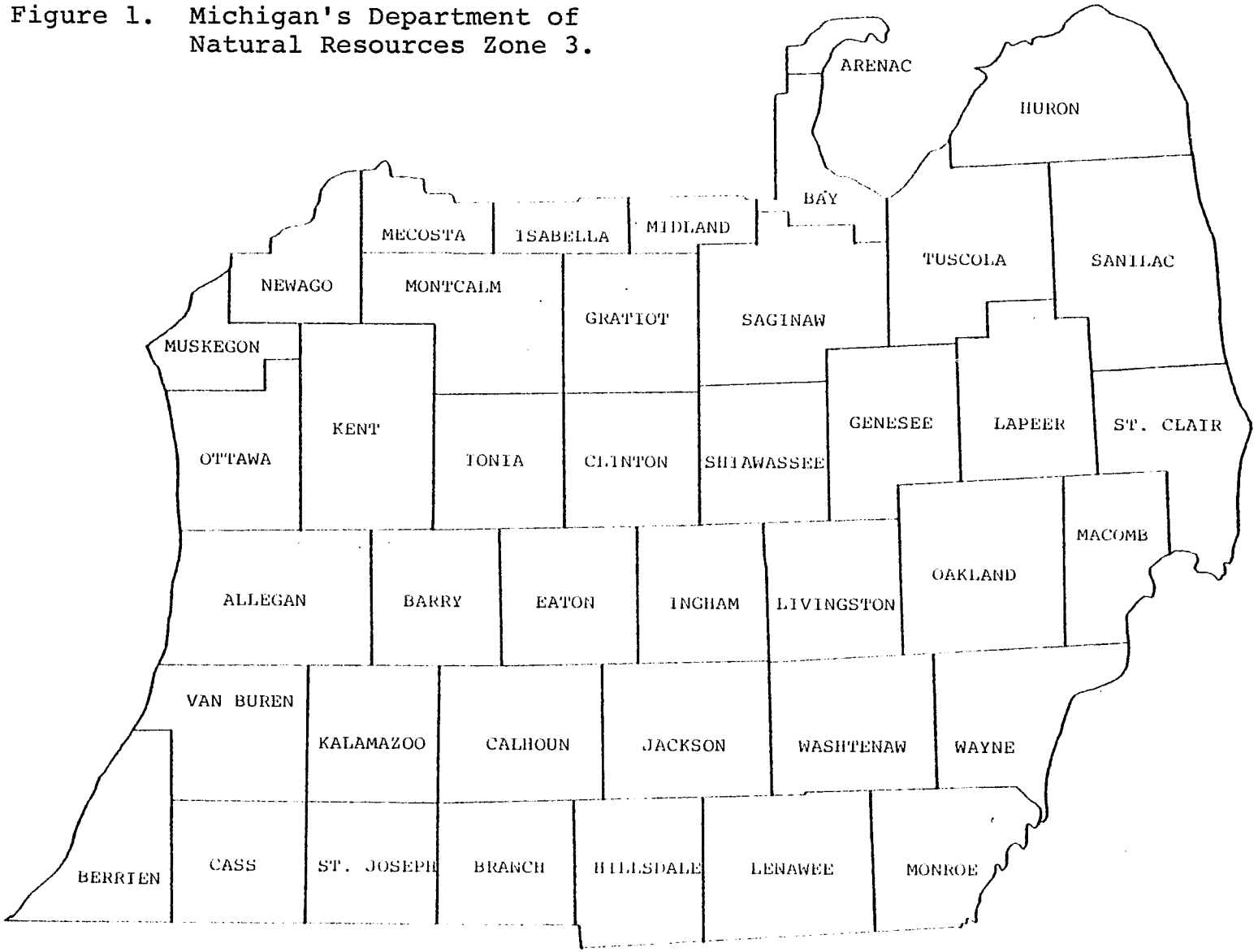
participating hunters and landowners felt them to be a success in terms of providing hunting opportunities and compensating landowners for such provision and felt their cancellation was premature. In several respects, Public Act 373 was seen as an authorization for the continuance of these programs.

The PAS Program covers a particular geographic region of Michigan, DNR zone 3 (see Figure 1), which was viewed by sponsors of Public Act 373 and Michigan's DNR as the region most in need of additional public hunting opportunities given current availability of public hunting land and hunter concentrations. In addition, the Program, while available to all hunters who purchase the Public Access stamp, is targeted at a specific client group--the urban dwelling hunter without rural land contacts. It is believed that this "urban hunter" experiences greater difficulty in finding land upon which to hunt and obtaining permission from the landowner to hunt on this land than his "rural hunter" counterpart.

Figure 2 shows the relationship of the three groups associated with the PAS Program. Hunters are essentially "consumers", landowners are "suppliers" and the WD acts as coordinator of the Program.

Public Act 373 was signed into law by Governor Milliken on December 23, 1976, and slated to begin

Figure 1. Michigan's Department of Natural Resources Zone 3.



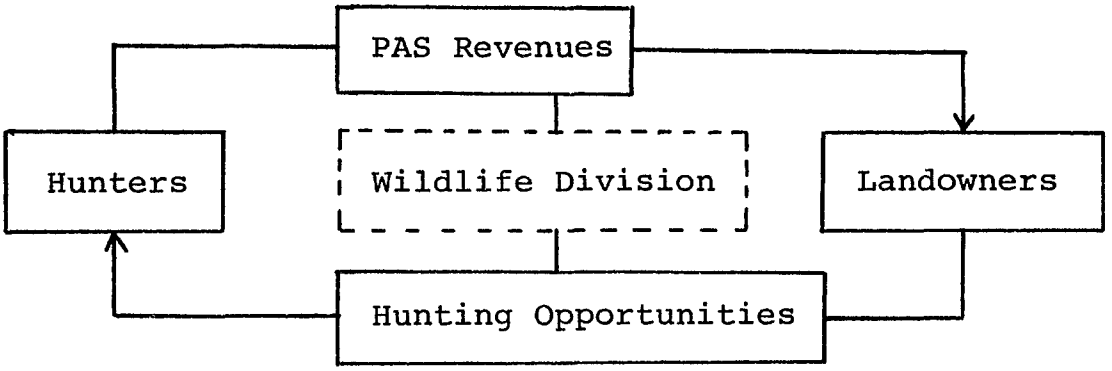


Figure 2. PAS Program.

September 15, 1977. During this ten month period, considerable work was required of the WD. Procedures and guidelines had to be developed to solicit landowners to participate, lease land from them and market the resultant hunting opportunities to hunters (an example of the WD's efforts towards landowners is in Appendix B). With respect to its marketing efforts towards hunters, the WD relied on news releases to local Michigan newspapers, news media, hunting organizations and clubs, and provided lists of participating landowners and farms to interested hunters (see Appendix C).

Since revenues from the sale of Public Access Stamps were not available to the WD until the end of the 1977-78 hunting season, first year operating expenses[1] had to be provided from the WD's existing budget which was already allocated to existing programs. The combination of insufficient lead time and lack of funding combined to hamper the PAS Program in its first year. Even so, over 93,000 acres were leased from a total of 472 landowners in 35 counties of zone 3 (see Figure 3). Hunter response is more difficult to measure. Chapter V presents an estimate of the Program's first year impact on southern lower Michigan hunters.

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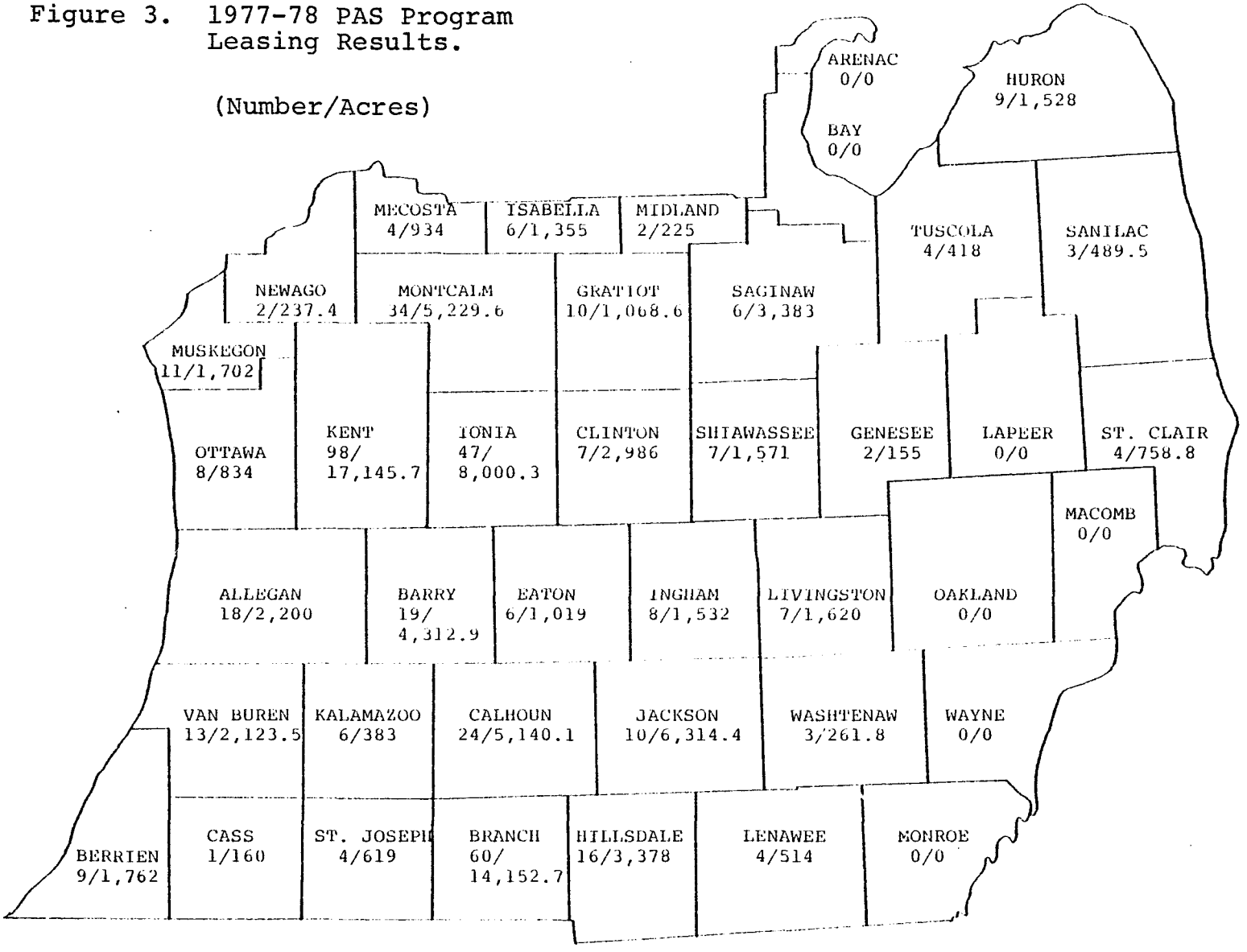
[1]Operating expenses included salaries, supplies, printing costs and travel. Payments to participating landowners were not made until the end of the 1977-78 hunting season when fees collected from hunters were available.

Figure 3. 1977-78 PAS Program Leasing Results.

(Number/Acres)



1.4 Study Purpose and Objectives

In order for the WD to effectively administer the PAS Program, appropriate information on southern lower Michigan landowners and hunters is necessary. Previous research has generated much valuable information about these two groups but has not provided complete and detailed information related to the PAS Program (for an overview of research on hunters, see Chapter II, Section 2.4). Some of this information is of value to administrators of the PAS Program, but other new and specific information is needed to support the Program's development and evaluation. The purpose of this study was to provide the WD with information on the characteristics and behavior of southern lower Michigan hunters and their first year experiences with the PAS Program. Landowner research is needed and is being undertaken in support of this Program, but is not reported herein.

Given the scale of the PAS Program and its potential impact (both positive and negative) on hunters in southern lower Michigan, it is imperative to determine if the program with its current objectives and structure is in fact needed. There is sufficient evidence that the number of hunting opportunities is declining and cannot be significantly increased via the Game and Wildlife Area Acquisition

Program (Michigan Department of Natural Resources 1975a). The important issue with respect to the PAS Program is whether or not this decline has negatively impacted urban hunters without rural land contacts (i.e., urban hunters who do not know any or many rural landowners). Study Objective 1 stated below consists of two parts. First, it is necessary to determine if "urban hunters without rural land contacts" exist in enough numbers to warrant the Program regardless of whether or not they have adequate access to private lands. Previous research has found hunters to be predominantly rural residents (Hendee 1969; Sofranko and Nolan 1970; and Hendee and Potter 1976). Second, if there is a significant number of urban hunters without rural land contacts in southern lower Michigan, it is necessary to establish this group's perception of the number of hunting opportunities available to them. Study Objective 1 is stated as follows:

1. To determine if the PAS Program is needed, specifically,

    a. to determine if there exists a significant segment of the total zone 3 hunter population that can be characterized as "urban without rural land contacts" and

    b. to determine the level of satisfaction this segment has with the number of hunting opportunities available to them.

Several studies have been conducted in Michigan profiling hunters (see Chapter II, Section 2.4). These efforts, however, have not provided all the information

needed to administer the PAS Program effectively and efficiently. For example, while information on game harvested is readily available, information on what game is sought, but not always harvested is not available. Furthermore, this previous information cannot be associated with the PAS Program's clients to establish if they differ significantly from other hunters. Study Objective 2 is divided into two parts to meet this specific need and is stated as follows:

2. To profile zone 3 hunters on the basis of their characteristics and behavior and to determine if the segment of hunters identified in Study Objective 1 differs from the rest of zone 3 hunters with respect to their characteristics and behavior.

As described in Chapter III, Section 3.2, relatively little information is available on how hunters select hunting sites. Given the total tasks involved in this study and the resources available to complete it, it was not possible to completely investigate this important aspect of hunting behavior but it was deemed too important to totally ignore. It was decided to allocate some resources to theory development and testing even though it was highly probable that this task could not be completed to the point that results could be applied with complete confidence to the PAS Program. A conceptually arrived-at hypothesis dealing with hunters' hunting site selection strategy and several factors previously not investigated that potentially affect that strategy was the extent of

involvement in this area. Thus, Study Objective 1 can be stated:

3. To investigate some of the parameters of the hunting site selection process of zone 3 hunters and to determine if zone 3 hunters can be segmented on the basis of how they select hunting sites.

Although the PAS Program has been in existence for a short time and as such has had little time to meet its objectives, an initial evaluation of the Program can provide information for improving the Program in the future. Such an initial evaluation considering lands leased, information provided, requirements of participating hunters and hunter reaction to the Program was therefore proposed. Study Objective 4 outlines this preliminary evaluation as follows:

4. To evaluate the PAS Program in 1977-78 on the basis of lands leased, information provided to and requirements placed on participating hunters, and zone 3 hunters' reactions to the Program.

1.5 Study Limitations

Constraining the degree to which the above four Study Objectives could be pursued were two major limitations, i.e., time and money. Since the PAS Program has a legislatively designated six year life span, it was crucial to supply the WD with information as soon as possible. Any changes in the Program to improve its effectiveness will require time to be implemented and time to show results.

The sooner any necessary recommendations are made, the sooner improvements can proceed. This time schedule did not permit as comprehensive and complete a study of all factors influencing the PAS Program that the research team and the WD would have preferred.

In addition, the amount of money and other resources available for the study limited the depth to which the Study Objectives could be addressed. This lack of funding primarily affected the size of the sample of zone 3 hunters surveyed and the choice of survey procedure. These two constraints should be considered when interpreting the results of this study.

1.6 Organization of the Dissertation

The remainder of this dissertation is divided into seven chapters. Chapter II presents the findings of a review of literature associated with hunter access programs and hunters. Chapter III proposes a conceptual approach to hunting site selection based on an examination of hunter behavior and consumer behavior models. Chapter IV presents the research hypotheses postulated and discusses the research methods developed to meet the study's objectives and test the research hypotheses. Chapter V reviews the study's general findings--the results of the survey. Chapter VI presents the results of the testing of

the research hypotheses. Chapter VII summarizes the dissertation and presents recommendations for the PAS Program and for further research on the Program and on hunting site selection.

CHAPTER II: LITERATURE REVIEW

2.1 Introduction

There is a considerable amount of research literature relating to hunting. The purpose of this chapter is to review the portion of this literature pertaining to the subject of this study. Relevant research literature on hunting, private lands and access program evaluations, and hunters is reviewed in this chapter. Additional research on a specific aspect of hunter behavior, hunting site selection, is reviewed in Chapter III, Section 3.2.

2.2 Hunting, Private Lands and Less Than Fee Simple Land Acquisition Techniques

There is a general consensus that in many areas of the U.S. private lands play a crucial role in the provision of hunting opportunities. This emphasis on the role of private lands is prompted by a concern over the scarcity of public hunting lands relative to hunters (Allen 1973; Bond and Whittaker 1971; and Durell 1969), a concern over the rising cost of land suitable for hunting (Stoddard and Day 1969; and Winton 1971) or a realization that private

lands often have better habitat for many species of game (Cain 1962).

Research on the enhancement of hunting opportunities on private lands, however, has been minimal. Hendee and Potter (1971:389) recognized this paucity of research and suggested:

> Research can help with studies defining ... the conditions under which (private land) will be available or withdrawn, the experimental testing of new access programs ... and the study of factors associated with access.

The realization of hunting opportunities on private lands is dependent upon landowners maintaining wildlife habitat. Stoddard and Day (1971:187) described why landowners may not maintain wildlife habitat as follows:

> Most rural private land is managed so as to maximize revenue from income-producing crops--livestock, farm crops, such as corn and wheat, timber or other commodities--and <u>not</u> for such intangibles as ... wildlife production. ... Thus there has been a negative economic incentive to landowners to consider these intangibles in their land management programs.

Many sources have stressed that landowners deserve economic compensation if hunting opportunities are to be maintained or increased on private lands (Berryman 1957; Bolle and Taber 1962; Braun 1967; Howard and Longhurst 1956; Kimball 1963; Knott 1963; Lincoln 1964; MacArthur 1959; Richards 1964; and Smith 1960). In the <u>Recreation Imperative</u> (Bureau of Outdoor Recreation 1974:369), a

draft of the nationwide outdoor recreation plan, it is recommended that:

> Incentives should be provided for public use of private lands ... This should include governmental arrangements with private owners of idled farmland and woodland to permit public use of such land for outdoor recreation activities, such as hunting.

McIntosh (1966), however, has suggested that there does not appear to be much opportunity in the near future for increased income to private landowners from the marketing of hunting rights (in West Virginia) due to abandonment of farmlands, wildlife habitat losses, increases in state-owned or leased hunting lands and because landowners value open and free hunting.

Less than fee simple land acquisition techniques, e.g., leasing, are one possible means of offering private landowners a positive economic incentive to maintain wildlife habitat and allow hunters access (Clawson and Knetsch 1963; Kaskaitas 1971; and Mahoney 1975). A number of sources have reported on or called for the use of less than fee simple land acquisition techniques (American Forest Products Industry 1965; Jackson 1971; Johnson 1966; McCurdy and Eschelberger 1968; Sargent, et al. 1958; Scheffer 195; Shaw 1975; Smith and Jordahl 1959; Stransky and Halls 1968; Uhlig 1961; Whyte 1962; and Winton 1971). In a comprehensive report for the Outdoor Recreation Resources Review Commission, Cain (1962:36) recommended:

> (T)he States should ... encourage and facilitate arrangements between ... (hunters) and private landowners for hunter access to lands supporting farm-related game, and such efforts should not preclude ... land-leasing systems that return to the private landowner a benefit for his economic interest in the land and the game it produces.

Less than fee simple land acquisition techniques have been found to be particularly successful in maintaining key game habitat types (Isley 1971; Martin 1971; Meyers 1971; and Wallerstrom 1971).

There is some indication that not all private landowners favor less than fee simple land acquisition techniques (Taylor 1963; and Waldbauer 1966). The potential for improving access conditions via the use of less than fee simple land acquisition techniques in areas of limited hunter access has not been well documented (Holecek and Westfall 1977).

2.3 Hunter Access Program Evaluations

As mentioned in Chapter I, Section 1.2, two federal programs have provided hunters access to private lands using less than fee simple land acquisition techniques. The first program was operated by the Agricultural Stabilization and Conservation Service (ASCS) as part of the U.S. Department of Agriculture's Cropland Adjustment Program (CAP) authorized by the Food and Agriculture Act of 1965.

Approximately 800,000 acres were acquired with five to ten year leases nationwide (Bureau of Outdoor Recreation 1973).

Nason (1971) evaluated this program in Nebraska and found that for hunters who were familiar with the program and who had hunted CAP lands during the 1970-71 season, 93 percent favored continuance of the program (four percent did not favor continuance and three percent did not respond). This figure decreased to 85 percent for hunters who were familiar with the program but who did not hunt CAP lands during the 1970-71 season (four percent did not favor continuance and 11 percent did not respond). Only 35 percent of hunters who knew of the program but had never hunted CAP lands favored continuance (four percent did not favor continuance and 61 percent did not respond).

Machan and Feldt (1972) also examined the public access component of the CAP in Indiana and found that improved regulation of hunters was needed on participating farms. Boyce (1967) reported the program's first year results in Michigan and concluded that s significant quantity of land had been opened to public hunting at a minimal cost. Besadny and Calabresa (1967) provided a descriptive report of the CAP public access program in Wisconsin but offered no measure of program performance.

The other federal program designed to provide hunters with access to private lands was the Pilot Public Access Program operated by the ASCS as part of the Set Aside Program authorized by the Agriculture Act of 1970. Public

access agreements were offered in five counties in each of 10 states in 1972-74.[1] In 1972, 1.3 million acres were leased in the 10 states (Bureau of Outdoor Recreation 1973) increasing to almost 1.8 million acres in 1973 (Womach, et al. 1975).

Womach, et al. (1975:2-5) evaluated the program and summarized their findings as follows:

1. Among the 10 states in the pilot program, the most success has been achieved in states where the need was the greatest.

2. The program has been highly successful in Oregon (where the need appears to be minimal) because it is administered to meet some localized needs of a heavily populated area.

3. The most serious concern of the state wildlife agencies (who assisted in operating the program) is habitat development. Under the Public Access Program farmers are not given an incentive to undertake longer term efforts for wildlife habitat development. Hunting agreements are for only one year and public access is their prime goal. Therefore, the states do not see the program as a suitable alternative to their own efforts at meeting hunting needs or even as a program they can heavily contribute to given its current design.

4. According to farmer estimates, farms in the program received over twice as many hunter visits as the nonparticipating farms.

5. Prior to the Public Access Program, 74 percent of participating farmers either allowed the public to hunt without restriction or allowed hunting by permission.

6. Even if the Public Access Program is discontinued in 1975 the participating farmers do not intend to impose additional hunting restrictions. Seventy-one percent of these farmers will either allow

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[1]The 10 states and the counties therein varied from year to year.

the public to hunt without restriction or will allow hunting by permission.

7. Participating farmers like the program and overwhelmingly want it continued.

8. Nearly all the hunters want the program to be continued and expanded.

In conclusion they state,

> The Public Access Program did satisfy a demand for hunting opportunities. But the improvement brought about was in the nature of a qualitative change rather than quantitative. The program did not substantially increase the number of farms accessible to hunters. What it did was to identify the farms where the public was already allowed to hunt. The program was in effect a marketing service.

Their conclusions were based on the premise that the goal of the Pilot Public Access Program was to provide hunting opportunities on land that would otherwise be unavailable. The program's objective was not to better utilize private lands already open to hunting which the program appears to have accomplished. Since the program did not appreciably increase the quantity of private lands open to hunting, it was judged a failure although one might reasonably question this conclusion especially if alternative measures of success/failure are favored.

Brown and Dawson (1977:256) also evaluated the landowner "side" of this program in New York. In commenting on the above evaluation, they stated:

> The ASCS program was generally concerned with providing assistance to farmers, and in-house evaluations did little to determine the overall impact of the program on the problem of public access.

Of the various state programs relying on less than fee simple land acquisition techniques to increase or maintain wildlife habitat or access to private lands none have been evaluated to the same degree as federal programs. Descriptive reports of programs in Montana (Kent 1973) and Wisconsin (Steinke 1957; and Martin 1971) are available but offer no examination of program performance. Thus an evaluation of a state program would benefit state agencies considering the use of such techniques.

2.4 Hunters

As Hendee (1972) has described it, the emphasis in wildlife management has gradually shifted from the production of game ("game bagged") to an emphasis on the provision of hunting-days ("days afield") to a concern with hunting satisfaction ("value of the experience"). With this changing emphasis, there has been a growing body of research on hunters, their characteristics and their motivations.

Hunter characteristics have been reported by many sources (Alexander 1974; Applegate 1977; Berger 1974; Bevins, et al. 1968; Bond and Whittaker 1971; Bureau of Sport Fisheries and Wildlife 1977; David 1966; Doll and Phillips 1972; Durell 1967; Ellis 1972; Garrett 1970; Gilbert 1975; Gun, et al. 1973; Kirkpatrick 1965; Klessig and Hale 1972; Lacaillade 1968; Lobdell 1967; More 1970; Peterlee 1967;

Peterlee and Scott 1977; Plummer 1971; Ratti and Workman 1976; Sendak and Bond 1970; Sherwood 1970; Sofranko and Nolan 1970; and Wright, et al. 1977). Hendee and Potter (1976) have summarized much of this research. They found that hunters are predominantly middle-aged adults averaging only slightly more education than the general population. The occupational and income distribution of hunters closely resembled that of the general population. As opposed to the general population, however, a majority of hunters spent their childhoods in rural areas. Hunters were found to be relatively well organized with a well developed communications network.

Michigan hunters have also been studied relatively extensively. Most of these studies have been of special hunter populations, i.e., shooting preserve users (Greene 1970), young hunters (Langenau and Mellon-Coyle 1978), southern lower Michigan State Game Area hunters (Palmer 1967) and deer hunters (Watson, et al. 1972). Two Michigan studies profiling hunters in general are dated at this time and provide relatively minimal management information (Jamsen 1967; and Ryel, et al. 1970).

Research indicating hunters' socioeconomic characteristics has been useful in determining economic values for hunting and in determining hunting participation rates. Perhaps of as much value to wildlife managers is research identifying hunters' motivations. Hendee's "Multiple

Satisfaction Approach" (1974) has provided a conceptual framework for investigating hunters' motivations and applying the results of such research. Hendee's Multiple Satisfaction Approach is presented in Figure 4. The important contribution of this approach to wildlife management is that game and the act of hunting are viewed as means to an end not ends in themselves.

Numerous studies have empirically supported Hendee's contention that hunters are motivated by a number of factors, e.g., success, companionship, exercise (Bjornn and Williams 1974; Brown, et al. 1977; Hauslee, et al. 1973; More 1973; Potter, et al. 1973; Schole, et al. 1973; and Stankey, et al. 1973).

This substantial body of research on hunters has provided many insights on hunters with implications for wildlife management. For example, the finding that most hunters have rural backgrounds may indicate that as the general population becomes more and more urbanized, hunting may become less popular as a recreation activity. Recent indications that a small but significant rural exodus is occurring may temper this trend (Manning 1975). The research on hunter motivation suggests that wildlife managers should consider non-game factors in their management programs, e.g., camping facilities. As valuable as this hunter research has been, it has provided relatively little information useful with respect to this study and the PAS

General Model	General Example	Specific Example
RESOURCE	OUTDOOR RECREATION RESOURCES	GAME AND FISH
↓	↓	↓
MEANS OF UTILIATION (how the resource is tapped to gain a product)	RECREATIONAL ACTIVITIES AND EXPERIENCES	HUNTING AND FISHING
↓	↓	↓
PRODUCT (what is derived from the resource)	MULTIPLE SATISFACTIONS	EXERCISE, DISPLAYING SKILLS, COMPANIONSHIP, SUCCESS, ETC.
↓	↓	↓
GOALS (ultimate objectives of management)	HUMAN BENEFITS	PHYSICAL BENEFITS (such as health), PSYCHOLOGICAL BENEFITS (such as self-esteem) PERSONAL BENEFITS (such as social relationships), ECONOMIC BENEFITS (such as food)

Figure 4. Hendee's Multiple Satisfaction Approach.

Program. The hunting site selection process, a focus on this study, has not been of interest to researchers in many instances. The relatively small amount of work in this area is reviewed in Chapter III, Section 3.2.

2.5 Conclusions

A number of general conclusions can be drawn from this review. First, less than fee simple land acquisition techniques (e.g., leasing) offer wildlife agencies a means of maintaining and possibly increasing hunting opportunities on private lands. Second, hunter access programs incorporating less than fee simple land acquisition techniques appear to be as much a marketing program as a land acquisition program for wildlife agencies. Third, the majority of research on hunter access programs and hunters has not provided wildlife agencies with the "marketing" information necessary in order to implement hunter access programs, namely how do hunters select hunting sites. The initiation of this study was prompted by this lack of marketing information.

CHAPTER III: RESEARCH MODEL

3.1 Introduction

The manner in which hunters select hunting sites may have a significant impact on the effectiveness of the PAS Program. If hunters do not normally use or know how to use the information on hunting sites that is now being provided in connection with the PAS Program, then they probably will not take full advantage of the PAS Program hunting sites available. Therefore, the Wildlife Division (WD) must have some understanding of how hunters actually select hunting sites and tailor its program marketing efforts in such a way that information on PAS Program hunting sites is usable by potential program participants. An explanatory model of hunting site selection (HSS) would assist in meeting this need.

An extensive review of the literature relating to the study's subject (see Chapter II) did not reveal a model of HSS amenable to this study's research design and objectives. The HSS models reviewed are presented in Section 3.2 of this chapter.

As mentioned in Chapter I, Section 1.4, research resources for this study were not sufficient to allow for

complete development and testing of a HSS model. Such theoretical development would have required a far more elaborate research design than that used for the study. Even so, an exploratory effort towards explaining HSS was desired. The alternative selected was to develop a hypothesis based on a simplified model of HSS. The results of testing this conceptually arrived at hypothesis will hopefully prove of value with respect to the PAS Program and also may assist in the development of needed, larger scale future studies.

The Chapter begins by discussing hunting site selection and some previous approaches to explaining it. It next identifies the dependent variable of interest and those variables assumed to be related to the dependent variables. The selection process is then described based on a consumer behavior approach. Last, the integrated HSS model is presented.

3.2 Hunting Site Selection

Before a hunter hunts, he must know of a place to hunt, have permission to hunt it and be able to get to it. In the past, wildlife managers seeking to provide hunting opportunities on private lands have concerned themselves mainly with the quantity and quality of game on private lands. If hunters do not even know of the availability of

private land hunting opportunities, then wildlife managers' efforts to enhance wildlife habitat on private lands mostly benefits hunting landowners. Therefore, the way hunters select hunting sites may be of as much importance to wildlife managers seeking to expand hunting opportunities on private lands as the quantity or quality of game or wildlife habitat.

Relatively few researchers have pursued this topic. Talhelm (1973:21-22) utilized a taxomic approach in defining recreation sites as a preliminary step in measuring site value. He states:

> (D)ifferent recreation resources have different attributes of diverse importance to users. Nearly any recreation resource (e.g., ... a given location for hunting), can be characterized by enumerating the attributes of the associated recreation experience that users expect. For example, duck hunting areas might be characterized by the probability of bagging ducks, the species mix of ducks, the crowding conditions, the type of hunting habitat, regulations, the extent to which publicity has influenced expectations, and other such attributes ... The idea is to use the permutations of attributes to define the different character ... of recreation, in such a way that each character is unique from the user's point of view ... If we have correctly defined and identified the various characters, few users will have any reason for not going to the closest site of any given character ... (H)unters or others select the most convenient sites having the attributes important to them, considering the availability of sites having other attributes.

Talhelm's approach is valuable in its recognition that recreation sites are composed of a set of site attributes which can be identified and that these attributes attract recreationists. He recognized a weakness in his approach,

however. He states: "(U)sers may lack knowledge of the attributes of the various sites, and thus mistakenly go to less advantageous sites."

This "lack of knowledge" problem becomes a major concern when recreation sites are unpublicized, i.e., hunting sites on private lands.

Wennergren, et al. (1977:401) relied on a behaviorally based (hunting participation) approach to develop economic values of hunting sites. Like Talhelm, they assumed hunters had knowledge with respect to the location and attributes of all hunting sites studied. They stated: "Recreation sites are selected and activity levels are determined by recreationists on the basis of both quality characteristics and location of sites."

They examined 74 designated deer hunting sites in Utah. Differences in site quality were hypothesized to be a function of variation in selected physical characteristics associated with the hunting site including,

1. Ratio of square miles of summer range to square miles of winter range,
2. Ratio of square miles of private land to square miles of total land,
3. Number of deer harvested per trip,
4. Number of deer harvested per square mile,
5. Ratio of number of bucks 2.5 years of age or older harvested to the total deer taken,
6. Total hunter days per square mile,
7. Number of non-resident hunters per square mile, and

8. Length of the hunting season as established by state wildlife administrators.

Differences in characteristics of hunters using the sites were not included in their analysis.

Regression equations were used to identify physical characteristics associated with site quality. Of the eight independent variables included in their analysis, number of deer killed per trip and the ratio of square miles of summer range to square miles of winter range were statistically significant. They argued that, "(t)he potential for a successful hunt is important to hunters making decisions relative to site selection" (1977:405).

Wennergren, et al. made a contribution in specifying empirically verified physical characteristics of the hunting site that influence site selection by hunters. In examining 74 designated deer hunting sites, however, they limited the applicability of their findings to hunting behavior in general. Big game hunting is different in several respects from small game hunting, i.e., seasons are shorter, game is less abundant, hunter pressure is generally greater, which in combination mean a successful hunt is less likely. Therefore, it is likely hunters expend more effort in selecting big game hunting sites.

For certain types of hunting, e.g., deer and waterfowl, Talhelm's and Wennergren, et al.'s assumption of perfect knowledge of the attributes and location of all alternative hunting sites may be acceptable. For small game hunting,

however, it is less acceptable to assume that hunters are aware of the attributes and location of all alternative sites. Therefore, relying on hunter behavior (participation) to define the HSS process associated with such "less important" hunting sites may not be as appropriate. Furthermore, HSS may not be as external to the hunter as Wennergren, et al. suggest.

Kennedy (1971) proposed a more complex model of the hunting area selection process as shown in Figure 5. Kennedy (1971:38) assumed that:

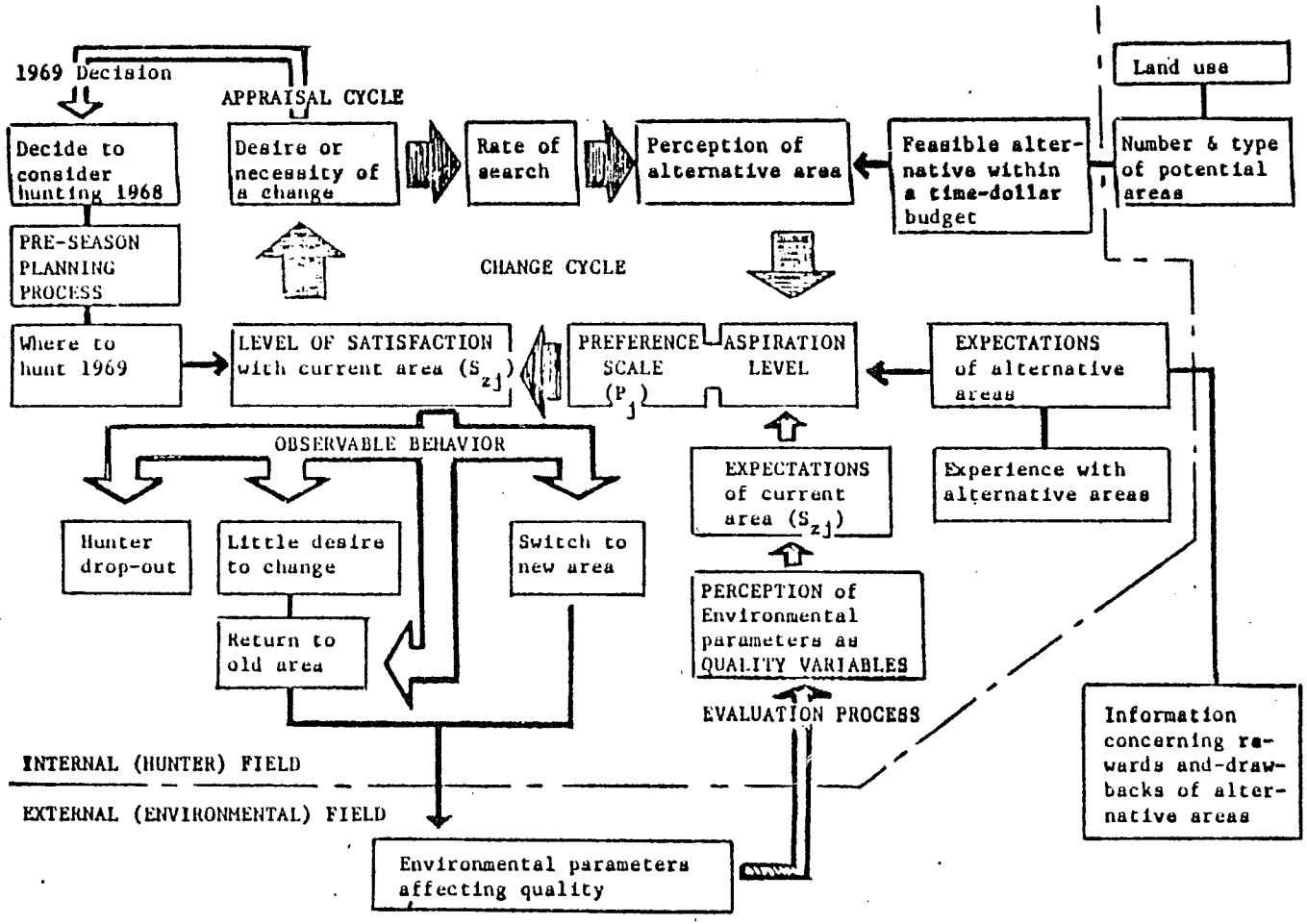
1. The area upon which recreation takes place does have a significant effect upon the final enjoyment of the experience,
2. Recreationists exhibit some rational or purposeful site selection behavior, and
3. Motivation is assumed.

His model incorporated three major "subroutines",

1. An evaluation process,
2. An appraisal cycle, and
3. A change cycle.

The evaluation process consists of matching rewards experienced to rewards expected, e.g., killing a deer. Based on the results of the evaluation process the hunter then enters a change cycle. Once a hunter hunts an area he may return his next trip or change areas. The change cycle represents this latter, searching behavior. Finally, the appraisal cycle is the interseasonal or long run time

Figure 5. Kennedy's Hunting Area Selection Process.



period in which benefits of certain hunting areas are reflected upon.

In his empirical investigation of Maryland's Pocomoke State Forest deer hunters, Kennedy focused on two site quality variables, namely crowdedness (hunter density) and hunting success (harvest rate). Both of these variables were found to influence hunters' evaluations of the Pocomoke State Forest.

The change cycle and the appraisal cycle of the hunting area selection process were not empirically investigated to the same extent as the evaluation process. The change cycle, however, is the one subroutine of Kennedy's model that most closely relates to the PAS Program. His focus on the evaluation process and not the change cycle leaves many questions unanswered, i.e., are information sources and information related to HSS?

Because of Kennedy's focus on the evaluation process and his lack of consideration of the role information sources and information may play in HSS, his model was not utilized for this study.

While the models developed by Talhelm, Wennergren, et al. and Kennedy are of interest with respect to this study, their approaches do not exactly fit the study's requirements. The weakness common to all three approaches is that they rely on the assumption that all hunters select hunting sites in essentially the same manner. Talhelm and

Wennergren, et al. assume hunters are "economic men", i.e., utility maximizers searching for the one hunting site with the best set of physical attributes. Kennedy's model is somewhat more complex but it is basically an economic approach with a rationality assumption.

Unlike these previous HSS models, the basic assumption underlying this study is that hunters select hunting sites differently. A model explaining HSS as a single type of decision was not viewed as realistic or practical. Therefore, a simplified conceptual model of HSS was developed specifically for this study in which the dependent variable of concern for the model was defined as the hunter's decision strategy--how the hunter selects a hunting site. This variable, Y_i, has more than one value,

$$i = 1, 2, 111, n.$$

where n = the number of decision strategies.

The general form of the model is,

$$Y_i = f(X_j)$$

where Y = the dependent variable (HSS decision strategy),

i = 1, 2, ..., n,

n = the number of decision strategies,

X = the independent variables (factors related to the HSS decision strategy),

j = 1, 2, ..., m, and

m = the number of independent variables.

Since previous HSS models did not differentiate HSS decision strategies, other decision models were examined.

3.3 Insights from Consumer Behavior Research

Many marketing and consumer behavior researchers have stressed the idea that consumer behavior is decision-making (Engel, et al. 1977; and Green and Wind 1975). Cooper (1969:6) postulated that consumers are "risk reducers"[1] and their decisions can be classified as one of eight decision strategies as follows:

1. Scrutinize Alternatives. This is the solution of rational decision-making. The decision-maker assembles impartial information by using his or her own skills or through "expert" sources, in order to optimize the decision.

2. Use Related Cues. For example, price, company images, etc., are traditionally associated with value.

3. Avoid Hazardous Decisions. The decision-maker can rely upon past experience--"brand loyalty."

4. Wait. Planning to spend, for example, on consumer durables, can pass through a lengthy "incubation period."

5. Imitation. Following other people's choices externalizes the risk.

6. Flirt with Risk as in Gambling. That is, deliberately choosing an alternative with a high pay-off value, but which has little chance of success (bargains).

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[1]Cooper described consumer behavior as risk-reduction--consumers try to reduce the risk of the consequences of a poor purchase.

7. Ignore the Risk. Choose alternatives at random, irrespective of cost, pay-off, or value.

8. Satisficing. "Satisficing" refers to choosing that solution first encountered which meets minimal requirements.

While it is likely that most consumers use more than one of these strategies in different buying situations, it is reasonable to expect that consumers tend to use the same strategy when confronting the same buying situation. The eight decision strategies in a sense, form a continuum of consumer decision-making from the consumer expending considerable effort in buying (1.) to consumers expending little purchasing effort 3., 4., 5. and 7.).[1]

3.4 Hunting Site Selection Model

Cooper's eight decision strategies were simplified into five possible HSS decision strategies as shown in Figure 6. As Cooper recognized, some individuals decide by habit. Others are systematic in their decision-making and resemble the rational economic man. Some rely on other's decisions. Others accept the first alternative meeting their requirements. Finally, some individuals rely

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[1]Another explanation of consumer behavior with the same decision strategies as Cooper is that consumers have or are willing to expend differing amounts of time to reach a decision, i.e., some consumers lack the time to compare alternative products. It is also reasonable to expect that the type of decision strategy varies with the type of product being considered, i.e., relatively major purchased most likely to have major consequences and involve more decision time.

on cues to make decisions. These five decision strategies represent the values of the model's dependent variable, HSS Decision Strategy.

There are probably a large number of factors that relate to the HSS decision strategy a hunter uses. The time available to the hunter to make decisions obviously plays a role. The study's research design did not allow this variable to be adequately incorporated into the model.

The independent variables included in the model were selected on the basis of,

1. Results of the pre-test,[1]
2. Previous research on HSS, and
3. Variables specifically selected by the research team.

The independent variables were,

1. Years Hunted. It was expected that a hunter's hunting experience, measured as years hunted, relates to his decision strategy.
2. Number of Areas Hunted. The alternatives available to the hunter, measured as number of areas hunted, was assumed to relate to his decision strategy.
3. Variety of Game. The variety of game sought, measured as the number of types of game hunted, was postulated to relate to HSS.
4. Kill. Wennergren, et al. (1977) and Kennedy (1971) stressed the relationship between success and HSS, here measured as the importance of killing game to the hunter.

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[1]The pre-test is discussed more fully in Chapter IV, Section 4.3.

1.
Habit.

Hunt same site(s) every year.

2.
Systematic.

Gather information on many sites, analyze information, then hunt "best" site(s).

3.
Recommended.

Hunt site(s) recommended by others.

4.
Satisfice.

Hunt site(s) that meet minimum requirements.

5.
Important Feature.

Hunt site(s) that have feature considered important, e.g., good cover, hunting permitted.

Figure 6. HSS Decision Strategies.

5. Where. It was hypothesized that the proximity of the hunting site, measured as the distance travelled to hunt, would impact the hunter's decision strategy.

6. Who. Kennedy (1971) recognized the importance of the group, measured as hunting party size, on individual decision-making.

7. Variety of Information Sources. According to Eisele (1972), the number and type of information sources used to obtain information on hunting sites is related to HSS.[1]

8. Variety of Information. How many types of information used, measured as the number of types of information, was expected to relate to the hunter's decision strategy.

The simplified conceptual HSS model developed for the study is presented in Figure 7. If one visualizes the dependent variable, HSS Decision Strategy, as ranging from no effort ("habit") to minimum effort ("recommended") to medium effort ("important feature" or "satisfice") to maximum effort ("systematic"), then to some extent the dependent variable can be ordinally measured. Based on this ordinal ranking, the two medium effort HSS decision strategies, "important feature" and "satisfice", were combined for analytical purposes (see Chapter IV, Section 4.2.3).

The empirical analysis of the HSS model is described in the next Chapter. Given the limitations of the survey procedure, only one research hypothesis relating to the model was developed. The model, however, may provide a basis for future work concerning HSS. In addition, the

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[1]Type of information sources was not empirically analyzed due to the nature of the survey procedure.

$$\underline{\text{HSS Decision Strategy}} = f(\underline{\text{Years Hunted}}, \underline{\text{Number of Areas Hunted}}, \underline{\text{Variety of Game}}, \underline{\text{Kill}}, \underline{\text{Where}}, \underline{\text{Who}}, \underline{\text{Variety of Information Sources}}, \underline{\text{Variety of Information}})$$

Figure 7. HSS Model.

proportion of hunters utilizing a particular decision strategy may have a bearing on the effectiveness of government programs, e.g., the PAS Program, that attempt to provide additional hunting opportunities to hunters.

CHAPTER IV: RESEARCH HYPOTHESES AND METHODS

4.1 Introduction

The research hypotheses and methods of the study were formulated in response to the study objectives presented in Chapter I, Section 1.4. This Chapter first presents the research hypotheses in both conceptual and operational forms along with the variables of interest and the statistical technique chosen. The last section of the Chapter discusses the research methods employed in the study (sampling, questionnaire design, etc.).

4.2 Research Hypotheses

The discussion of each research hypothesis includes:

1. the study objective from which the hypothesis was derived,
2. A conceptual statement of the hypothesis,
3. the variables of interest and an explanation of their measurement,
4. the statistical technique selected to test the hypothesis and the significance level used, and
5. an operational statement of the hypothesis.

4.2.1 Research Hypothesis 1: The PAS Program is Needed

Research Hypothesis I was derived from Study Objective 1:

a. to determine if there exists a significant segment of the total zone 3 hunter population that can be characterized as "urban without rural land contacts" and

b. to determine the level of satisfaction this segment has with the number of hunting opportunities available to them.

The significance of the proportion of zone 3 hunters that can be characterized as urban without rural land contacts must be determined by the PAS Program administrator, the WD. Therefore, Research Hypothesis I deals with part b.

Conceptually stated, Research Hypothesis I is:

> Zone 3 urban hunters without rural land contacts (PAS Program Clients) are less satisfied with the number of hunting opportunities available to them than are the other zone 3 hunters.

Research Hypothesis I is concerned with both the significance and the direction of the relationship between PAS Program client status and satisfaction with the number of hunting opportunities.

The variables involved in Research Hypothesis I include PAS Program Client Status and Satisfaction. PAS Program Client Status has values of "Client" and "Other Hunters."

The variable was created in the following manner. First, residence status was established by response to question #1 of the survey instrument (see Appendix D). Then the existence of rural land contacts was determined by response to question #7. These two responses were then combined to establish PAS Program Client Status. A hunter living in a medium or large city and recording no (0) days hunted on his own, a friend's, a neighbor's or a relative's property was classed as a "Client." All other hunters were classed as "Other Hunters."

The variable, Satisfaction (short for satisfaction with the number of hunting opportunities available), was measured by response to question #3. Satisfaction had values of "Satisfied" and "Unsatisfied."

The variables, PAS Program Client Status and Satisfaction, were analyzed using the Chi-square and Kendall's tau statistical techniques with a significance level of .05 for null hypothesis rejection. Operationally stated, Research Hypothesis I consists of:

> A statistically significant (at the .05 level) proportion of "Clients" will respond that they are "Unsatisfied" compared to "Other Hunters." Conversely, a statistically significant proportion of "Other Hunters" will respond that they are "Satisfied" compared to "Clients."

4.2.2 Research Hypothesis 2: PAS Program Clients Differ From Other Zone 3 Hunters

Research Hypothesis 2 was derived from Study Objective 2:

> 2. To profile zone 3 hunters on the basis of their characteristics and behavior and to determine if the segment of hunters identified in Study Objective 1 differs from the rest of zone 3 hunters with respect to their characteristics and behavior.

A sizable number of questions on the survey instrument measured zone 3 hunter characteristics and behavior. Research Hypothesis 2 addresses only a portion of these characteristics and behaviors. Conceptually stated, Research Hypothesis 2 is:

> There is a significance difference between zone 3 urban hunters without rural land contacts (PAS Program Clients) and other zone 3 hunters with respect to,
>
> 1. The variety of game they hunt,
> 2. when they hunt,
> 3. where they hunt,
> 4. who they hunt with,
> 5. why they hunt, and
> 6. the number of days per season they hunt.

Research Hypothesis 2 deals only with the significance of the relationship between PAS Program Client Status and the other variables, not the direction.

The variables of interest for this hypothesis include,

1. PAS Program Client Status,
2. Variety of Game,
3. When,
4. Where,
5. Who,
6. Why, and
7. Days.

For the measurement of PAS Program Client Status, see Research Hypothesis 1. Variety of Game was measured by summing the responses to question #8 of the survey instrument and had values of "1" to "9". When was measured for three separate time periods: opening day of hunting season, week days after opening day and week-ends after opening day (see question #9) and had values of "Morning," "Afternoon," and "All Day" for all three time periods. Where was measured by response to question #10 and had values of "Within 15 Minutes" (drive of home), "Within 30 Minutes," "Within 45 Minutes," "Within 60 Minutes," and "Over an Hour." Who was measured by the response to question #11 and had values of "Alone," "With One Hunting Partner," and "With a Group." Why was measured by response to question #14 which listed six separate motivations for hunting: getting out-of-doors, the suspense and challenge of seeking game, the companionship and enjoyment of hunting friends, the actual killing of game and taking it home, getting-away-from-it-all, and

getting some exercise.[1] The values for each motivation were "Very Important," "Somewhat Important," and "Not Important." Days was measured by adding the number of days recorded for question #7 and ranged from "0" upwards.

The variables, PAS Program Client Status, When, Where, Who and Why, were analyzed using the Chi-square statistical method with a significance level of .05. The variables, PAS Program Client Status, Variety of Game and Days, were analyzed using the T-test statistical technique with a significance level of .05. Operationally stated, Research Hypothesis 2 consists of:

> A statistically significant (at the .05 level) proportion of "Clients" differ from "Other Hunters" with respect to their responses for,
>
> 1. Variety of Game,
> 2. When,
> 3. Where,
> 4. Who,
> 5. Why, and
> 6. Days.

4.2.3 Research Hypothesis 3: Hunters Can Be Segmented on Their HSS Decision Strategy

Research Hypothesis 3 was derived from Study Objective 3:

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[1]The motivations for hunting were modifications of Kennedy's (1971).

3. To investigate some of the parameters of the hunting site selection process of zone 3 hunters and to determine if zone 3 hunters can be segmented on the basis of how they select hunting sites.

Research Hypothesis 3 is essentially an empirical test of the Hunting Site Selection (HSS) model proposed in Chapter III. Conceptually stated, Research Hypothesis 3 is:

> Zone 3 hunters can be segmented according to their HSS decision strategy using the following for segmentation purposes,
>
> 1. the number of years they have hunted,
> 2. the number of areas they hunt,
> 3. the variety of game they hunt,
> 4. the importance of killing game,
> 5. where they hunt,
> 6. who they hunt with,
> 7. the variety of information sources they use to select hunting sites, and
> 8. the variety of information they use to select hunting sites.

The variables of interest in this hypothesis include,

1. HSS Decision Strategy,
2. Years Hunted,
3. Number of Areas Hunted,
4. Variety of Game,
5. Kill,
6. Where,
7. Who,

8. Variety of Information Sources, and

9. Variety of Information.

HSS Decision Strategy was measured by response to question #18 of the survey instrument and had values of (select on the basis of) "Recommendations", "Important Feature/ Satisfice," and "Systematic Evaluation."[1] Years Hunted was measured by response to question #3 and had values of "1" upwards. Number of Areas Hunted was measured by response to question #12 and had values of "1" upwards. For the measurement of Variety of Game, Where and Who, see Research Hypothesis 2 (Section 4.2.2). Kill was measured by response to question #14, fourth motivation ("The actual killing of game and taking it home") and had values of "Very Important," "Somewhat Important," and "Not Important." Variety of Information Sources was measured by summing the responses to question #16 and had values from "0" to "6". Variety of Information was measured by adding the responses to question #17 and had values ranging from "0" to "10".

The variables, HSS Decision Strategy through Variety of Information, were analyzed using the statistical technique, discriminant analysis with a significance level of .05. Following is a short description of the technique.

---

[1]Two of the values for question #18, the "Important Feature" and "Meets Minimum Requirements" (Satisfice) HSS decision strategies, were combined into one value (see Chapter III, Section 3.4).

Discriminant analysis (DA) is a multivariate statistical technique with the objective of classifying objects or cases by a set of independent "discriminating" variables into one or more mutually exclusive and exhaustive categories or groups (Morrison 1969). Discriminating variables are selected that measure characteristics upon which the groups are expected to differ. "The mathematical objec - tive of (DA) is to weight and linearly combine the discriminating variables in some fashion so that the groups are forced to be as statistically distinct as possible (Klecka 1975:435)." DA is similar to multiple regression with the exception that in the case of DA, the dependent variable is not metric.

DA forms one or more linear combinations (functions) of the discriminating variables of the form,

$$D_i = d_{i1}Z_1 + d_{i2}Z_2 + \ldots + d_{ip}Z_p$$

where D_i is the score on discriminant function i, the d's are weighting coefficients, and the Z's are the standardized values of the p discriminating variables. The maximum number of discriminant functions that can be formed is either one less than the number of groups or equal to the number of discriminating variables, if there are more groups than variables.

According to Klecka (1975), two research objectives can be pursued once the discriminant functions are formed:

analysis and classification. For analysis purposes, the number of discriminant functions necessary to obtain satisfactory discrimination, the spatial relationships among the groups and the weighting coefficients can be interpreted. The "success" of DA, however, is most readily measured by classification.

Once a set of discriminating variables is found and discriminant functions formed which provide satisfactory discrimination for cases with known membership, the classification of new cases with unknown membership can proceed. These new cases can be drawn from an unused portion of the data used to form the functions or from data collected at a later point in time.

Classification occurs by the use of a classification function for each group (derived from the within-groups covariance matrix and the centroids of the discriminating variables) of the form,

$$C_i = c_{i1}V_1 + c_{i2}V_2 + \ldots + c_{ip}V_p + c_{io}$$

where C_i is the classification score for group i, the c_{ij}'s are the classification coefficients, c_{io} is a constant, and the V's are the raw scores on the discriminating variables. Since there are as many classification scores as there are groups, cases are classified into the group for which they receive the highest score.

With an assumption of a multivariate normal distribution, the classification scores can be converted to probabilities of group membership. Assigning a case to the group for which it has the highest score is equivalent to assigning the case to the group for which it has the greatest probability of membership. A priori knowledge of group membership allows a Bayesian adjustment of the probability of group membership.

In a simple, two group DA, classification results can be illustrated with a matrix similar to Figure 8. The entry n_{ij} is the number of cases actually in $Group_i$, but classified by DA in $Group_j$. Therefore, $(n_{11} + n_{22})$ is the proportion of cases correctly classified. If this proportion is significantly greater than a random assignment to the groups reflective of the actual proportion of cases in each group would produce, then the DA can be considered "successful."

DA was selected among other multivariate methods to test Research Hypothesis 3 because it requires groups to be chosen a priori. Since the HSS model was developed before data collection and analysis, it was decided to utilize a statistical technique that measured the success of this a priori model development. DA does not "form" groups as some other multivariate methods do, e.g., cluster analysis, multidimensional scaling, rather it measures the success of using a set of predetermined variables to differentiate a set of predetermined groups.

		Classified by DA: Group 1	Classified by DA: Group 2	
Actual Group Membership: Group 1		n_{11}	n_{12}	$n_{1\cdot}$
Actual Group Membership: Group 2		n_{21}	n_{22}	$n_{2\cdot}$
		$n_{\cdot 1}$	$n_{\cdot 2}$	n

Figure 8. Example of two group discriminant analysis classification results.

To measure the success of the HSS model, the classification features of DA were used. Sixty percent of the cases (82 out of 150 respondents to question #18 with matching data on the discriminating variables) were used to form the discriminant functions. The remaining 40 percent (68 respondents) were used as data to test the success of the analysis. Prior probabilities of group membership were assigned based on the number of responses to each value of question #18. Assignment of prior probabilities meant that only a "better than chance" classification would be determined significant.

Operationally stated, Research Hypothesis 3 consists of:

> Higher proportions of unclassified respondents to question #18 can be classified into three groups, i.e., "Recommendations", "Important Feature/Satisfice," and "Systematic Evaluation," by discriminant analysis using the discriminating variables, Years Hunted, Number of Areas Hunted, Variety of Game, Kill, Where, Who, Variety of Information Sources, and Variety of Information, than can be classified by an assignment using prior probabilities of .29, .47, and .24 respectively, derived from the number of initial responses to each value of question #18.

4.3 Research Methods

The study's research methods consisted of the following (not necessarily in consecutive order):

1. Identification of the population to be studied and selection of a sample of that population,
2. Development of the survey instrument,

3. Administration of the survey instrument to the sample, and

4. Data coding, transfer to computer and analysis.

4.3.1 Sampling

The public Access Stamp was required of all hunting license purchasers who intended to hunt in zone 3 in 1977-78.[1] Therefore, that group defined the population to be sampled to meet the objectives of the study. Three possible methods of deriving a sample representative of that population were evaluated and are discussed below.

When individuals purchased a 1977-78 hunting license in Michigan (almost all types of licenses) and intended to hunt in zone 3, they were supposed to buy a Stamp. Either the hunter requested the Stamp or the license dealer ascertained if the Stamp was applicable and informed the hunter it was required. At this purchase time, the hunter would write his/her name and address on a "green sheet" which the dealer retained. Eventually these green sheets were supposed to be forwarded to the DNR. In the aggregate, these green sheets indicated all hunters who hunted or intended to hunt in zone 3. Thus, the green sheets would have been an excellent sampling frame for the study.

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[1]Except for "seniors," landowners hunting on their own property and servicemen home on leave.

Several problems would have occurred, however, in using these green sheets as a sampling frame for the study. One, not all zone 3 hunters knew they were required to buy the Stamp. Two, some zone 3 hunters probably knew about the Stamp requirement, but did not purchase one anyway. Finally, in some cases it may have happened that even though the hunter knew about the Stamp requirement and may have wanted to buy one, the dealer was ignorant of the Stamp requirement or careless about selling the Stamps. The result was that as of January 1, 1978 (the date sampling began), the green sheets totaled approximately 330,000 hunters, but the DNR had estimated that around 515,000 hunters hunt in zone 3.[1] The research team decided that this "gap" of 185,000 hunters was too significant to ignore in view of the study objectives.

A second approach to selecting a sample of zone 3 hunters would involve utilizing then current (1977) hunting license records. When individuals purchase a hunting license in Michigan they are required to write their name, address and other information on the license form. License dealers save carbon copies of this information and are supposed to forward the carbon copies to the DNR. The carbon copies are used by the Office of Surveys and Statistics as sampling frames for the DNR's various annual game surveys

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[1]Interoffice communication dated February 22, 1977, from Louis J. Hawn, Acting Chief, Office of Surveys and Statistics, to Arlow Boyce, Wildlife Planning Executive, Wildlife Division.

e.g., the Small Game Survey, the Firearm Deer Survey. These carbon copies would have been the second most preferred sampling frame for zone 3 hunters after certain types of license purchasers were deleted, e.g., "senior," bear, and some procedure were used to obtain zone 3 hunters.

A major problem with this approach is that it would have required a considerable amount of resources to draw a sample. The research team unfortunately did not have adequate resources given the time constraints of the study and so this alternative was not selected.

A third method involved utilizing existing Office of Surveys and Statistics' samples for the DNR's 1976 game surveys. Computer printouts of the names and addresses of the hunters sampled for the 1976 game surveys were available. These printouts were used as sampling frames for smaller samples of each type of license purchaser. Since the resources and time needed to draw a sample from these relatively "clean" lists was much less than that required for the approach discussed above, i.e., using current carbon copies; this method while not the most preferred presented a means of obtaining a reasonably accurate sample of zone 3 hunters.

This approach was not without its problems, however. Since the sampling frames were one year old at the time the sample was drawn, it was expected that some hunters had

stopped hunting, others not represented by the samples had started hunting, some had moved on and so on. The associated problems of using the 1976 sampling frames were realized but were considered relatively less important than the problems inherent in the first two methods.

In using these 1976 samples, three major steps were taken to obtain the desired sample. The first step was to determine which license types would be included. Resident Small Game, Resident Firearm Deer, Resident Bow and Arrow Deer and Resident Sportsman were chosen. Other license types were either inappropriate in light of the study's objectives, e.g., "seniors," non-resident, or the samples associated with the license type were too small considering the nature of the study, e.g., Muzzleloader Deer.

Step two consisted of determining the total sample size. At the time sampling started (January 1, 1978), the research team was prepared to survey approximately 1,000 hunters via a mailed questionnaire. This was a small sample, but resources for a larger survey were unavailable. This 1,000 figure was also arrived at as a compromise between the need for reasonably accurate estimates of certain variables and the exploratory nature of the study. The process used to arrive at a total sample of approximately 1,000 hunters was as follows.

Based on revenues received, the DNR determined that the number of hunting licenses sold for the 1976-77 hunting season were:

1. Resident Small Game 488,463
2. Resident Firearm Deer 511,158
3. Resident Bow and Arrow Deer 56,915
4. Resident Sportsman 144,269

The DNR did not receive name and address information on all these license purchasers, however, since some license dealers did not return carbon copies of the licenses they sold. From the carbon copies returned, the Office of Surveys and Statistics selected samples from the various license types for its annual game surveys. The Office did not total the number of license carbon copies it received, but simply systematically selected its samples as the carbon copies were returned over the hunting season. The Office's sample sizes and sampling rates (in parentheses) for 1976 were:

1. Resident Small Game 4,374 (1/100)
2. Resident Firearm Deer 11,540 (1/40)
3. Resident Bow and Arrow Deer 1,759 (1/30)
4. Resident Sportsman Varied depending on the specific game survey sampling was for.

Multiplying sample sizes by sampling rates results in estimated totals for license carbon copies received of:

1. Resident Small Game 437,400
2. Resident Firearm Deer 461,000
3. Resident Bow and Arrow Deer 52,770

4. Resident Sportsman 135,970[1]

These totals were accepted as an appropriate starting point for deriving a sample of hunters for the study. It was realized that these Office of Surveys and Statistics samples did not represent all license purchasers but that detail was determined unresolvable given study constraints and was considered to be of little significance.

Utilizing a 0.1 percent sampling rate for the projected totals above results in a desired sample size of:

1.	Resident Small Game	437
2.	Resident Firearm Deer	462
3.	Resident Bow and Arrow Deer	53
4.	Resident Sportsman	136
	TOTAL	1,088[2]

Sampling itself consisted of systematically selecting every nth name with random starts, where n = the sampling rate required to derive the desired sample.

A final step was to set some form of geographic limitation on the samples since the Office of Surveys and

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[1]The total for Resident Sportsman was derived by averaging the figures arrived at for the Sportsman portions of the individual Small Game, Firearm Deer and Bow and Arrow Deer sample, i.e., for the Small Game sample, 1,346 (1/100), for the Firearm Deer sample, 3,414 (1/40) and for the Bow and Arrow Deer sample, 4,558 (1/30), resulting in totals of 134,600; 136,560 and 136.740, respectively and an average of 135,970.

[2]The final sample totalled 1,082 hunters due to the geographic limitation on residence. After a number of resamplings to obtain the desired total were conducted and 1,082 hunters had been selected, it was decided to discontinue sampling.

Statistics samples were statewide. Only those license purchasers residing south of a line at the bottom of the counties--Mainistee, Wexford, Missaukee, Roscommon, Ogemaw and Iosco--were included. It was assumed that the number of hunters living north of the line that hunted in zone 3 was small and would not greatly bias the study's results. What this requirement meant as far as the systematic selection process was concerned was that when the nth name appeared and the address was north of this line, the next name with an address south of the line was selected. In some cases, resampling of the Office's samples were necessary to insure the desired totals. Again, a systematic selection process with a random start was used.

4.3.2 Development of the Survey Instrument

Several forms of eliciting the desired information from the sample hunters were considered. The need for geographic representation of the population and limited study resources, however, necessitated the use of a self-administered, mailed questionnaire. The survey instrument (see Appendix D) was developed on the basis of:

1. Study objectives and research hypotheses,
2. Examination of instruments used in prior studies of this nature,
3. Informal interviews with hunters, and

4. The results of the study's pre-test sent to 100 hunters drawn from the same sampling frame as the study's sample.

Steps 3 and 4 proved to be of the most value in refining the questionnaire. Discussions with hunters and pre-test results showed the need to alter a previous "site attribute" approach to the HSS model and to carefully structure the format and directions of the questionnaire.

The survey instrument consisted of four major sections. The first section (questions #1-#5) was designed to provide basic information and separate hunters that did not hunt in southern lower Michigan (zone 3) from those that did. The second section (questions #6-#18) was intended to gather general information on zone 3 hunters focusing on their hunting and HSS behavior. The third section of the questionnaire (questions #19-#30) was designed to elicit information from hunters on their knowledge of, experiences with and reaction to the PAS Program. The last section gave respondents an opportunity to make additional comments and suggestions regarding the PAS Program or the questionnaire in general.

Responses to many questions were contingent upon responses to other questions. For example, only respondents who hunted in zone 3 (see question #5) were asked to respond to questions #6 through #18. This "sorting" procedure was used to minimize confusion on the part of respondents (by not asking them questions that would not make sense to

them) and also to allow valid interpretations of the findings.

Every attempt was made to insure that the questionnaire was understandable and easy to complete. However, some complexity and resultant confusion was inherent in the questionnaire due to the order and nature of the questions.

4.3.3 Administration of the Survey Instrument and Response Rate

In total, three mailings were used to obtain an acceptable response rate. The first mailing included a cover letter (see Appendix E) designed to explain the purpose of the survey and encourage response and was mailed on May 26, 1978. The Second mailing consisted of a "reminder" postcard (see Appendix F) reminding non-respondents to complete and return their questionnaires and was sent on June 9, 1978, two weeks after the first mailing. The third and final mailing included another letter encouraging response (see Appendix G) along with another questionnaire and was mailed on June 23, 1978, two weeks after the second mailing.

The initial sample totalled 1,082 hunters. Four were duplicates (hunters who purchased more than one license type in 1976 and were sampled from each license type) and were eliminated leaving 1,078 hunters in the sample. Two weeks after the third mailing (July 7, 1978), 641 usable questionnaires had been returned and 112 questionnaires had

been returned marked "non-deliverable" or "no forwarding address."[1] Thus as of that date, questionnaires returned represented 59.5 percent of all questionnaires mailed and 66.9 percent of all questionnaires received. Response by license type was as follows:

1.	Resident Small Game	230
2.	Resident Firearm Deer	283
3.	Resident Bow and Arrow Deer	30
4.	Resident Sportsman	93
5.	Unable to ascertain	5
	TOTAL	641

Given the considerable time lapse since the 1977-78 hunting season, the use of a sample based on 1976 hunting license purchases, and the need to analyze the data and provide the Wildlife Division with information as soon as possible, the response rate was considered adequate. Some questionnaires were received after the cut-off date, but were not included in the data analysis.

Telephone follow-ups of 26 non-respondents were conducted to determine if non-respondents differed significantly from respondents. No consistent differences were found based on a reduced form of the original questionnaire.

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[1]This large number of non-deliverables was expected since the sample was based on 1976-77 hunting licenses.

4.3.4 Data Transfer and Analysis Procedures

The data on the questionnaires were coded onto specially developed coding sheets. Before the coding sheets were submitted for key-punching the data onto computer cards, 10 percent of sheets were spot checked for errors. No significant or consistent errors were detected. The data were then key-punched onto 80 column computer cards and verified for accuracy.

The data were analyzed on the CDC 6500 computer installation at the Michigan State University Computer Laboratory utilizing a package of prewritten computer programs, Statistical Package for the Social Sciences (Nie, et al. 1975) and subsequent updated and amended additions (Michigan State University Computer Laboratory 1978). The SPS system includes a number of statistical techniques and date transformation features that were well suited to the study's objectives.

CHAPTER V: RESULTS OF THE SURVEY

5.1 Introduction

This Chapter describes the general results of the survey of zone 3 hunters. The results are divided into two sections. The first section (questions #1-#18 of the survey instrument) includes the characteristics, behavior and motivations of zone 3 hunters. The second section (questions #19-#30) describes zone 3 hunters' knowledge of, and reaction to experiences with the PAS Program. The Chapter ends with some comments on the effectiveness of the sampling procedure and survey instrument.

5.2 Zone 3 Hunters' Characteristics, Behavior and Motivations

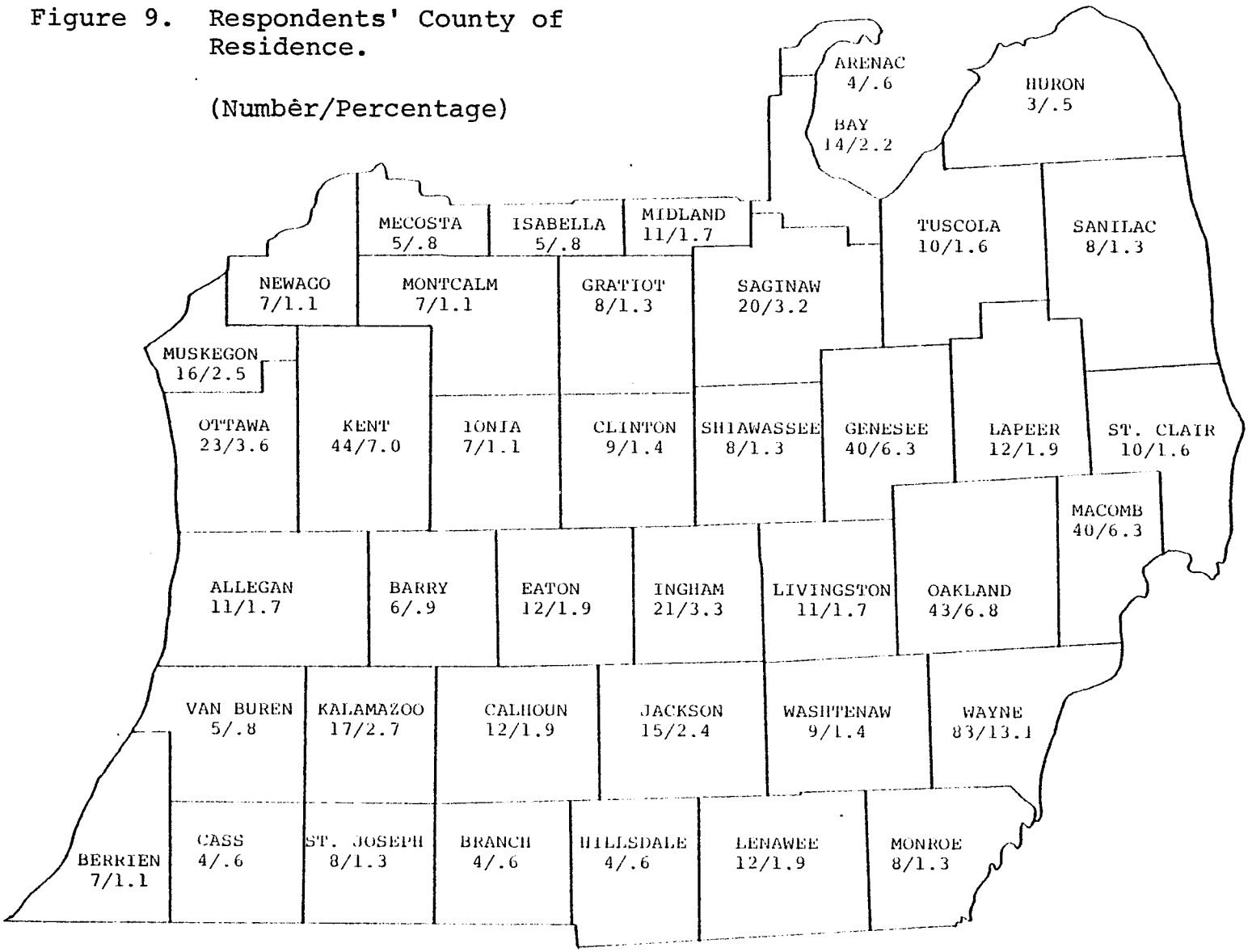
Table 1 gives the residence of respondents. The most frequent response (31.8%) was from hunters who lived in the country, but not on a farm. Figure 9 shows the county of residence reported by respondents. All counties in the sample area were represented with the highest frequency of respondents (13.1%) residing in Wayne County.

Table 1. Residence of Respondents

Residence	Number	Percent
On a Farm	81	12.9
In the Country, But Not on a Farm	200	31.8
In a Small Town (Under 10,000)	100	15.9
In a Medium City (10,000 -50,000)	115	18.3
In a Large City (Over 50,000)	132	21.0
No response	13	--
TOTAL	641	99.9

Figure 9. Respondents' County of Residence.

(Numbêr/Percentage)



The mean number of years hunted by respondents was 17.6 years and ranged from one to 55 years. Table 2 gives the hunting licenses and stamps purchased for the 1977-78 hunting season by respondents. The most common (58.8%) type of license was a firearm deer license. Almost 5 percent of the respondents did not purchase a hunting license in 1977-78 even though due to the sampling method, they purchased a license in 1976.

Over 71 percent of the respondents hunted in zone 3. Of those respondents who hunted in zone 3, almost 94 percent hunted there in 1977-78.

Table 3 gives the number of days hunted in zone 3 by type of game (deer, small game and waterfowl) and by type of property (own; friend's, neighbor's or relatives; other, private; and public). All combinations of game and property received some response with the highest mean number of days (11.7 days) being for small game on own property. The combination of game/property with the most responses (181) was for small game on friend's, neighbor's or relative's property.

Table 4 gives the types of game respondents hunted in zone 3. Pheasant (82.3%), rabbit (79.9%) and deer (72.1%) were frequently hunted game.[1] Table 5 gives the time of day respondents hunted by opening day of hunting season,

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[1]It should be emphasized that the "popularity" of a type of game is a function of its availability as well as hunter preferences.

Table 2. Respondents' 1977-78 Hunting Licenses and Stamps[a]

License/ Stamp	Number of Responses	Percent of Responses	Percent of Respond-ents
Firearm Deer	375	29.3	58.8
Bow and Arrow Deer	64	5.0	10.0
Small Game	338	26.4	53.0
Sportsman	154	26.4	24.1
Waterfowl Stamp	101	7.9	15.8
Public Access Stamp	203	15.8	31.8
Other	15	1.2	2.4
None	31	2.4	4.9
TOTAL	1,281	100.0	N.A.

[a]Since respondents could purchase more than one license or stamp, total responses sum to more than 641.

Table 3. Respondents Number of Days Hunted by Type of Game and Type of Property

Type of Property	Mean Number of Days	Number of Respond-ents
Deer		
Own	5.5	54
Friend's, Neighbor's or Relative's	5.4	140
Other Private	5.3	77
Public	6.3	103
Small Game		
Own	11.7	73
Friend's, Neighbor's or Relative's	10.8	181
Other Private	8.6	121
Public	8.0	108
Waterfowl		
Own	4.8	8
Friend's, Neighbor's or Relative's	5.5	19
Other Private	6.6	20
Public	5.1	36

Table 4. Respondents' Type of Game Hunted[a]

Type of Game	Number of Responses	Percent of Responses	Percent of Respond-ents
Deer	326	18.9	72.1
Rabbit	361	20.9	79.9
Squirrel	238	13.8	52.7
Pheasant	372	21.6	82.3
Ruffed Grouse	129	7.5	28.5
Quail	69	4.0	15.3
Woodcock	94	5.5	20.8
Waterfowl	99	5.7	21.9
Other	36	2.1	8.0
TOTAL	1,724	100.0	N.A.

[a]Since respondents could hunt more than one type of game, total responses sum to more than 455.

Table 5. Respondents' Time of Day Hunted by Opening Day, Week Days After Opening Day and Week-ends After Opening Day

Time of Day	Number	Percent
Opening Day of Season		
Morning	106	25.5
Afternoon	44	10.6
All Day	265	63.9
No Response	4	--
TOTAL	419[a]	100.0
After Opening Day of Season (Week Day)		
Morning	111	27.3
Afternoon	174	42.9
All Day	121	29.8
No Response	4	--
TOTAL	410[a]	100.0
After Opening Day of Season (Week-end)		
Morning	108	26.5
Afternoon	45	11.0
All Day	255	62.5
No Response	4	--
TOTAL	412[a]	100.0

[a]Only a portion (456 out of 641) of the total number of respondents hunted in southern lower Michigan (see question #5). Only these southern lower Michigan-hunting respondents were asked to respond to questions #6 through #18. Therefore, for these questions, the number of respondents ranged from 410 to 460.

and weekday and week-end after opening day. On opening day, most respondents (63.9%) hunted all day. On week days after opening day, 42.9 percent of the respondents hunted in the afternoon. On week-ends after opening day, most respondents (62.5%) hunted all day.

Table 6 gives the time in minutes respondents drove to hunt in zone 3. The most common response (39.5%) was from hunters who hunted within a 15 minute drive of their home. Table 7 gives respondents' hunting group size. Fifty seven percent of the respondents hunted with one hunting partner.

The number of different hunting areas reported by respondents ranged from one to 65 with a mean of 7.0 areas. Less than half (47.9%) of the respondents reported that they had enough areas to hunt.

Table 8 gives respondents' motivations for hunting. The most frequently cited very important reason (72.0%) was getting out-of-doors. The reason cited most often as not important (42.3%) was the actual killing of game and taking it home.

Over 56 percent of the respondents usually hunted the same area(s) every year. Table 9 gives the information source usually used to find out about new areas for those respondents who tended to try out new areas each year or so. For those respondents, over 80 percent obtained hunting site information from others.

Table 10 gives the type of information these "new area" respondents obtained. The major types of information were

Table 6. Respondents' Travel Time to Hunt

Driving Time	Number	Percent
Within a 15 Minute Drive	174	39.5
Within a 30 Minute Drive	115	26.1
Within a 45 Minute Drive	55	12.5
Within a 60 Minute Drive	34	7.7
Over an Hour's Drive	62	14.1
No Response	14	--
TOTAL	454	99.9

Table 7. Respondents' Hunting Group Size

Hunting Group	Number	Percent
Alone	75	17.0
Wiht One Hunting Partner	252	57.0
With a Group of Hunting Friends	115	26.0
No Response	12	--
TOTAL	454	100.0

Table 8. Respondent's Motivations for Hunting

Importance	Number	Percent
Getting Out-of-Doors		
Very Important	316	72.0
Somewhat Important	99	22.6
Not Important	24	5.5
No Response	16	--
TOTAL	455	100.0
The Suspense and Challenge of Seeking Game		
Very Important	240	55.4
Somewhat Important	154	35.6
Not Important	39	9.0
No Response	22	--
TOTAL	455	100.0
The Companionship and Enjoyment of Hunting Friends		
Very Important	200	46.2
Somewhat Important	170	39.3
Not Important	63	14.5
No Response	22	--
TOTAL	455	100.0

(Continued)

Table 8. (Continued)

Importance	Number	Percent
The Actual Killing of Game and Taking it Home		
Very Important	64	15.1
Somewhat Important	177	41.7
Not Important	183	43.2
No Response	31	--
TOTAL	455	100.0
Getting-Away-From-It-All		
Very Important	245	56.6
Somewhat Important	123	28.4
Not Important	65	15.0
No Response	22	--
TOTAL	455	100.0
Getting Some Exercise		
Very Important	187	43.5
Somewhat Important	166	38.6
Not Important	77	17.9
No Response	25	--
TOTAL	455	100.0

Table 9. Respondents' Type of Information Source[a]

Type of Information Source	Number of Responses	Percent of Responses	Percent of Respondents
Others	160	38.7	82.1
Scout Personality	115	27.8	59.0
DNR	28	6.8	14.4
Landowner	87	21.1	44.6
Media	17	4.1	8.7
Other	6	1.5	3.1
TOTAL	413	100.0	N.A.

[a]Only a portion (192) of the total number of respondents who hunted in southern lower Michigan also hunted new areas each year or so (see question #15). Only these "new area" hunters were asked to respond to questions #16 through #18. Since these respondents could use more than one type of information source, total responses sum to more than 192.

Table 10. Respondents' Type of Hunting Site Information[a]

Type of Information	Number of Responses	Percent of Responses	Percent of Respond-ents
Size of Site	99	9.8	51.3
Distance of Site	72	7.1	37.3
Hunting Allowed	152	15.1	78.8
Land Cover of Site	126	12.5	65.3
Game and Game Sign	144	14.3	74.6
Crowdedness of Site	111	11.0	57.5
Others' Luck at Site	104	10.3	53.9
Water on Site	78	7.7	40.4
Food and Cover for Game on Site	114	11.3	59.1
Other	7	.7	3.6
TOTAL	1,007	100.0	N.A.

[a]Since respondents could use more than one type of information, total responses sum to more than 195.

if hunting was allowed (78.9%), the presence of game and game sign (74.6%) and the type of land cover (65.3%). Table 11 gives the method of hunting site selection these new area respondents usually used. The most often cited (37.0%) method was the important feature method.

5.3 Zone 3 Hunters' Knowledge of, Experiences with and Reaction to the PAS Program

Almost three fourths (73.9%) of the respondents knew of the PAS Program before completing the questionnaire.[1] Table 12 gives the manner by which respondents who knew about the Program first learned of it. The largest portion (42.1%) learned about it when they purchased their hunting license.

Of those respondents that knew about the PAS Program, only 23.8 percent made some attempt to find out about any properties in the Program. Table 13 gives the reasons why some respondents did not make any attempt to find out about any PAS Program properties. For these respondents, almost half (47.3%) reported that they already had enough areas to hunt.

Of those respondents that tried to find out about PAS Program properties, 41.8 percent did obtain a list of participating landowners. Table 14 gives the reasons why some respondents did not get a list. Most of these respondents (57.1%) could not figure out how to get one.

Table 11. Respondents' Method of Hunting Site Selection

Method	Number	Percent
Recommended by Other	55	28.6
Meets Minimum Requirement	17	8.9
Systematically Gather Information	46	24.0
Has Important Feature	71	37.0
Other	3	1.6
No Response	3	--
TOTAL	195	100.1

Table 12. How Respondents First Learned of the PAS Program

How First Learned of Program	Number	Percent
When Bought License	197	42.1
Someone Told	84	17.9
Hunted Program Property	2	.4
Media	166	35.5
DNR	13	2.8
Other	6	1.3
No Response	5	--
TOTAL	473[a]	100.0

[a]Only a portion (470 out of 641) of the total number of respondents were aware of the PAS Program (see question #19). Only these "aware of the PAS Program" hunters were asked to respond to question #21 through #30.

Table 13. Reasons Why Respondents Did Not Try to Find Out About the PAS Program

Reason	Number	Percent
Too Much Trouble	44	13.3
Already Had Enough Areas to Hunt	156	47.3
Don't Believe in Program	70	21.2
Other	60	18.2
No Response	27	--
TOTAL	357	100.0

Table 14. Reason Why Respondents Did Not Obtain List of Participating Landowners

Reason	Number	Percent
Too Much Trouble	7	12.5
Could Not Figure Out How to Get One	32	57.1
Could Not Wait for One	6	10.7
Other	11	19.6
No Response	7	--
TOTAL	63	99.9

Of those respondents that did obtain a list of participating landowners, 59.1 percent reported that the list did have enough information on it. Table 15 gives the reasons why some respondents felt the list did not have enough information on it. The two most frequently cited reasons (23.5% each) were the lack of maps and the lack of land cover information.

Of those respondents that obtained a list of participating landowners, over half (54.7%) hunted on one or more PAS Program properties. Table 16 gives the reasons why some respondents did not hunt on a Program property. The two most often given reasons (16.7% each) were the trouble involved and the availability of adequate hunting areas already.

Figure 10 shows that of the 470 respondents in the sample who were aware of the PAS Program, only 29 eventually hunted on a PAS Program property. It is evident that some of the 441 respondents that did not eventually hunt on a Program property did try to find out about a property and get a list of participating landowners.

Table 17 gives the reasons why respondents hunted on PAS Program properties. Most respondents (48.1%) were looking for a new area to hunt. Table 18 gives these "PAS Program property hunters'" descriptions of the property(s) they hunted. Almost 70 percent described the properties as either good or fair.

Table 15. Reasons Why Respondents Felt List of Participating Landowners Did Not Have Enough Information On It

Reason	Number	Percent
No Maps	4	23.5
No Land Cover Information	4	23.5
No Game Information	1	5.9
No Street Address for Landowner	1	5.9
No Phone Number for Landowner	1	5.9
No Information on When Landowner Would Be Home	1	5.9
Other	5	29.4
No Response	2	--
TOTAL	19	100.0

Table 16. Reasons Why Respondents Did Not Hunt on PAS Program Properties

Reason	Number	Percent
Too Much Trouble	3	16.7
Already Had Enough Areas to Hunt	3	16.7
Dont' Believe in Program	2	11.1
Other	10	55.6
No Response	7	--
TOTAL	25	100.0

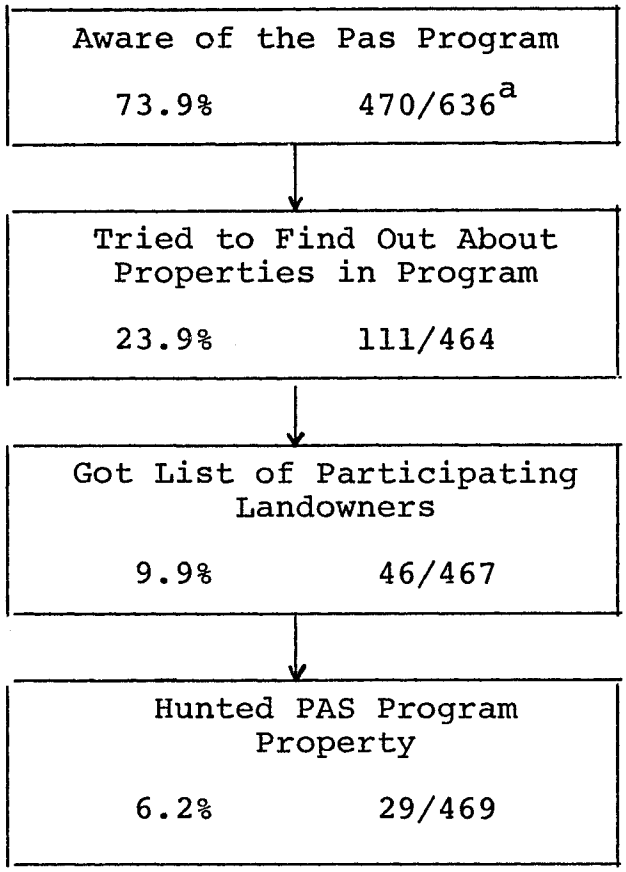

Figure 10. Respondents' Experiences with the PAS Program

[a]Total number of respondents aware of PAS Program minus non-respondents to each question.

Table 17. Reasons Why Respondents Hunted on PAS Program Properties.

Reason	Number	Percent
Looking for New Area To Hunt	13	48.1
Curious About Program	6	22.2
Hunted Program Properties in Past	5	18.5
Other	3	11.1
No Response	2	--
TOTAL	29	99.9

Table 18. Respondents' Descriptions of PAS Program Property

Description	Number	Percent
Excellent	4	14.3
Good	10	35.7
Fair	9	32.1
Poor	5	17.9
No Response	--	--
TOTAL	28	100.0

Table 19 gives PAS Program property hunters' descriptions of the participating landowners. Over 60 percent described the landowners as friendly and helpful.

Over 58 percent of these PAS Program property hunters knew of the Hunter Access Tag requirement. Table 20 gives the suggestions with respect to the Hunter Access Tag requirement of the respondents who were aware of the requirement. The largest portion (35.3%) did not mind it.

Table 21 gives the suggestions for the PAS Program of all respondents aware of the Program. The most frequent suggestions were to end the Program (23.7%), provide more information on the lists of participating landowners (23.2%)[1] and to provide lists of participating landowners to license dealers (20.4%).

Table 22 gives the general breakdown of all respondents' additional comments and suggestions regarding the PAS Program or the questionnaire.

5.4 Conclusions

The testing of the research hypotheses presented in Chapter IV, Section 4.2, is in the next Chapter. In

---

[1]The suggestion, "provide more information on the lists of participating landowners," may have been interpreted by respondents as providing more information on the lists (e.g., the land cover of properties) or as providing more information on the lists (e.g., where to get lists). This possibility should be kept in mind in interpreting the results.

Table 19. Respondents' Descriptions of Participating Landowners

Description	Number	Percent
Friendly and Helpful	17	60.7
Friendly, but Not Too Helpful	7	25.0
Unfriendly	3	10.7
Not at Home	1	3.6
No Response	--	--
TOTAL	28	100.0

Table 20. Respondents' Suggestions for Hunter Access Tag Requirements

Suggestion	Humber	Percent
Don't Mind It	6	35.3
Would Prefer to Pick Up Tag Without Contacting Landowner	1	5.9
Would Prefer to Sign In Without Picking Up Tag and Contacting Landowner	4	23.5
Would Prefer to Contact Landowner and Not Pick Up Tag or Sign In	1	5.9
Would Prefer No Requirements	5	29.4
No Response	3	--
TOTAL	10	100.0

Table 21. Respondents' Suggestions for PAS Program

Suggestion	Number	Percent
Continue Program As Is	34	8.0
Provide More Information on Lists	99	23.2
Lease More Land in Respondent's Area	25	5.9
Provide Lists to Dealers	87	20.4
Lease Better Land in Respondent's Area	7	1.6
Raise Stamp Charge to Lease More/Better Land	13	3.0
Lease Larger Properties in Respondent's Area	6	1.4
End the Program	101	23.7
Other	9	2.1
No Suggestion	46	10.8
No Response	39	--
TOTAL	466	100.1

Table 22. Respondents' Other Comments By Type of Comment

Type of Comment	Number	Percent
DNR-related	62	37.8
PAS Program-related	88	53.7
Questionnaire-related	14	8.5
TOTAL	164	100.0

addition, specific recommendations concerning the PAS Program are made in Chapter VII, Section 7.3. Therefore, the conclusions discussed in this Section relate to the effectiveness of the sampling procedure and the survey instrument.

The sampling procedure used in the study (see Chapter IV, Section 4.3) appears to have been warranted. A large portion of the sample hunted in zone 3 (71.3%). However, only 31.7 percent purchased a Public Access Stamp. Thus, sampling on the basis of Stamp purchases would have considerably underrepresented zone 3 hunters.

The structured format and directions used in the questionnaire also appear to have been warranted since some questions, e.g., questions on zone 3 hunters' experiences on PAS Program properties, were answered by a very small number of respondents (see Figure 10). A more open-ended survey instrument might have caused considerable confusion among respondents.

In some instances, it appears that the response categories of the questionnaire may have hampered respondents by not specifying their actual experiences. Many respondents checked the "other" response category and did or did not explain further. Questionnaire space constraints did not allow for a large number of response categories for each question. This lack of specificity in "other" responses should be kept in mind in interpreting the results.

CHAPTER VI: TESTING THE RESEARCH HYPOTHESES

6.1 Introduction

The results of testing the research hypotheses postulated in Chapter IV, Section 4.2, are presented in this Chapter. Each hypothesis is given in its operational form, the test is described and then the results of the test are discussed. The Chapter ends with some conclusions drawn from the results.

6.2 Hypotheses Test Results

6.2.1 Research Hypothesis 1: The PAS Program is Needed

Operationally stated, Research Hypothesis 1 consists of:

> A statistically significant (at the .05 level) proportion of "Clients" will respond that they are "Unsatisfied" compared to "Other Hunters." Conversely, a statistically significant proportion of "Other Hunters" will respond that they are "satisfied" compared to "Clients."

The variables, PAS Program Client Status and Satisfaction, were analyzed using the Chi-square and Kendall's tau statistics utilizing the Statistical Package for the Social Sciences (SPSS) subprogram, CROSSTABS. According to Nie, et al. (1975), Chi-square determines if a systematic relationship exists between the variables. Chi-square does not indicate the direction of the relationship. Kendall's tau measures association.

Table 23 indicates a statistically significant relationship exists between PAS Program Client Status and Satisfaction--"Clients" are less satisfied than "Other Hunters." In addition, the relationship was a significant, negative one. Based on these results, Research Hypothesis 1 was accepted (the null hypothesis was rejected).

6.2.2 Research Hypothesis 2: PAS Program Clients Differ From Other Zone 3 Hunters.

Research Hypothesis 2, in operational form, is:

> A statistically significant (at the .05 level) proportion of "Clients" differ from "Other Hunters" with respect to their responses for,
>
> 1. Variety of Game,
> 2. When,
> 3. Where,
> 4. Who,
> 5. Why, and
> 6. Days.

Table 23. Cross-Tabulation of PAS Program Client Status with Satisfaction

		Satisfaction with the Number of Hunting Areas		
		Yes	No	Row Total
PAS Program Client Status	Clients	25	46	71
		35.2[a]	64.8	17.7
		12.9[b]	22.3	
		6.3[c]	11.5	
	Other Hunters	169	160	329
		51.4	48.6	82.2
		87.7	77.7	
		42.3	40.0	
	Column Total	194	205	400
		48.5	51.5	100.0

Chi-square	5.4733	Kendall's tau	-.1235
Degrees of Freedom	1.0		
Significance	.0193	Significance	.0068
Non Response	241.0		

[a]Row percentage

[b]Column percentage

[c]Total percentage

The variables were analyzed using the Chi-square, Kendall's tau and T-test statistics. The T-test measures the statistical significance of mean differences. In this instance, the mean differences between "Clients" and "Other Hunters" were compared for Variety of Game and Days. SPSS subprograms CROSSTABS and T-TEST were utilized. Tables 24-29 give the test results.

Table 24 indicates no statistically significant difference between "Clients" and "Other Hunters" in terms of the number of types of game they hunt (Variety of Game).

The variable, When, was measured for three periods: opening day of hunting season, week days after opening day and week-ends after opening day. Three separate tables were developed (Table 25, parts a-c). For all three periods, no statistically significant relationships existed between "Clients" and "Other Hunters."

Table 26 indicates a statistically significant relationship between PAS Program Client Status and Where--"Clients" travel farther to hunt than "Other Hunters." The Kendall's tau statistic shows a significant, negative relationship.

Table 27 indicates no statistically significant relationship exists between "Clients" and "Other Hunters" with respect to their hunting party size (Who).

The variable, Why, was measured by response to six separate motivations for hunting: getting out-of-doors,

Table 24. Mean Difference for PAS Program Client Status for Variety of Game

PAS Program Client Status	Number of Cases	Variety of Game Mean Value	T Value[a]	Degrees of Freedom	2-Tail Probability
Client	71	3.7746			
			-.51	93.14	.614
Other Hunters	338	3.8994			

[a]Separate variance estimate.

Table 25. Cross-Tabulation of PAS Program Client Status with When

25a. Cross-Tabulation of PAS Program Client Status with Opening Day of Hunting Season

		Opening Day of Hunting Season			
		Morning	After-noon	All Day	Row Total
PAS Program Client Status	Clients	21	3	42	66
		31.8[a]	4.5	63.6	17.5
		21.4[b]	7.9	17.4	
		5.6[c]	.8	11.1	
	Other Hunters	77	35	200	312
		24.7	11.2	64.1	82.5
		78.6	92.1	82.6	
		20.4	9.3	52.9	
	Column Total	98	38	242	378
		25.9	10.1	64.0	100.0

Chi-square	3.4853	Kendall's tau	.0168
Degrees of Freedom	2		
Significance	.1751	Significance	.3305
Non Response	263		

[a]Row percentage

[b]Column percentage

[c]Total percentage

Table 25. (Continued)

25b. Cross-Tabulation of PAS Program Client Status with Week Day After Opening Day of Hunting Season

		Week Day After Opening Day			
		Morning	After-noon	All Day	Row Total
PAS Program Client Status	Clients	18	18	21	57
		31.6[a]	31.6	36.8	15.4
		17.6[b]	11.6	18.8	
		4.9[c]	4.9	5.7	
	Other Hunters	84	137	91	312
		26.9	43.9	29.2	84.6
		82.4	88.4	81.3	
		22.8	37.1	24.7	
	Column Total	102	155	112	369
		27.6	42.0	30.4	100.0

Chi-square	3.0581	Kendall's tau	-.0121
Degrees of Freedom	2		
Significance	.2167	Significance	.3835
Non Response	272		

[a]Row percentage

[b]Column percentage

[c]Total percentage

Table 25. (Continued)

25c. Cross-Tabulation of PAS Program Client Status with Week-End After Opening Day of Hunting Season

		Week-End After Opening Day			
		Morning	After-noon	All Day	Row Total
PAS Program Client Status	Clients	20	2	43	65
		30.8[a]	3.1	66.2	17.5
		20.6[b]	5.0	18.3	
		5.4[c]	.5	11.6	
	Other Hunters	77	38	192	307
		25.1	12.4	62.5	82.5
		79.4	95.0	81.7	
		20.7	10.2	51.6	
	Column Total	97	40	235	372
		26.1	10.8	63.2	100.0

Chi-square	5.092	Kendall's tau	-.0033
Degrees of Freedom	2		
Significance	.0784	Significance	.4659
Non Response	269		

[a]Row percentage

[b]Column percentage

[c]Total percentage

Table 26. Cross-Tabulation of PAS Program Client Status with Where

		Travelling Time to Hunt					
		Within 15 Minutes	Within 30 Minutes	Within 45 Minutes	Within 60 Minutes	Over an Hour	Row Total
PAS Program Client Status	Clients	13	19	7	10	21	70
		18.6[a]	27.1	10.0	14.3	30.0	17.6
		7.9[b]	18.1	14.9	30.3	42.9	
		3.3[c]	4.8	1.8	2.5	53.	
	Other Hunters	151	86	40	23	28	328
		46.0	26.2	12.2	7.0	8.5	82.4
		92.1	81.9	85.1	69.7	57.1	
		37.9	21.6	10.1	5.8	7.0	
	Column Total	164	105	47	33	49	398
		41.2	26.4	11.8	8.3	12.3	100.0

Chi-square	36.0816	Kendall's tau	-.2255
Degrees of Freedom	4		
Significance	.0000	Significance	.0000
Non Response	243		

[a]Row percentage [b]Column percentage [c]Total percentage

Table 27. Cross-Tabulation of PAS Program Client Status with Who

PAS Program Client Status		Hunting Party Size: Alone	With One Partner	With A Group	Row Total
	Clients	8	44	18	70
		11.4[a]	62.9	25.7	17.6
		11.3[b]	19.7	17.5	
		2.0[c]	11.1	4.5	
	Other Hunters	63	169	85	327
		19.3	54.7	26.0	82.4
		88.7	80.3	82.5	
		15.9	45.1	21.4	
	Column Total	71	223	103	397
		17.9	56.2	25.9	100.0

Chi-square	2.6584	Kendall's tau	-.0324
Degrees of Freedom	2		
Significance	.2647	Significance	.2064
Non Response	244		

[a]Row percentage

[b]Column percentage

[c]Total percentage

the suspense and challenge of seeking game, the companionship and enjoyment of hunting friends, the actual killing of game and taking it home, getting-away-from-it-all, and getting some exercise. For all six motivations, no statistically significant relationship exists between "Clients" and "Other Hunters" (Table 28, parts a-f).

Table 29 indicates a statistically significant difference between "Clients" and "Other Hunters" in terms of the number of days they hunted (Days)--"Other Hunters" hunted considerably more days than "Clients."

Based on the above results, Research Hypothesis 2 can only be partially accepted.

6.2.3 Research Hypothesis 3: Hunters Can Be Segmented on Their HSS Decision Strategy.

Research Hypothesis 3, in operational form, consists of:

> Higher proportions of unclassified respondents to question #18 can be classified into three groups, i.e., "Recommendations," "Important Feature/Satisfice," and "Systematic Evaluation," by discriminant analysis using the discriminating variables, Years Hunted, Number of Areas Hunted, Variety of Game, Kill, Where, Who, Variety of Information Sources, and Variety of Information, then can be classified by an assignment using prior probabilities of .29, .47, and .24, respectively, derived from the number of initial responses to each value of question #18.

Table 28. Cross-Tabulation of PAS Program Client Status with Why

28a. Cross-Tabulation of PAS Program Client Status with Getting Out-of-Doors

		Importance of Getting Out-of-Doors			
		Very Important	Somewhat Important	Not Important	Row Total
PAS Program Client Status	Clients	51	16	3	70
		72.9[a]	22.9	4.3	17.7
		18.1[b]	17.0	15.0	
		12.9[c]	4.0	.8	
	Other Hunters	231	78	17	326
		70.9	23.9	5.2	82.3
		81.9	83.0	85.0	
		58.3	19.7	4.3	
	Column Total	282	94	20	396
		71.2	23.7	5.1	100.0

Chi-square	.1585	Kendall's tau	.0126
Degrees of Freedom	2		
Significance	.9238	Significance	.3596
Non Response	245		

[a]Row percentage

[b]Column percentage

[c]Total percentage

Table 28. (Continued)

28b. Cross-Tabulation of PAS Program Client Status with the Suspense and Challenge of Seeking Game

		Importance of the Suspense and Challenge of Seeking Game			
		Very Important	Somewhat Important	Not Important	Row Total
PAS Program Client Status	Clients	39	24	6	69
		56.5[a]	34.8	8.7	17.7
		17.5[b]	17.9	18.2	
		10.0[c]	6.2	1.5	
	Other Hunters	184	110	27	321
		57.3	34.3	8.4	82.3
		82.5	82.1	81.8	
		47.2	28.2	6.9	
	Column Total	223	134	33	390
		57.2	34.4	8.5	100.0

Chi-square	.0162	Kendall's tau	-.0050
Degrees of Freedom	2		
Significance	.9920	Significance	.4496
Non Response	251		

[a]Row percentage

[b]Column percentage

[c]Total percentage

Table 28. (Continued)

28c. Cross-Tabulation of PAS Program Client Status with the Companionship and Enjoyment of Hunting Friends

		Importance of the Companionship & Enjoyment of Hunting Friends			
		Very Important	Somewhat Important	Not Important	Row Total
PAS Program Client Status	Clients	33	28	8	69
		47.8[a]	40.6	11.6	17.7
		18.4[b]	18.2	14.3	
		8.5[c]	7.2	2.1	
	Other Hunters	146	126	48	320
		45.6	39.4	15.0	82.3
		81.6	81.8	85.7	
		37.5	32.4	12.3	
	Column Total	169	154	56	389
		46.0	39.3	14.4	100.0

Chi-square	.5379	Kendall.s tau	.0217
Degrees of Freedom	2		
Significance	.7642	Significance	.2980
Non Response	252		

[a]Row percentage

[b]Column percentage

[c]Total percentage

Table 28. (Continued)

28d. Cross-Tabulation of PAS Program Client Status with the Actual Killing of Game and Taking it Home

		Importance of the Actual Killing of Game and Taking it Home			
		Very Important	Somewhat Important	Not Important	Row Total
PAS Program Client Status	Clients	7	26	33	66
		10.6[a]	39.4	50.0	17.3
		12.1[b]	16.4	20.0	
		1.8[c]	6.8	8.6	
	Other Hunters	51	133	132	316
		16.1	42.1	41.8	82.7
		87.9	83.6	80.0	
		13.4	34.8	34.6	
	Column Total	58	159	165	382
		15.2	41.6	43.2	100.0

Chi-square	2.0519	Kendall's tau	-.0579
Degrees of Freedom	2		
Significance	.3585	Significance	.0795
Non Response	259		

[a]Row percentage

[b]Column percentage

[c]Total percentage

Table 28. (Continued)

28e. Cross-Tabulation of PAS Program Client Status with Getting-Away-From-It-All

		Importance of Getting-Away-From-It-All			
		Very Important	Somewhat Important	Not Important	Row Total
PAS Program Client Status	Clients	40	21	8	69
		58.0[a]	30.4	11.6	17.6
		17.8[b]	19.3	14.0	
		10.2[c]	5.4	2.0	
	Other Hunters	185	88	49	322
		57.5	27.3	15.2	82.4
		82.2	80.7	86.0	
		47.3	22.5	12.5	
	Column Total	225	109	57	391
		57.5	27.9	14.6	100.0

Chi-square	.7109	Kendall's tau	.0115
Degrees of Freedom	2		
Significance	.7008	Significance	.3853
Non Response	250		

[a]Row percentage

[b]Column percentage

[c]Total percentage

Table 28. (Continued)

28f. Cross-Tabulation of PAS Program Client Status with Getting Some Exercise

		Importance of Getting Some Exercise			
		Very Important	Somewhat Important	Not Important	Row Total
PAS Program Client Status	Clients	31	29	9	69
		44.9[a]	42.0	13.0	17.8
		18.7[b]	19.1	12.9	
		8.0[c]	7.5	2.3	
	Other Hunters	135	123	61	319
		42.3	38.6	19.1	82.2
		81.3	80.9	87.1	
		34.8	31.7	15.7	
	Column Total	166	152	70	388
		42.8	39.2	18.0	100.0

Chi-square	1.4266	Kendall's tau	.0328
Degrees of Freedom	2		
Significance	.4900	Significance	.2145
Non Response	253		

[a]Row percentage

[b]Column percentage

[c]Total percentage

Table 29: Mean Difference for PAS Program Client Status for Days

PAS Program Client Status	Number of Cases	Variety of Game Mean Value	T Value[a]	Degrees of Freedom	2-Tail Proba-bility
Client	57	17.5614			
Other Hunters	256	23.9961	-2.07	120.37	.041

[a]Separate variance estimate.

The variables were analyzed using the Discriminant Analysis (DA) statistical technique. DA is described in Chapter IV, Section 4.2.3. For this test, a portion of the respondents (82 cases--60 percent) were used to form the discriminating functions.[1] The remaining portion (68 cases--40 percent) were used for the test. The SPSS subprogram, DISCRIMINANT ANALYSIS, was utilized.

Table 30 gives the classification results and indicates that over half of the cases with membership known were correctly classified. This was statistically significant at the .05 level. Therefore, Research Hypothesis 3 was accepted (the null hypothesis rejected).

The DA yielded additional information regarding the HSS model. Table 31 gives the means for the three groups ("Recommendations," "Important Feature/Satisfice," and "Systematic Evaluation") and indicates that systematic hunters knew of more hunting areas, used more hunting site information sources, used more types of hunting site information and travelled relatively farther to hunt than the other two groups of hunters.

---

[1]Only a portion (192) of the total number of respondents who hunted in southern lower Michigan also hunted new areas (see question #15). Only these "new area" hunters were asked to respond to questions #16 through #18. Of the respondents to question #18, only a portion (150) had matching responses to the eight discriminating variables. A complete set of responses was necessary for analysis purposes.

Table 30. Classification Results of Dscriminant Analysis

		Predicted Group Membership			
		Recommen-dations	Important Feature/ Satisfice	Systematic Evaluation	Number of Cases
Actual Group Member-ship	Recommen-dations	8 47.1[a]	6 35.3	3 17.6	17
	Important Feature/ Satisfice	2 6.7	20 66.7	8 26.7	30
	Systematic Evaluation	6 30.0	7 35.0	7 35.0	20
	Ungrouped	0	1 100.0	0	1

52.2 percent of known cases correctly classified

Chi-square 10.776

Significance .001

[a]Row percentage

Table 31. Group Mean Results of Discriminant Analysis

Discriminating Variables	Group Means: Recommendations	Important Feature/ Satisfice	Systematic Evaluation	Total
Years Hunted	9.7826	15.1163	14.3750	13.4756
Number of Areas Hunted	6.5652	819302	10.9375	8.6585
Variety of Game	3.6522	4.5116	4.1875	4.2073
Kill	1.6087	1.8272	1.8125	1.7683
Where	2.6522	2.6279	2.8125	2.6707
Who	2.1739	2.2093	2.0000	2.1585
Variety of Information Sources	1.8261	1.9302	2.5000	2.0122
Variety of Information	1.9130	4.6977	5.7500	4.9634

Important feature/satisfice hunters had the most hunting experience in years, hunted the most types of game, were more motivated by actually killing game and hunted with a larger group than the other two groups.

Table 32 gives the standardized discriminant function coefficients and indicates the relative importance of the eight discriminating variables.[1] The first discriminant function[2] is "dominated" by the variables, Variety of Information Sources, Who and Where. The variables, Variety of Game, Years Hunted and Variety of Information, are relatively more important in the second discriminant function. Neither of these discriminant function lends themselves to easy interpretation.

6.3 Conclusions

The results of the testing of the three research hypotheses lead to several conclusions. One, apparently there is a need for the PAS Program with its current emphasis on urban hunters without rural land contacts if this groups' satisfaction with the number of hunting opportunities is considered important.

---

[1]These discriminant function coefficients can be interpreted similarly to beta weights in multiple regression.

[2]The maximum number of discriminant functions is one less than the number of groups when there are fewer groups than discriminating variables.

Table 32. Standardized Discriminant Function Coefficients

Discriminating Variables	Discriminant Function	
	Function 1	Function 2
Years Hunted	-.2258	0.6010
Number of Areas Hunted	-.4165	-.1010
Variety of Game	-.0643	-.6567
Kill	-.2463	-.1806
Where	-.4651	.1227
Who	.5205	-.2686
Variety of Information Sources	-.7525	.1799
Variety of Information	-.1864	.4251

Two, the results of testing Research Hypothesis 2 suggest that the differences between these PAS Program clients and other hunters for the most part do not relate to the characteristics and behavior variables considered in this study. If these two groups of hunters are different, then other variables are more important in measuring this difference.

Finally, it appears that hunters can be segmented on the basis of their HSS decision strategy, at least as conceptualized in this study.

CHAPTER VII: SUMMARY AND RECOMMENDATIONS

7.1 Introduction

This chapter begins with a summary of the preceding six chapters. It then analyzes the PAS Program in relation to four factors: properties leased, information provided, requirements of participating hunters and participating hunters' reactions to the Program, and makes recommendations for the role of marketing in the PAS Program. The chapter concludes with some recommendations for further research on the PAS Program and on hunting site selection.

7.2 Summary

Hunters and Wildlife managers are concerned with the reduction in hunting opportunities on privately-owned, rural land in southern lower Michigan. In response to this concern, the Public Access Stamp (PAS) Program was established by Public Act 373 of 1976. The PAS Program authorizes the Michigan Department of Natural Resources (DNR) to require all hunters in southern lower Michigan (DNR zone 3) to purchase a "Public Access Stamp" and,

using the revenues generated from the sale of such stamps, to lease land from landowners in zone 3 for public hunting.

The purpose of this study was to (1) determine the need for the PAS Program--were urban hunters without rural land contacts (PAS Program clients) dissatisfied with the number of hunting opportunities available to them, (2) profile zone 3 hunters on the basis of their characteristics and behavior and determine if PAS Program clients differ from other zone 3 hunters, (3) investigate the hunting site selection (HSS) process of zone 3 hunters and determine if they could be segmented on the basis of how they select hunting sites, and (4) to evaluate the PAS Program in 1977-78 on the basis of the properties, the information provided, hunter requirements and hunter reactions.

Research literature on hunting, private lands and less than fee simple land acquisition techniques, hunter access program evaluations, and hunters was reviewed. This literature review pointed to the need to generate information specific to zone 3 hunters and the PAS Program in order to meet the objectives of the study.

A HSS model was developed based on a consumer behavior approach to study the hunter's decision strategy in selecting a hunting site. The model consisted of five HSS decision strategies: "habit," "systematic," "recommended," "satisfice," and "important feature." Three decision strategies (systematic, recommended and a combination of

satisfice and important feature) were hypothesized to be predictable using eight characteristic and behavior variables.

Three research hypotheses were postulated relating to the first three study objectives. To meet the study objectives and test the research hypotheses, a survey of zone 3 hunters was conducted in the Spring of 1978. The survey consisted of (1) identifying the population to be surveyed and selecting a sample, (2) developing a survey instrument and pretesting it, (3) administering the survey instrument to the sample, and (4) data coding, transfer to computer and analysis. The study population was all zone 3 hunters, estimated to number 515,000 in 1977, and the sample consisted of 1,078 hunters residing in or near zone 3 who had been previously surveyed by the DNR. The survey instrument was a self-administered mailed questionnaire and three mailings were utilized to elicit a response from 641 hunters. The data were analyzed using computer programs available in the Statistical Package for the Social Sciences.

The results of the survey indicated that respondents:

1. lived in a rural setting,
2. had considerable hunting experience,
3. hunted small game most often,
4. hunted all day on opening day and week-ends after opening day, but hunted afternoons on week days after opening day,
5. hunted within a 15 minute drive of their home,

6. hunted with one other hunter,
7. hunted for a variety of reasons (getting out-of-doors the most important and killing game the least important),
8. obtained hunting site information from others,
9. utilized a variety of types of information to select hunting sites, and
10. selected hunting sites on the basis of one important feature.

In terms of the PAS Program, respondents:

1. first learned of the Program when they bought their hunting license,
2. did not attempt to find out about the Program, and
3. suggested the Program be discontinued.

Of the three research hypotheses postulated, two were accepted and one only partially accepted. The results of testing the hypotheses indicated a need for the PAS Program and that hunters can be segmented on the basis of their HSS decision strategy as conceptualized in this study.

7.3 Analysis of the PAS Program

The PAS Program was analyzed on the basis of:

1. the properties leased,
2. the information provided,
3. the requirements of participating hunters, and
4. hunter reaction to the Program.

Based on this analysis, a number of recommendations for the PAS Program were made.[1] These recommendations focus on the role of marketing in the Program. Schick, et al. (1976) have stressed the importance of marketing in wildlife management. Brown and Dawson (1977) and Womach, et al. (1975) have commented on how hunter access programs are essentially hunting marketing programs. The importance of marketing with respect to the PAS Program has also been stressed (Westfall, et al. 1977).

Kotler (1975:5) states marketing, "relies heavily on designing the organization's offering in terms of the target market's needs and desires and on using effective pricing, communication, and distribution to inform, motivate, and service the markets." The "target market" for the PAS Program is urban hunters without rural land contacts (see Chapter I, Section 1.3). Although not explicitly stated in Public Act 373 or by the Wildlife Division (WD), the implicit rationale for targeting the PAS Program at this group is the perception that this group

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[1] As mentioned in Chapter I, Sections 1.3 and 1.4, the PAS Program began with the 1977-78 hunting season and was analyzed after its first year. In interpreting the recommendations, the short (one year) existence of the Program (with its associated start up problems) and the immediate analysis of the Program should be kept in mind. In addition, since the sample totalled only 456 respondents who hunted in zone 3 out of an estimated 515,000 zone 3 hunters (see Chapter IV, Section 4.3.1), further caution in interpreting the recommendations is advised.

supports the WD but does not benefit from WD activities as much as other hunters.

Once a target market has been identified, an analysis of that market is necessary in order to develop a marketing program. This study indicated that PAS Program clients were for the most part not significantly different from other hunters with the exception of where they hunt (farther from home) and the total number of days they hunt (fewer). (See Chapter VI, Section 6.2.2.) Other characteristics may distinguish these two groups of hunters; however, this study did not investigate all possible differentiating characteristics.

In order to determine if PAS Program clients differ significantly from other zone 3 hunters in terms of their knowledge of, experiences with and reaction to the PAS Program, the variable, PAS Program Client Status, and the responses to questions #19 and #21 through #30 were analyzed using the Chi-square statistical technique (see Chapters IV and VI for an explanation of the Chi-square technique and the variable, Pas Program Client Status, and Appendix D for the study questionnaire). Only one relationship was significant at the .05 level (i.e., a higher proportion of "Clients" felt there was not enough information on the lists of participating landowners--question #23--compared to "Other hunters").

On the basis of this study, it cannot be said that PAS Program clients require a unique marketing program compared to other zone 3 hunters. However, some marketing program is necessary.[1]

A marketing program is the mix of product, place (distribution), price and promotion a firm or organization utilizes to achieve its objectives. The PAS Program "product" is hunting opportunities which include not only land upon which to hunt but also the "access system"--the rules and procedures to gain access to the PAS Program properties. "Place" refers to both the distribution of PAS Program properties in zone 3 and the distribution of information about the Program. The "price" hunters pay for the PAS Program product includes the $1.00 for the Public Access Stamp and the time and effort required to find out about the Program and the properties, and travel to and gain access to them. The "promotion" involved with respect to the PAS Program includes:

1. free publicity, e.g., newspaper and magazine articles,
2. paid advertising (no paid advertising was used prior to or during the 1977-78 hunting season).
3. point-of-purchase promotion (the only point-of-purchase promotion provided was the DNR Hunting Guide and hunting license dealers' knowledge of the Program), and

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[1]No marketing program is a program, albeit in ineffective one.

4. on-site promotion such as signs and information at PAS Program properties.

7.3.1 PAS Program Properties Leased

The PAS Program properties provided to hunters did not reflect the distribution of Program clients with some exceptions. The counties with Michigan's urban areas (Bay, Genesee, Ingham, Jackson, Kalamazoo, Kent, Muskegon, Saginaw, Washtenaw and Wayne) received only 30.5 percent of the leased properties (see Figure 3, Chapter I, Section 1.3). If the 98 properties in Kent County are not included, only 9.7 percent of the Program properties were in "urban" counties. Thirty three percent of the leased acres were in urban counties. Again, if Kent County is excluded, only 14.7 percent of the Program acres were in Michigan's urban counties.

Hunting is restricted in Wayne County and parts of Oakland County; therefore, little land is available in these two counties for the PAS Program. Adjacent counties (Genesee, Lapeer, Livingston, MaComb, Monroe and Washtenaw) did not make up for this deficiency. These neighboring counties had only 12 properties totalling 2,036.8 acres in the Program.

Clearly, if the PAS Program is to provide hunting opportunities close to its client group, then more land

should be leased in Michigan's urban areas. Where PAS Program clients hunted (farther from home; see Chapter VI, Section 6.2.2) was one of the few distinguishing characteristics of this group. Leasing land closer to urban hunters will most likely require a higher per acre cost and more negotiating efforts; however, support for the Program will probably fade without an improved distribution of Program properties.

For the small number of respondents who actually hunted on a PAS Program property (28; see Chapter V, Section 513, Table 18), half described the property as "excellent" or "good" and half as "fair" or "poor." While this information is a limited representation of the quality of PAS Program properties, it suggests the WD should make every effort to lease land with a reasonable chance of hunting success.

7.3.2 Content and Availability of PAS Program Information

The information on the PAS Program provided to hunters is shown in Appendix C (an example of a participating landowner list) and Figure 11. Figure 11 is the cover of the yearly DNR Hunting Guide. On page 3 of the guide is the following:

Figure 11. DNR Yearly Hunting Guide.

1977-78

MICHIGAN BIG GAME- small game HUNTING GUIDE

DEPARTMENT OF NATURAL RESOURCES

Box 30028 Lansing, Mich. 48909

PUBLIC ACCESS STAMP

For all hunting in Zone 3, a new $1 public access stamp is required in your possession. Its purpose: To provide funds to lease private lands for public hunting. As exceptions to this requirement, the stamp is not needed by:

1. Persons hunting under senior citizen's licenses;

2. Residents of this state or their children and employees when hunting small game on their own enclosed farm land where they live.

3. Residents of this state while on furlough from military service of the United States.

The public access stamp must be affixed to the reverse site of a current hunting license with your name signed across the face of the stamp.

After September 1, you may obtain free lists of private lands to be leased with stamp sale revenues for public hunting in Zone 3.

Such lists will be available from DNR field offices or by writing to:

Public Access Program
Department of Natural Resources
P. O. Box 30028
Lansing, Michigan 48909

Written requests to that address should specify those counties in which you wish to hunt.

The information contained in the Hunting Guide, if made available to zone 3 hunters, was adequate to introduce hunters to the Program.

In addition to the DNR Hunting Guide, a number of articles on the PAS Program appeared in southern lower

Michigan newspapers and other media during the Fall of 1977.[1] This "introductory" information should make hunters familiar with the PAS Program and provide them with enough to take the next step--obtain a list of participating landowners.

Since free publicity does not always result in maximum exposure to the target market due to the media's discretionary use of it, in the future the WD should consider paid advertising to introduce the Program to hunters.[2]

According to Kotler (1975:240),

> A consumer can be conceived as being in some stages of readiness in relation to the product such as (1) unawareness, (2) awareness, (3) comprehension, (4) interest, (5) desire, and (6) action.

PAS Program clients are probably in all six stages with the proportion in stage 1 being higher during the Program's first year and the proportion in later stages increasing during subsequent years. The WD's promotional efforts in any one year should be adjusted to the stage considered

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[1] For example, "Public Access Stamp leasing winding up; tops 104,000 acres" in The State Journal, October 19, 1977; "An Old Law Opens New Lands" by Kenneth S. Lowe in Michigan Out-of-Doors (November, 1977), 31(10):24-25; and "Pheasant season opens--hunters snipe at new laws" in The Detroit News, October 21, 1977.

[2] No section of Public Act 373 prohibits the Department of Natural Resources from spending Stamp revenues on advertising. Chapter 4, Section 44 allows the expenditure of Stamp revenues for "program administration." No guidelines on the balance between leasing and program administration expenditures are given in the Act; therefore, a higher expenditure on promotion appears safe.

most important at that time. This suggested adjustment process will require a promotional strategy including:

1. promotional objectives identifying the target market, the target effect (what stage or stages is the target market in?) and the optimal target reach and frequency,
2. media selection,
3. advertising timing, and
4. advertising evaluation.

The next step in utilizing PAS Program properties, i.e., obtaining a list of participating landowners, was not facilitated by the WD to a great degree. Hunters had to write to the WD Lansing headquarters for a list. Lists were also available from DNR District Offices; however, the location of these Offices was not included in the DNR Hunting Guide (the Offices' telephone numbers were included). As noted in Chapter V, Section 5.3, Table 14, over half of the respondents who did not obtain a list of participating landowers gave as the reason that they could not figure out how to get a list.

A better approach would be to make lists available to hunting license dealers. Table 12 (Chapter V, Section 5.3) indicated that most respondents first learned of the PAS Program when they purchased their hunting license. Most hunters do not visit DNR Lansing headquarters or District Offices and may not take the time or trouble to write for a list. While distributing lists to all license dealers

would involve a higher Program administration cost, such distribution is desirable to insure that all prospective PAS Program clients have enough information to utilize Program properties.

Due to a lack of resources for its own distribution system, the WD must rely on middlemen (hunting license dealers) to inform zone 3 hunters of the Public Access Stamp requirement and the Program in general. The responsibilities of these distributors should be spelled out with respect to the PAS Program. An informal field check of Lansing area hunting license dealers in the Fall of 1977 indicated some variability in their knowledge of zone 3 hunter requirements with respect to the PAS Program and the Program in general. The WD should continuously motivate dealers to sell Public Access Stamps, distribute information on the Program (specifically lists of participating landowners as suggested above) and promote the Program in general.[1] To insure adequate license dealer performance, the WD should also conduct periodic evaluations of dealers.

The information on the lists (see Appendix C) was in some cases inadequate for locating PAS Program properties. Often only a rural route number or town was provided as an

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[1]An amendment to PA 373 has been proposed by the WD which would return a small portion of Public Access Stamp revenues to license dealers on the basis of the number of Stamps sold for distribution costs.

address. In these instances, no directions other than range, township and section number were provided. It is reasonable to expect urban hunters would require additional information on how to get to the PAS Program properties, e.g., road addresses, mileage from intersections, etc. As noted in Chapter V, Section 5.3, 40.9 percent of those respondents who obtained a list felt it did not have enough information on it.

Another recommendation with respect to the lists in relation to the above finding would be to include some indication of the type of habitat available at a PAS Program property, e.g., pasture, upland woods, cropland, etc. It is conceivable a hunter could try several properties before finding the habitat associated with the type of game he wants to hunt. Table 10 (Chapter V, Section 5.2) indicated a majority of respondents utilized information on land cover, game and game sign, and food and cover for game in selecting hunting sites. Any information on the lists giving some indication of the preceding would be beneficial.

In addition to or as an alternative to the above recommendations concerning information on the lists, the inclusion of participating landowners' phone numbers on the lists would facilitate both locating PAS Program properties and determining the type of habitat or hunting available.

In theory, once a hunter arrived at the vicinity of a PAS Program property, signs provided by the WD would identify the boundaries of the property. Based on informal field investigations, it was sometimes difficult to connect a farm headquarters with a particular piece of property. Much time and effort could easily be spend searching for the landowner's residence. Better identification of farm headquarters would lessen this possible confusion.

7.3.3 PAS Program Hunter Requirements

The requirement of hunters to obtain a Hunter Access Tag (HAT) was made to insure the landowner some control over the number of hunters on his property (the rule being one hunter per 10 acres). By having the requirement and not providing for the possibility of landowners not being at home, the WD placed some hunters in a predicament. Some hunters undoubtedly travelled to a PAS Program property, found the landowner not at home and then were faced with the choice of hunting the property without a HAT (thus acting illegally), finding an alternative PAS Program property or returning home.[1] Some modification to accommodate for this situation would be preferable. Respondents generally

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[1]This happened to the research team in one instance during an informal field investigation.

preferred no requirement or less contact with the landowner (see Table 20, Chapter V, Section 5.3).

7.3.4 Hunters' Reaction to the PAS Program

By and large, hunter reaction to the PAS Program was negative. As noted in Chapter V, Section 5.3, over 76 percent of the respondents did not try to find out about any properties in the Program. Approximately one fifth of these respondents indicated the reason for not pursuing the Program further was that they did believe in the Program (Table 13, Chapter V, Section 5.3). The most common suggestion (23.7%) regarding the PAS Program made by respondents was to end the Program (see Table 21, Chapter V, Section 5.3).

This negative reaction may have been due to the entire Program itself, to some aspects of the Program or to its "presentation" to zone 3 hunters. Most likely all three possibilities were involved. To improve hunter reaction to the PAS Program, the WD should concentrate on the last two possibilities by modifying those elements of the Program causing problems (see Sections 7.3.1-3) and aggressively marketing the Program to zone 3 hunters.

7.4 Recommendations for Further Research

The WD may benefit from additional research on the "hunter side" of the PAS Program, particularly given the immediacy of this study's analysis of the Program after its first year. A duplication of this study towards the end of the Program's six year life span would aid the WD in determining if any changes in hunters' knowledge of, experiences with and reaction to the Program had occurred in the interim.

Some measurement of Program inputs (i.e., expenditures, staff, etc.) and Program outputs (i.e., acres, participating hunters, participating hunter days, etc.) would allow the WD to determine how the PAS Program compares to its other programs, particularly on a cost per hunter day basis.

Finally, an investigation of the impact of the PAS Program on its specific client group, urban hunters without rural land contacts, would assist the WD in determining if it is meeting the needs of its target market.

As mentioned in Chapter I, Section 1.4, it was not possible within the constraints of the study to fully investigate the hunting site selection (HSS) process. This section also makes a number of recommendations for further research on HSS.

In general, more research is needed on the relationship between hunting "participation" and hunting land "supply." Specifically, how does the amount of, the satisfaction with and the motivation for hunting relate to the various types of hunting sites (public versus private, near versus distant, small versus large, etc.).

More research on hunting should rely on experimental and observational research methods rather than survey methods. Survey methods are too limited in relation to the research problem because they must involve respondent recall.

Exactly what hunters consider or visualize as a hunting site needs to be determined. Is the wildlife manager's management unit the same as the hunter's hunting site?

Further testing of the hypothesis that hunters select hunting sites in different manners is necessary before the results of this study can be generalized. Along with this, the examination of other variables in distinguishing HSS decision strategies is needed. How does the type of hunting site information relate to HSS? This study only examined the amount (referred to as variety), not the type of information on hunting sites. Finally, the question of the method by which "systematic" hunters transfer hunting site information and recommendations to hunters who rely on others' recommendations needs to be answered. This systematic HSS hunters obviously influences a larger group.

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APPENDIX A

Appendix A: Public Act 373 of 1976.

STATE OF MICHIGAN
78TH LEGISLATURE
REGULAR SESSION OF 1976

Introduced by Senators Allen and Hertel

ENROLLED SENATE BILL No. 1071

AN ACT to amend chapter 4 of Act No. 286 of the Public Acts of 1929, entitled as amended "An act to provide for the protection of wild animals and wild birds; to regulate the taking, possession, use and transportation of same; to prohibit the sale of game animals and birds; to regulate the manner of hunting, pursuing and killing game animals, birds and furbearing animals; to provide for the issuing of licenses and permits for the taking, hunting or killing of all wild animals and birds and the disposition of the moneys derived therefrom; to provide for the issuance of a sportsman's license by combining several hunting and fishing licenses; to provide penalties for the violation of any of the provisions of this act and the rules adopted thereunder, and to repeal certain acts relating thereto," as amended, being sections 314.6 to 314.43 of the Compiled Laws of 1970, by adding sections 44, 45, 46, 47 and 48.

The People of the State of Michigan enact:

Section 1. Chapter 4 of Act No. 286 of the Public Acts of 1929, as amended, being sections 314.6 to 314.43 of the Compiled Laws of 1970, is amended by adding sections 44, 45, 46, 47 and 48 to read as follows:

CHAPTER 4

Sec. 44. Beginning April 1, 1977, every holder of a license issued under sections 6 or 16 of this chapter, except a resident who is otherwise qualified and is 65 years old or older, shall purchase a public access stamp for a fee of $1.00 before taking or attempting to take a wild bird or other animal in zone 3. All income from the sale of public access stamps shall be credited to the fish and game protection fund and shall be appropriated for the sole purpose of acquiring public access leases to private land and the administration thereof in zone 3. The department of natural resources shall lease private lands to provide public access for the purpose of hunting. Hunter access shall begin on September 15, 1977, during the hunting seasons specified by the department of natural resources.

Sec. 45. The natural resources commission may provide lease payments in amounts determined by the commission to be appropriate in relation to the benefits to the general public of the use of the leased acreage, if for the lease period the participating landowner agrees to permit without other compensation, access to that acreage by the general public for the purpose of hunting subject to this act and the rules promulgated pursuant thereto. Department of natural resources field personnel shall inspect the lands and their value to the program. Final approval of lease proposals shall be made by the department of natural resources.

Sec. 46. (1) Participating landowners shall have authority to control hunter access according to the terms of the lease agreement.

(2) Participating landowners may cancel their lease agreement at any time prior to the specified expiration date pursuant to rules adopted under section 48. Cancellation of the agreement prior to the specified expiration date shall result in forfeiture by the participating landowner of lease payments received for the year in which cancellation occurs.

(3) Participating landowners shall post, with distinctive signs provided by the department, the boundaries of land leased under provisions of section 45.

Sec. 47. No cause of action shall arise for injuries to persons hunting on lands leased under section 45 unless the injuries were caused by the gross negligence or willful and wanton misconduct of the owner, tenant or lessee.

Sec. 48. The department of natural resources may promulgate those rules it deems necessary governing the administration and operation of a hunting access program conducted pursuant to sections 44 and 45 and Act No. 306 of the Public Acts of 1969, as amended, being sections 24.201 to 24.315 of the Michigan Compiled Laws.

Section 2. This act shall expire December 31, 1982.

This act is ordered to take immediate effect.

Secretary of the Senate.

Clerk of the House of Representatives.

Approved .....

.....

Governor.

APPENDIX B

Appendix B: Wildlife Division Letter to Landowners.

STATE OF MICHIGAN

WILLIAM G. MILLIKEN, Governor

DEPARTMENT OF NATURAL RESOURCES

STEVENS T. MASON BUILDING, BOX 30028, LANSING, MICHIGAN 48909
HOWARD A. TANNER, Director

TO: Michigan Landowners

The State Legislature passed Act 373 and it was signed by the Governor in December of 1976. This Act requires that any person hunting in Zone 3 (the southern 40 counties of Michigan) purchase a Public Access Stamp which will cost $1 and have it in his possession while hunting. Monies realized from the sale of these stamps is to be used to lease private lands for public hunting. The Department of Natural Resources' Wildlife Division will handle the program.

Some things you should know about the program:

1. Leasing rates are outlined on the attached application.
2. Leases will be for three years but may be terminated at the end of any year without penalty.
3. Leases will cover the period from September 15 to March 1 of each year.
4. Lease payments will be made in March of each year.
5. The DNR will furnish the necessary signs to post your land.
6. You will be permitted to limit the number of hunters using your land at any one time.
7. Hunters must get your permission before hunting.
8. Act 373 releases the landowner of liability for all but gross negligence or willful or wanton misconduct.

We expect to receive more applications than there will be funds to cover. If we are unable to accept your application in 1977, we will contact you when additional monies are available.

Following receipt of your application, a DNR representative will contact you regarding the completion of a lease agreement.

Michigan Department of Natural Resources

6-13-77
APB:mh

MICHIGAN
THE GREAT LAKE STATE

R1026 10.76

APPENDIX C

Michigan Department of Natural Resources November 15, 1977

PUBLIC ACCESS STAMP PROGRAM

The following lands have been leased by the DNR under the Public Access Stamp Program to provide lands for public hunting. Lands leased under the program will be marked by green and white signs that say:

Hunting Permitted
under the
Public Access Stamp Program
You must get permission at the farm headquarters.

The landowner will give you a hunting permit tag. This tag must be returned to the landowner at the end of the day's hunt. The landowner has the right to limit the number of hunters using his land at any one time. Please observe all Safety Zone and Standing Crop signs and enjoy your hunt. Your good sportsmanship will assure you continued opportunities to hunt. THIS IS THE FINAL SUPPLEMENTAL LIST FOR THIS YEAR.

NEWAYGO COUNTY

Landowner	Farm Headquarters	Township	Town	Range	Section	Acres
Walter Umlor	Conklin 49403	Big Prairie	13N	11W	3	
" "	" "	Wilcox	14N	12W	22	80
MECOSTA COUNTY						
Glen Jefts	Rt. 2, Box 282, Big Rapids 49307	Colfax	15N	9W	27,28	276
MIDLAND COUNTY						
Gerald Malone	945 N. Brennan Rd., Hemlock 48626	Jasper	13N	2W	13	80
Thomas Bennett	2020 W. Chippewa Rd., Midland 48640	Lee	14N	1W	21	100
CLINTON COUNTY						
Eyde Construction	5030 Northwind Dr., E. Lansing 48823	Bath	5N	1W	32	109
Brad Dinehart	7850 Stone Rd., Muir 48860	Bengal	7N	3W	9	38
David Benner	Rt. 1, St. Johns 48879	Essex	8N	3W	10	204
Dale Anderson	Rt. 1, St. Johns 48879	Essex	8N	3W	21,22,27,28,34	480
Robert Underwood	Rt. 1, Box 154, Fowler 48835	Essex	8N	3W	5,6,7	
" "	" " " " " "	Lebanon	8N	4W	1	245
K. E. Loudenbeck	Rt. 1, Box 153, Fowler 48835	Lebanon	8N	4W	1	183

APPENDIX D

Appendix D: Questionnaire.

MSU HUNTER SURVEY

1. Where do you live now? (CHECK ONLY ONE)

___ On a farm
___ In the country, but not on a farm
___ In a small town (under 10,000)
___ In a medium city (10,000-50,000)
___ In a large city (over 50,000)

2. What county do you live in? (PLEASE FILL IN COUNTY)

_____

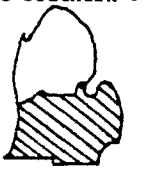
3. How many years have you been hunting? (PLEASE FILL IN NUMBER OF YEARS)

_____

4. What hunting license(s) and stamp(s) did you buy in 1977? (CHECK ALL THAT APPLY)

___ Firearm Deer
___ Bow & Arrow Deer
___ Small Game
___ Sportsman
___ Waterfowl Stamp
___ Public Access Stamp
___ Other (please fill in, _____)
___ None

5. Do you hunt in Southern lower Michigan? (Essentially the area of the Southern Peninsula South of M-20, see map at right)



___ Yes ___ No (IF NO, PLEASE GO TO QUESTION 19.)

6. Did you hunt in Southern lower Michigan in 1977?

___ Yes ___ No (IF NO, PLEASE GO TO QUESTION 8.)

7. In Southern lower Michigan in 1977, how many different days did you hunt on the following areas? (PLEASE FILL IN NUMBER OF DIFFERENT DAYS OR 0 WHERE APPLICABLE)

	On your property	On a friend's, neighbor's, or relative's property	On other private land	On public land
Deer	___	___	___	___
Small game	___	___	___	___
Waterfowl	___	___	___	___

8. In Southern lower Michigan, what game do you hunt? (CHECK ALL THAT APPLY)

___ Deer
___ Rabbit
___ Squirrel
___ Pheasant
___ Ruffed Grouse
___ Quail
___ Woodcock
___ Waterfowl
___ Other (please fill in, _____)

9. In Southern lower Michigan, what time of day do you usually hunt? (CHECK ONE FOR OPENING DAY, ONE FOR WEEK DAY AFTER OPENING DAY AND ONE FOR WEEK-END AFTER OPENING DAY WHERE APPLICABLE)

Opening day of season	After opening day of season	
	Week day	Week-end
___ Morning	___ Morning	___ Morning
___ Afternoon	___ Afternoon	___ Afternoon
___ All day	___ All day	___ All day

PLEASE GO TO NEXT PAGE

10. In Southern lower Michigan, do you usually hunt, (CHECK ONLY ONE)

___ Within a 15 minute drive of your home
___ Within a 30 minute drive of your home
___ Within a 45 minute drive of your home
___ Within a 60 minute drive of your home
___ Over an hour's drive from your home

11. In Southern lower Michigan, do you usually hunt, (CHECK ONLY ONE)

___ Alone
___ With one hunting partner
___ With a group of hunting friends

12. In Southern lower Michigan, how many different areas or places do you know of where you can hunt? (PLEASE FILL IN NUMBER OF AREAS)

_____

13. Are you satisfied with the number of areas or places you have to hunt in Southern lower Michigan?

___ Yes, I feel I have enough areas or places to hunt
___ No, I would like more areas or places to hunt

14. How important are the following reasons why you hunt? (CHECK ONE FOR EACH REASON)

	Very Important	Somewhat Important	Not Important
Getting out-of-doors	___	___	___
The suspense and challenge of seeking game	___	___	___
The companionship and enjoyment of your hunting friends	___	___	___
The actual killing of game and taking it home	___	___	___
Getting-away-from-it-all	___	___	___
Getting some exercise	___	___	___

15. Do you usually, (CHECK ONLY ONE)

___ Try out one or more new hunting areas each year or so, OR
___ Hunt the same area(s) every year IF YOU HUNT THE SAME AREA OR AREAS, PLEASE GO TO QUESTION 19.)

16. Before you try out a new hunting area, how do you usually get information about that area? (CHECK ALL THAT APPLY)

___ By talking to friends, relatives or others that have tried the area or know about it
___ By scouting out the area myself
___ By talking to the DNR
___ By talking to the owner of the area
___ By reading about the area in a newspaper, magazine or hearing about it on radio or TV
___ Other (please fill in, _____)

17. Exactly what information do you usually get? (CHECK ONLY THOSE THAT YOU USUALLY GET)

___ The size of the area
___ How far the area is from my home
___ If the owner allows hunting
___ The area's land cover (crops, woods, etc.)
___ If there is game and game sign on the area
___ How crowded the area usually is
___ If others have had any luck hunting the area
___ If there is water on the area (marsh, pond, etc.)
___ If there is food and cover for game on the area
___ Other (please fill in, _____)

PLEASE GO TO NEXT PAGE

18. When you pick out a new hunting area, how do you usually do it? (CHECK ONLY ONE)

___ I usually pick an area that has been recommended to me by a friend or relative
___ I usually pick the first area that meets my requirements
___ I usually gather as much information on as many areas as I can and then pick the area I feel is best
___ I usually pick an area that has good cover, or is open to hunting or has some other feature important to me
___ Other (please fill in, _____)

19. In 1976, the State Legislature passed a law requiring all people who hunt in Southern lower Michigan (DNR Zone 3) to buy a $1.00 "Public Access Stamp." Money from the sale of these stamps is used to lease privately-owned lands in Zone 3 for public hunting. The "Public Access Stamp" program officially began Fall, 1977.

Did you know about this program before reading the above?

___ Yes

___ No (IF NO, PLEASE GO TO QUESTION 31.)

20. How did you first learn about the program? (CHECK ONLY ONE)

___ I learned about it when I bought my license
___ Someone told me about it
___ I found out about it when I hunted property in the program
___ I read about it in a newspaper or magazine or heard about it on radio or TV
___ I learned about it from the DNR
___ Other (please fill in, _____)

21. Did you try to find out about any properties in the program?

___ Yes

___ No If no, then why not? (CHECK ONLY ONE)

___ It was too much trouble
___ I already have enough areas or places to hunt
___ I don't believe in the program
___ Other (please fill in, _____)

(NOW PLEASE GO TO QUESTION 30.)

22. Did you get a list of participating landowners?

___ Yes

___ No If no, then why not? (CHECK ONLY ONE)

___ It was too much trouble
___ I couldn't figure out how to get one
___ I couldn't wait for one
___ Other (please fill in, _____)

(NOW PLEASE GO TO QUESTION 30.)

23. Did the list have enough information on it?

___ Yes

___ No If no, then why not? (CHECK ONLY ONE)

___ It didn't have any maps on it
___ It didn't indicate the land cover on the properties
___ It didn't indicate the game that might be on the properties
___ It didn't have all the landowners' street addresses
___ It didn't have the landowners' phone numbers
___ It didn't indicate when the landowners would be home
___ Other (please fill in, _____)

(NOW PLEASE GO TO QUESTION 24.)

24. Did you hunt on any properties in the program?

___ Yes

___ No If no, then why not? (CHECK ONLY ONE)

___ It was too much trouble
___ I already have enough areas to hunt
___ I don't believe in the program
___ Other (please fill in, _____)

(NOW PLEASE GO TO QUESTION 30.)

PLEASE GO TO NEXT PAGE

25. Why did you hunt on property(s) in the program? (CHECK ONLY ONE)

___ I was looking for a new area to hunt
___ I was curious about the program
___ I have hunted the property(s) in the past
___ Other (please fill in, _____)

26. How would you describe the property(s) you hunted? (CHECK THE ONE THAT BEST APPLIES)

___ Excellent
___ Good
___ Fair
___ Poor

27. How would you describe the landowner(s) you met? (CHECK THE ONE THAT BEST APPLIES)

___ Friendly and helpful
___ Friendly, but not too helpful
___ Unfriendly
___ Not at home

28. When a hunter used "Public Access Stamp" property(s), he or she was supposed to contact the landowner and get a green "Hunter Access Tag."

Did you know about this requirement before reading the above?

___ Yes

___ No (IF NO, PLEASE GO TO QUESTION 30.)

29. How do you feel about this requirement? (CHECK THE ONE THAT BEST APPLIES)

___ I don't mind it
___ I would prefer to pick one up without contacting the landowner
___ I would prefer to sign in somewhere on the property without contacting the landowner or picking up a tag
___ I would prefer to contact the landowner and not get a tag or sign in
___ I would prefer no requirement at all

30. Which one of the following would you suggest regarding the "Public Access Stamp" program? (CHECK ONLY ONE)

___ Continue the program as it is
___ Provide more information on the lists of participating landowners
___ Lease more land in my region
___ Provide lists of participating landowners to license dealers
___ Lease better land in my region
___ Raise the $1.00 charge so that more and/or better land could be leased
___ Lease larger properties in my region
___ End the program
___ Other (please fill in, _____)
___ No suggestion

If you have any additional comments or suggestions, please write them in the space below.

31. THANKS FOR YOUR TIME AND COOPERATION!

APPENDIX E

Appendix E: First Cover Letter.

MICHIGAN STATE UNIVERSITY

DEPARTMENT OF PARK AND RECREATION RESOURCES
NATURAL RESOURCES BUILDING

EAST LANSING · MICHIGAN · 48824

Dear Michigan Hunter:

In the continuing effort to provide quality hunting opportunities, it becomes necessary from time to time to request information on hunting from the best source - Michigan's hunters. The Department of Park and Recreation Resources at Michigan State University is presently undertaking such an effort. Although it would be nice to contact all Michigan hunters for the information we need, the costs are prohibitive. Consequently, we selected at random a small number of hunters who purchased licenses in 1976 to provide us with this information. As one of this small number of selected license purchasers, your responses to the enclosed questionnaire will receive considerable weight in the tabulations we will be making. Your views are valuable, but in this case they are crucial since you are essentially representing the many hunters who we are not able to contact.

Please fill out as much of the enclosed questionnaire as you can and return it to us in the enclosed postage paid envelope as soon as possible. If you have any questions, feel free to call us collect at (517) 353-0823 and identify yourself as a Michigan hunter. Your responses will be held in strictest confidence. They will be pooled with those of other respondents and our mailing records will then be destroyed further insuring your confidentiality.

Thanks for your help and good luck next season!

Sincerely,

Richard D. Westfall
Project Coordinator

Donald F. Holecek
Project Director

APPENDIX F

Appendix F: Reminder Postcard.

Dear Michigan Hunter:

You were recently sent a questionnaire on your hunting experiences. Your completion and return of the questionnaire is essential if we are to get an accurate picture of Michigan's hunters. If you have already returned the questionnaire, thanks for your help and please ignore this card. If you haven't returned it yet, won't you take a few minutes to complete the questionnaire and drop it in the mail? Your cooperation in this study is IMPORTANT!

If for some reason you did not receive the questionnaire or have lost or misplaced it, don't worry. If we haven't heard from you in a week, we will send you a second and final questionnaire. Your cooperation will insure the accuracy of our results and we can guarantee it will be appreciated.

Sincerely,

Richard D. Westfall
Project Coordinator

Donald F. Holecek
Project Director

APPENDIX G

Appendix G: Second Cover Letter.

MICHIGAN STATE UNIVERSITY

DEPARTMENT OF PARK AND RECREATION RESOURCES
NATURAL RESOURCES BUILDING

EAST LANSING · MICHIGAN · 48824

Dear Michigan Hunter:

Approximately three weeks ago we mailed you a "MSU HUNTER SURVEY". We are still looking forward to your response. If you have just mailed your questionnaire, then please ignore this letter.

Your prompt response is critical for two reasons. First, we only mailed a small number of questionnaires to selected individuals so each response will carry considerable weight in our analysis. Second, we would like to tabulate the results in the next few weeks so that we can present our findings to the Michigan Department of Natural Resources (DNR) which is concerned with how its programs impact Michigan's hunters.

We have included another questionnaire along with a stamped return envelope if for some reason the first mailing failed to reach you. Again, we would like to thank you for your help and wish you enjoyable hunting in the future.

Sincerely,

Richard D. Westfall
Project Coordinator

Donald F. Holecek
Project Director

RDW:fp

Enclosure