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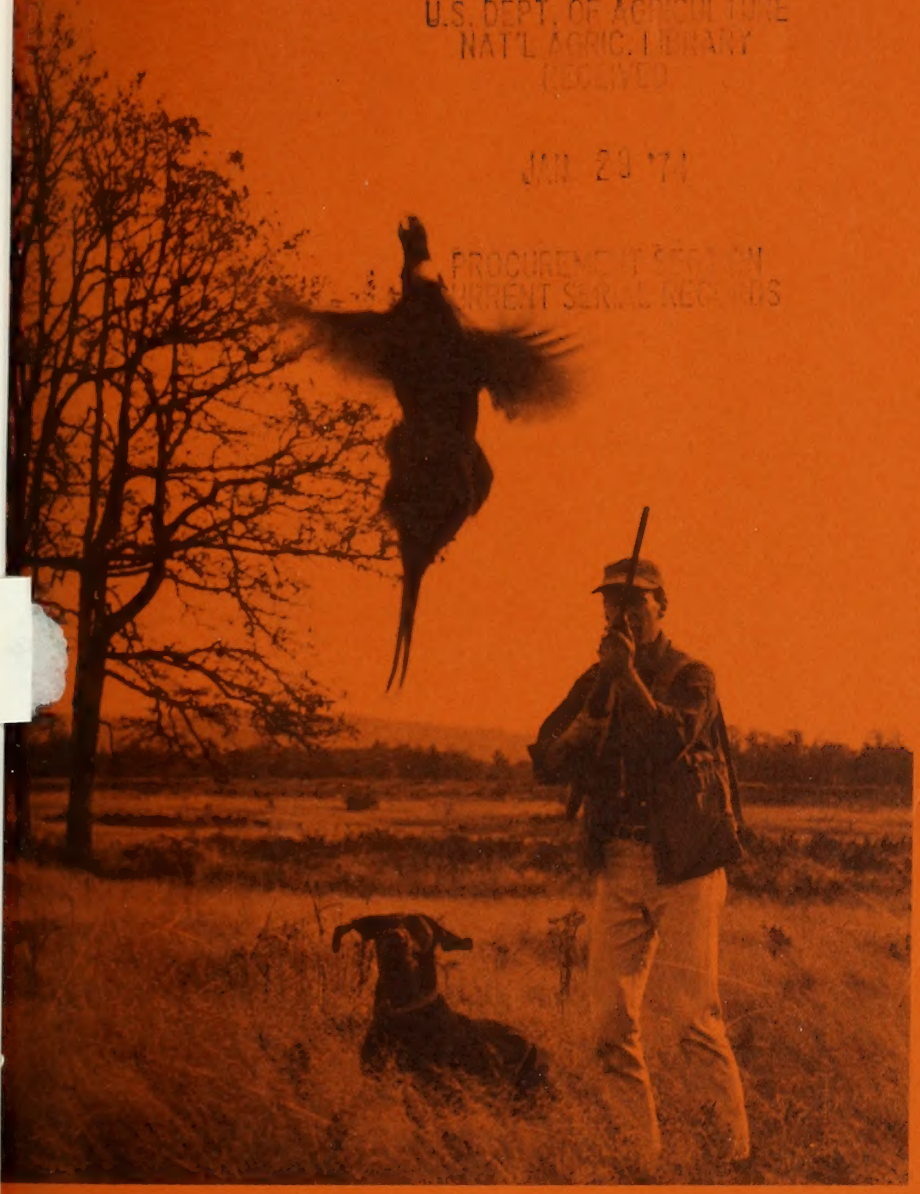

Hunters at Regulated Plant-and-Shoot Pheasant Areas in Western Washington

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ABSTRACT

This study focuses on pheasant hunters at four State of Washington Department of Game plant-and-shoot areas. Of the 1,296 hunters who received a mail questionnaire, 87 percent responded. Findings suggest positive values from a popular program, the need to reduce crowding, a need to more equitably distribute hunting success, and a revenue potential from a user charge. Hunter's sex, age, education, occupation, income, residence, organization membership, and hunting-related reading habits, motives, complaints, and success are described. Management recommendations are developed from the study findings.

Keywords: Hunting, pheasants, wildlife management, public opinion surveys.

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The valuable computer programing assistance of Randel Washburne in this study is greatly appreciated.

This study was done in cooperation with the State of Washington Department of Game, University of Washington College of Forest Resources, with financial assistance from Wildlife Management Institute and American Petroleum Institute.

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INTRODUCTION

THE PLANT-AND-SHOOT CONCEPT

"Plant and shoot" hunting refers to the sporting pursuit of game birds that have been raised in captivity and then released in a hunting area. Ideally, these planted birds closely approximate wild ones in their appearance and behavior under sport-hunting conditions. This type of hunting grew rapidly during the 1950's because of diminishing hunting opportunities. Population densities, urban sprawl, conversion of agricultural land to urban uses, "clean farming" practices, and other land uses reduce bird habitat. Increasing hunting pressure, accompanied by hunter nuisance, leads private landowners to lease hunting rights[1/] or to post their land against trespass altogether. These pressures are most acute in the Eastern United States, but all regions of the country are now feeling the pinch.

Many States provide public or private or both plant-and-shoot programs to meet increasing hunting demands. In 1965 about 2,500 public and private preserves operated in 47 States, with over 2 million game birds harvested each year (Kozicky and Madson 1966). The numbers are far greater today.

Managing plant-and-shoot programs is a difficult challenge, and privately owned programs receive little profit (Dickey 1957, 1962). Successful programs require efficient raising and planting of birds, and intensive, but carefully controlled, management of hunting pressure to insure hunting safety and satisfaction under acceptable standards of quality.

WASHINGTON'S REGULATED PLANT-AND-SHOOT PHEASANT HUNTING

Washington's pheasant-hunting program stems from the State Game Commission's policy that free public hunting is desirable (Dziedzic and Lauckhart 1966). The Department of Game follows this directive through regulated plant-and-shoot hunting. Regulation of hunters differs from area to area. Controls include limits on vehicles in parking lots; self-issued permits; restrictions on camping, littering, fires, and road use; and "no-shoot" safety zones.

Regulated areas throughout Washington belong to or are controlled by the Department of Game under management-lease agreements with private or public landowners. Owners of private lands are guaranteed posting and enforcement of "safety zones," which typically include buildings, feedlots, roadways, and other areas that the landowner wishes protected. Selection of areas for regulated hunting depends on their proximity to population centers, extent and condition of habitat, posting status of surrounding land, and availability.

Plant-and-shoot funding comes from general hunting-license revenue, and recently from sale of upland bird permits required for all pheasant, chukar, and quail hunting in the State.

The Cascade Range in Washington divides the more densely populated and forested western Washington from rural eastern Washington, where the high-quality

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1/ John Scribner Barclay. Significant factors influencing the availability of privately owned rural land to the hunter. M. S. thesis on file at Pa. State Univ., University Park, 112 p., 1965.

pheasant habitat provides abundant hunting opportunities. In the populous 40-mile-wide strip along Puget Sound in western Washington, 61 percent of the State's population resides on less than 10 percent of the land.

Regulated plant-and-shoot areas total some 27,000 acres in both eastern and western Washington. However, the program and this study focus on western Washington, where approximately 32,000 pheasants are raised and released each year on regulated and other public shooting areas for about $3.50 per bird. Bird stocking aims to maximize hunter-days afield, and hunters typically average 2 to 4 days afield per bird killed.

Each year, the Washington Department of Game raises some 32,000 pheasants for release on western Washington's public hunting areas. Ideally, these planted birds are identical to wild ones in appearance and behavior under sport hunting conditions. (Courtesy Washington Department of Game.)

A STUDY OF REGULATED PLANT-AND-SHOOT HUNTERS

STUDY OBJECTIVES

People-management problems are particularly complex on public hunting areas where hunting conditions are congested. Public plant-and-shoot hunting supplements natural hunting by increasing hunting opportunities and extending the pleasure of hunting to a wider clientele than possible under natural conditions. The following specific objectives of this study relate to these people-management problems.

1. To describe clientele of the plant-and-shoot regulated areas and to compare them with Washington's general hunting population and with the State and Puget Sound basin populations.

2. To determine attractions or hunter motives for patronizing regulated areas and how hunters originally were introduced to the areas. And further, to survey hunter complaints about the areas.

3. To determine the distribution of success among regulated hunters, comparing it with success on nonregulated areas and with other factors.

4. To evaluate the income potential of regulated areas under a hypothetical fee structure.

5. To develop management implications of the study findings.

THE STUDY AREAS

This study includes four hunting areas in western Washington that are close to the population centers of the Puget Sound basin and where hunters are required to issue themselves a permit each time they enter an area. The areas include the Lake Terrell, Stillwater, Fort Lewis, and Scatter Creek Wildlife Recreation Areas (fig. 1).[2/]

[2/] Except for the Fort Lewis area, all are owned by Washington Department of Game.

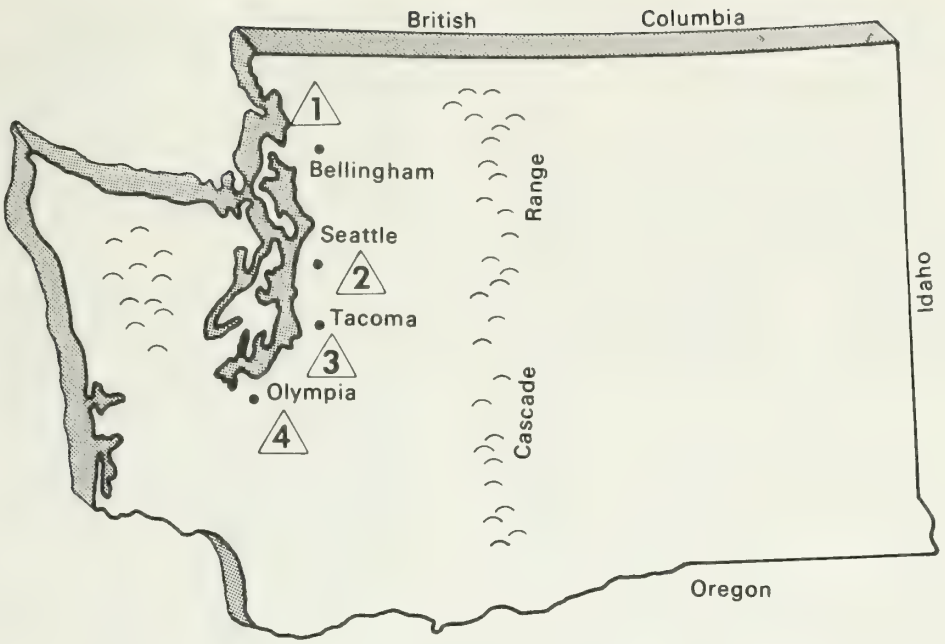

Figure 1.--*Location of the four regulated plant-and-shoot pheasant hunting areas studied in Washington: (1) Lake Terrell, (2) Stillwater, (3) Fort Lewis, (4) Scatter Creek.*

Lake Terrell is the northernmost area, located near Bellingham, about 110 miles from Seattle. The Lake Terrell area includes about 1,050 acres, but only 400 acres are for regulated pheasant hunting. The Department of Game farms approximately 150 acres there for both waterfowl and upland game habitat, and the pheasant habitat is excellent for western Washington.

Just 25 miles east of Seattle is the Stillwater area on 458 acres of Snoqualmie River bottom land. This area was first opened for regulated hunting in 1970, but other activities include waterfowl hunting, bird-dog training, and field trials. About 200 acres of agricultural crops provide short-term cover and food for wildlife.

The 900-acre Fort Lewis area, 15 miles south of Tacoma, provides hunting under a special use agreement with the U.S. Army.

The Scatter Creek area, 15 miles south of Olympia, is divided into a 400-acre unit and a 320-acre unit. In addition to pheasant hunting, the area provides some grouse, duck, and deer hunting.

HUNTING ACTIVITY, SUCCESS, AND OPERATION OF THE FOUR STUDY AREAS

All four study areas show heavy hunting pressure with relatively few birds available per hunter, and success varies widely (table 1). The Stillwater area close to Seattle is the smallest area but shows the most hunters, the fewest pheasants released, and the lowest success. Stillwater hunters averaged 12.3 visits per bird bagged compared with 3.6 visits per bird on all areas combined.[3/] The planting of more pheasants at Stillwater might, therefore, be a good way to increase hunter success and thus hunter enjoyment. The other three areas are similar in stocking and success, yielding about one bird per 2.7 hunter-days. For the season, there was only 0.16 bird available per hunter visit at Stillwater, but over three times as many were available at the other three areas. This might be because 1970 was the first year of operation at Stillwater. But when more birds were planted the next year, the larger number of hunters held the birds available per visit to half that of the other areas.

Table 1 reflects hunter congestion. Almost 21,000 hunter visits took place on 2,478 acres. However, hunter density varies considerably, as figure 2 shows. The heavy hunting pressure and high bird harvest on weekends might be shifted to weekdays by revising planting schedules and other measures to encourage a shift in hunting pressure.

The Nilo system of shooting preserve management provides an example of how a private shooting preserve views hunter crowding (Kozicky and Madson 1966, p. 45): "Each hunting party should be assigned sufficient acreage and hunting cover so that it can enjoy about two hours afield without interfering with another hunting party. A well-developed 300-acre area might accommodate four hunting parties of four members each . . . ."

3/ The Washington Department of Game interpretation of these data is that Stillwater provided more recreation per bird planted and thus was more efficient in achieving the agency's objective of maximizing hunter-days of recreation.

Table 1.--*Hunting pressure, harvest, and stocking of four regulated hunting areas during 1970*

Area	Acres	Hunter visits	Pheasants released	Birds harvested	Percent harvest[1/]	Hunter visits per bird harvested	Birds available per hunter visit	
							1970	1971
Lake Terrell	400	5,340	2,878	2,053	71	2.6	0.54	0.49
Stillwater	458	6,692	1,050	545	52	12.3	.16	.24
Fort Lewis	900	4,019	2,280	1,515	66	2.7	.57	.49
Scatter Creek	720	4,910	2,445	1,739	71	2.8	.50	.57
Total	2,478	20,961	8,653	5,852	68	3.6	.41	.45

Source: State of Washington Department of Game.

1/ One survey of private shooting preserves elsewhere during 1958-59 showed an average pheasant harvest of 74 percent for 15 economically successful preserves, although the average harvest for nine economically marginal preserves was 63 percent (Kozicky and Madson 1966).

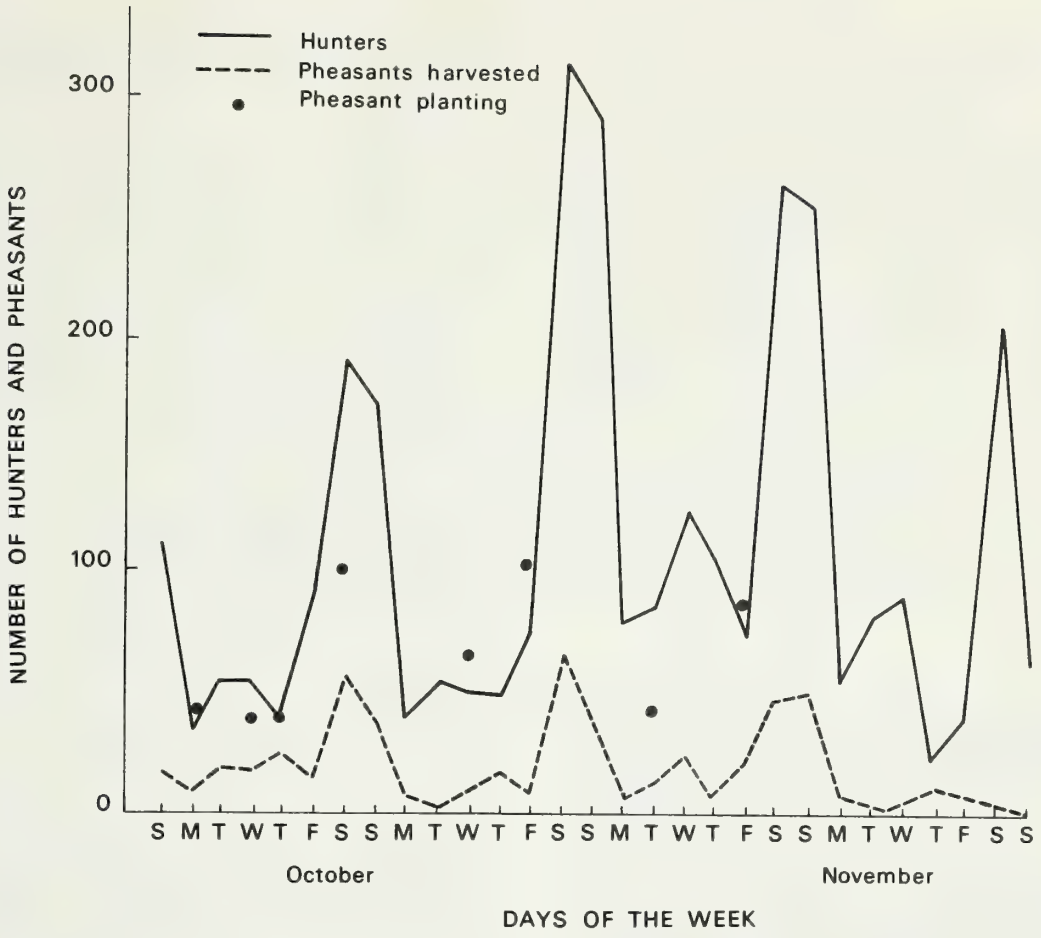

Figure 2.--*Total number of hunters, pheasants harvested, and pheasants planted during the first half of the 1970 season on the Stillwater area (calculated from Department of Game figures based on registration permits).*

THE QUESTIONNAIRE

Hunters received a 10-page mail questionnaire including multiple-choice and open-end questions.

A cover letter on the front of the questionnaire told the hunter of the study sponsorship, how his name was chosen, the importance of his cooperation, that his identity was confidential, and offered him a report of the results.

Many months were spent designing, pretesting, and refining the questionnaire.[4/]

[4/] Readers interested in questionnaire construction are referred to Potter et al. 1972.

SAMPLING

Hunters provided their name, address, and car license number on self-issued hunting permits required each time they entered plant-and-shoot areas. While on the area the hunter carried a receipt portion of his permit, and upon leaving he recorded the number of pheasants or other game bagged and deposited the permit in a locked box. Violators of this procedure were subject to arrest.

We sampled permits from the four selected areas for the first half (4 weeks) of the pheasant season in the fall of 1970. Only permits from the first half of the season were used because pheasant releasing stopped shortly after the second half began and hunter numbers dropped drastically.

Hunters' names and addresses came from self-issued permits which they must carry while hunting and then return with a record of their success. Questionnaires were mailed to 1,296 hunters who had registered at four regulated areas in western Washington.

Fifteen percent of the 7,067 permits collected were unusable because of incomplete addresses or illegible handwriting. We also discarded 1,240 permits with duplicate names resulting from multiple visits to an area by the same hunter. After eliminating such duplication, we drew a 27-percent random sample of the remaining 4,767 hunters.

Questionnaires were mailed to 1,296 of them on March 1, 1971, each with a postage-paid return envelope and a code number to identify each respondent. The Post Office returned 80 questionnaires which left a net sample of 1,216. Three mail followup contacts spaced about a week apart helped boost the response to 1,062, for an *87.3 percent rate of return*. Table 2 summarizes, for each regulated area, the number of hunter-days, number of different hunters entering areas, questionnaires mailed and returned, and response rates. These data are comparable for each area.

Despite the 87.3-percent rate of return, we contacted 92 nonrespondent hunters by telephone to see if they systematically differed from respondents on six key questions. Thirty-six of the 92 hunters had unlisted or disconnected telephones, and only 19 supplied answers to the six questions. This admittedly inadequate sample of nonrespondents did indicate their similarity to respondents, but about twice as many expressed decreasing interest in hunting.

No data in this report were adjusted for nonresponse bias because it appeared negligible, and any small distortion from the 12.7-percent nonrespondents would not alter the data significantly nor change the implications.

Table 2.--*Summary by regulated areas studied of hunter use, questionnaires mailed, and response rate*

Regulated area	Registered hunter-days[1/]	Number of different hunters	Questionnaires mailed[2/]	Net sample[3/]	Completed questionnaires returned	Percent return
Lake Terrell	2,026	995	269	263	225	85.6
Stillwater	2,189	1,888	514	482	417	86.5
Fort Lewis	1,348	800	217	203	185	91.1
Scatter Creek	1,504	1,084	296	268	235	87.7
Total	7,067	4,767	1,296	1,216	1,062	87.3

[1/] Figures represent hunter-days (a hunter registered each time he entered) during the first half (4 weeks) of the pheasant season.

[2/] Approximately a 27-percent sample.

[3/] Questionnaires mailed minus those returned by Post Office.

HUNTER CHARACTERISTICS

The following section characterizes hunters in regulated areas and compares them with a sample of all licensed hunters in Washington,[5/] with census data on the State's population and census from the seven-county Puget Sound basin. Such information helps answer questions important to the management of the regulated hunting program. For example, who are the direct beneficiaries of the program? How do they compare with other hunters and with the general population? How might hunters be educated or informed of management practices? We considered these questions in light of the hunter's sex, age, education, occupation, income, residence, membership in sportsman's organizations, and readership of sporting magazines.

SEX

Most hunters are males. Previous studies report from 89- to 99-percent male participation, averaging about 93 percent (Peterle 1967, Garrett 1970, Folkman 1963, Kirkpatrick 1965, Bevins et al. 1968). Thus, it is not surprising to find *women as only 2.8 percent of the regulated area hunters*. However, 6.2 percent of all Washington hunters are women. Data on all Washington hunters indicate that 75 percent of the women hunters prefer big game hunting, which may explain the lower proportion of women in the regulated areas.

AGE

Regulated area pheasant hunters represent ages from 11 to 78, but middle-age adults predominate, with an average age of 34.8 years (table 3). Age distributions for hunters in the four areas studied are largely the same and not meaningfully different from those for all Washington hunters.

Compared with the Washington population, the very young and the elderly

[5/] Data came from a similar questionnaire study of a 2-percent sample of all licensed Washington hunters which resulted in approximately an 85-percent return and data on 5,540 hunters.

Table 3.--*Age distribution of regulated area hunters compared with all Washington hunters and the general population*

Regulated area	Age group (years)						Total	Number of respondents
	Under 20	20-24	25-34	35-44	45-64	65+		
	Percent							
Lake Terrell	18	14	27	17	22	3	101	223
Stillwater	13	9	31	22	20	5	100	411
Fort Lewis	13	16	24	26	20	1	100	184
Scatter Creek	17	8	27	21	23	4	100	233
Average[1/]	15	11	28	21	21	4	100	1,051
All Washington hunters	17	11	24	19	25	4	100	5,419
Washington State population[2/]	25	11	16	13	25	10	100	--

[1/] No statistically significant differences exist between areas at 0.05 level. Chi square = 25.222, with 18 degrees of freedom.

[2/] Males only, 10 years and over (U.S. Bureau of the Census 1971).

pheasant hunters are slightly underrepresented. Decreasing physical ability and lessening interest in participating in strenuous activity are probably reasons why older persons are underrepresented among hunters (U. S. Outdoor Recreation Resources Review Commission 1962). The younger age groups are probably underrepresented because of time constraints in establishing families, education, and careers. Perhaps urbanization of American society and changing values and life styles account for some of this difference.

EDUCATION

The regulated area pheasant hunters are well educated, much more so than the average for other Washington hunters, the State, and Puget Sound region populations. Twenty-two percent of the regulated area hunters had attended college at one time, 11 percent had college degrees, and another 10 percent had done postgraduate work (table 4). The *43 percent of the hunters with education beyond high school is about one-third greater than all Washington hunters*. The high educational level of the pheasant hunters may relate to the proximity of the regulated areas to metropolitan areas where there are many employment opportunities for educated persons.

We found no other studies of plant-and-shoot hunting programs with comparable data, although several studies have reported educational levels of all types of hunters.[6/] These studies show about the same trends as our findings, though not so pronounced.

[6/] A national survey by the U. S. Bureau of Sport Fisheries and Wildlife (1965) found that 18.6 percent of the hunters (all types) sampled had attended college, and in 1970 another survey showed 25.6 percent had attended college (U. S. Bureau of Sport Fisheries and Wildlife 1972). Bevins et al. (1968) found that 22 percent of the hunters in six Northeastern States had attended college. Kirkpatrick (1965) found that 30 percent of New Mexico resident upland bird and waterfowl hunters had high school educations and 18.1 percent had attended college.

Table 4.--*Educational attainment of regulated area hunters compared with all Washington hunters and the general population*

Regulated area	Less than high school	High school	Some college	College graduate	Post-graduate	Total	Number of respondents
				Percent			
Lake Terrell	25	38	19	8	10	100	223
Stillwater	21	32	24	12	10	99	408
Fort Lewis	21	38	21	12	8	100	182
Scatter Creek	25	34	20	12	9	100	233
Average[1/]	23	35	22	11	10	101	1,046
All Washington hunters	33	37	18	6	5	99	5,400
Puget Sound[2/]	35	33	14	-----18------		100	--
Washington State population[3/]	37	36	14	7	6	100	--

[1/] No statistically significant differences exist between areas at 0.05 level. Chi square = 8.16 with 12 degrees of freedom.

[2/] Seven counties: Whatcom, Skagit, Snohomish, King, Pierce, Thurston, and Lewis (U.S. Bureau of the Census 1972).

[3/] All persons over 24 years old; data not available on persons less than 25 years old. (U.S. Bureau of the Census 1972.)

The questionnaires showed that hunters were predominately young and middle-age adult males, with higher education and income than either Washington's general population or other hunters in the State. Over half lived in a large city or suburb. (Courtesy Washington Department of Game).

OCCUPATION

Regulated area hunters almost equally represent white-collar and blue-collar occupations. Thirty-one percent hold professional, semiprofessional, technical, and managerial jobs, and 30 percent are tradesmen, operators, or laborers (table 5). Following are students (14 percent), and sales, service, or clerical personnel (10 percent).

The few significant differences in occupations between the areas are logically explained by the area's location. The Stillwater and Scatter Creek areas, near Seattle and Olympia, respectively, received more use by hunters in the sales-service-clerical occupations than did the areas farther from large urban populations. The Fort Lewis area had a very high proportion of armed services hunters because of the nearby military reservation.

Compared with all Washington hunters, regulated area hunters have about 10 percent more in the professional-managerial occupation group and about 10 percent fewer hunters in the trade-operator-laborer category. This variation, like that for education, probably results from the location of regulated hunting areas near urban centers where professional-technical employment opportunities are concentrated.

Table 5.--*Occupations of hunters from four regulated areas compared with all Washington hunters and the general population*

Regulated area	Occupational classification								Total	Number of respondents
	Professional, semiprofessional, technical, managerial	Sales, service, clerical	Trade, operator, laborer	Rancher, farmer	Housewife	Armed services	Retired, unemployed	Student		
	Percent									
Lake Terrell	27	5	40	3	3	1	5	17	101	217
Stillwater	35	14	29	2	2	1	6	13	102	402
Fort Lewis	28	5	24	1	2	19	8	13	100	172
Scatter Creek	31	12	28	0	1	4	7	16	99	229
Average[1/]	31	10	30	2	2	5	6	14	100	1,020
All Washington hunters	20	9	39	3	4	2	6	17	100	5,355
Puget Sound[2/]	27	26	46	1	0	0	0	0	100	--
Washington State population[3/]	27	21	43	4	------- 5 -------				100	--

[1/] Statistically significant difference exists between areas at 0.001 level. Chi square = 147.84 with 24 degrees of freedom.

[2/] Seven counties: Whatcom, Skagit, Snohomish, King, Pierce, Thurston, and Lewis (U.S. Bureau of the Census 1972).

[3/] Males only, 14 years and over (U.S. Bureau of the Census 1972).

INCOME

Regulated area hunters have high incomes consistent with their education and occupations. Almost half earn over $12,000 per year and 15 percent earn more than $18,000 per year (table 6). The regulated area hunters also earn slightly higher incomes than all Washington hunters.

Both regulated hunters and all Washington hunters in general have higher incomes than reported in most other hunter studies that precede this study by several years. Inflation may account for most of this difference.[7/]

[7/] Garrett (1970) found 22 percent of Nevada resident hunters earning between $12,000 and $18,000 per year. Davis (1967) found only 5.9 percent of Arizona hunters earning over $15,000. Of resident bird hunters (upland game and waterfowl) in New Mexico, Kirkpatrick (1965) found 6.9 percent with incomes of $15,000 to $24,999 and 2.2 percent earning more than $25,000. One study (Nobe and Gilbert 1970) reported incomes greater than those of Washington's regulated area hunters, e.g., 30 percent of resident Colorado hunters earned over $15,000 per year.

Table 6.--*Income of hunters from four regulated areas compared with all Washington hunters and the general population*

Regulated area	Income						Total	Number of respondents
	Under $5,999	$6,000-8,999	$9,000-11,999	$12,000-14,999	$15,000-17,999	$18,000 and up		
	Percent							
Lake Terrell	6	16	33	21	13	10	99	211
Stillwater	5	14	31	21	11	18	100	388
Fort Lewis	8	18	32	19	8	14	99	176
Scatter Creek	8	13	29	24	12	13	99	217
Average[1/]	7	15	31	21	11	15	100	992
All Washington hunters	13	21	29	18	8	10	99	5,134
Puget Sound[2/]	18	17	22	17	- - 23 - - -		100	--
Washington State population[3/]	21	19	- - -37- - -		- - 23 - - -		100	--

[1/] No statistically significant difference exists between areas at 0.05 level. Chi square = 17.38 with 18 degrees of freedom.

[2/] Seven counties: Whatcom, Skagit, Snohomish, King, Pierce, Thurston, and Lewis (U.S. Bureau of the Census 1972).

[3/] Family income (U.S. Bureau of the Census 1972).

RESIDENCE

Because the regulated hunting areas were close to the Seattle megalopolis, it is not surprising that *over half the regulated hunters reported their residence as "very large city or suburb," but only a quarter said they lived in a "rural area or farm"* (table 7). The two regulated areas closest to urban concentrations, Stillwater and Fort Lewis, had more urban-resident use (67 and 63 percent, respectively) than Lake Terrell (18 percent), the farthest removed from urban areas. This suggests that the regulated areas attract hunters from adjacent or nearby areas.[8/]

Many more regulated hunters, compared with all Washington's hunters, were from urban areas, and they were less likely to be from small towns, rural communities, or farms. In this respect, the regulated hunting program along Puget Sound supplements natural hunting opportunities by serving the nearby urban population which does not have easy access to the more abundant pheasant hunting in eastern Washington.

MEMBERSHIP IN SPORTSMAN, GUN CLUB, OR HUNTING ORGANIZATIONS

Only a minority of regulated area hunters belong to an organized group related to their sporting activity. *Eighteen percent reported membership in an organized sporting group or club.* Of these, 20 percent belonged to more than one organization. Hunters listed local sportsman's or gun clubs most often, followed by duck and dog clubs (table 8).

Hunters are like other recreationists in their organizational membership. About the same low percentage of Washington car campers and wilderness users belong to organized groups (Hendee, Gale,

[8/] A Pennsylvania study found 88 percent of the hunters on shooting preserves were city residents (Frey and Wingard 1960), no doubt also due to nearness to an urban population.

Table 7.--*Residence of hunters from four regulated areas*

Regulated area	Residence				Total	Number of respondents
	Very large city	Small town	Rural area	Farm		
	- - - - - - - - - - *Percent* - - - - - - - - - -					
Lake Terrell	18	45	22	15	100	222
Stillwater	67	15	16	2	100	410
Fort Lewis	63	16	20	2	101	182
Scatter Creek	45	25	25	5	100	234
Average[1/]	51	24	20	5	100	1,048
All Washington hunters	30	35	24	11	100	--

[1/] Differences between areas are significant at 0.05 level. Chi square = 188.22 with 9 degrees of freedom.

Table 8.--*Organization membership of regulated area hunters*

Club membership	Number	Percent
Nonmembers	863	82
Members	188	18
Total	1,051	100
Membership:[1/]		
Gun or sportsman club	164	76
Duck and dog club	28	13
Wildlife-conservation club	9	4
Fishing, bow and arrow, horse club	15	7
Total	216	100

[1/] Includes all clubs listed, i.e., as some hunters listed more than one club, the percent column is the percent of memberships, not percent of hunters. For example, 76 percent of the 216 memberships were in gun and sportsman's clubs.

and Harry 1969). These data indicate that *attempts to communicate with regulated area hunters, as with other recreationists, through organized groups and clubs will reach only a small proportion of them. Likewise, organized interest groups represent a minority of views though they may sometimes reflect opinions held by other users.*

READING HABITS OF REGULATED AREA HUNTERS

Few hunters belong to organized groups, but a majority of them read hunting, wildlife, gun, or other sportsman publications. *Eighty-one percent of the regulated area hunters reported reading at least one of 39 different publications.* Of these, 38 percent read one, 35 percent read two, 22 percent read three or more magazines, and another 5 percent mentioned they read as many as possible. *Although they listed 39 different magazines, three monthly magazines and one weekly newspaper accounted for 75 percent of the publications read: Outdoor Life, Field & Stream, Sports Afield,* and *Fishing and Hunting News of Western Washington* (table 9).[9/]

These data indicate several things. First, considerable vicarious or offsite extension of hunting participation is suggested. Second, one local medium, *The Fishing and Hunting News of Western Washington,* apparently reaches almost as many regulated hunters (13 percent)

[9/] Sixty-one percent of Kansas State sportsmen read conservation magazines, and the favorite sporting magazines were *Field & Stream, Sports Afield,* and *Outdoor Life,* according to Donald E. Zimmerman. Determination of the sources of conservation information and characteristics of selected Kansas sportsmen. M.S. thesis on file at Kansas State Univ., Manhattan, 73 p., 1968.

Table 9.--*Publications read by regulated area hunters*

Publication	Number	Percent
Do not read publications	196	19
Read	843	81
Total	1,039	100
Publications read:[1/]		
Outdoor Life	360	24
Field & Stream	337	23
Sports Afield	223	15
Fishing and Hunting News of Western Washington	192	13
American Rifleman	87	6
Guns & Ammo	32	2
Wildlife Bulletin (Washington Department of Game)	15	1
Sports Illustrated	15	1
Western Outdoors	12	1
Alaska Sportsman	11	1
Other	[2/]206	14
Total	1,490	101

[1/] Only the first three publications listed by respondent were tallied. We, therefore, tallied 1,490 publications.

[2/] Includes the response "all of the major ones" and 47 publications that were classified as dog, horse, or trapping.

as are included in all groups and clubs combined (18 percent). Third, in spite of the extensive reading habits of hunters, *only 1 percent of the regulated hunters mentioned reading the Department of Game publication*, Washington Wildlife, *which is available free of charge. Perhaps this reflects an unexploited opportunity for game managers to communicate with hunters.*

HUNTER ATTRACTIONS, MOTIVES, AND COMPLAINTS

This section presents data on how hunters first learned of regulated plant-and-shoot hunting, why they hunt in these areas, and their complaints and suggestions as to how the program might be improved.

HOW HUNTERS LEARNED ABOUT REGULATED PLANT-AND-SHOOT HUNTING

Hunters first learned of the regulated hunting program from several sources. *The primary source for 46 percent of the hunters was word-of-mouth*

information from partners, neighbors, family, friends, and other acquaintances. Secondary sources of information were the Department of Game (24 percent), the mass media (20 percent), and "other" sources (10 percent) such as "from a club," "live near area," or "saw a road sign."

These data indicate the highly informal and social nature of the communication process and its applicability to hunters. However, formal information sources are extremely important as the primary source of new information subsequently dispersed through person-to-person contacts. This emphasizes the importance of Department of Game contacts whereby information was dispersed to nearly one-fourth of the hunters. Because word-of-mouth information can be erroneous or misleading, the form, length, and substance of the original messages should not be taken for granted, and every Department of Game employee must regard himself as an information representative of his agency.

MOTIVES FOR HUNTING ON REGULATED AREAS

The reasons given by hunters for visiting regulated plant-and-shoot areas reflect their hunting expectations. Hunters gave the three most important reasons why they hunted a Department of Game regulated area. Some 920 hunters gave 1,975 reasons which fell into six conceptually distinct categories. Broadly defined, these reasons reflected: "availability of game," "convenience," "public access," "regulation of activity," "dogs," and "other reasons." The reasons and some examples were:

Availability of game.-- Hunters expected higher success because of the planted game in the areas, typified by responses such as: "There are birds there but nowhere else," "because of the amount of game," or "availability of game."

Convenience.-- The convenience category refers to the proximity of a regulated area to the hunter's residence, e.g., "close to home," "near where I live."

Public access.--Hunters liked the public availability of the area. Examples were: "no private property signs," "don't have to worry about landowners," or "don't have to worry about parking."

Regulation of activity.-- They appreciated good enforcement of hunting and safety regulations and the controlled aspect of the areas by references to: "I don't worry about hitting houses because safety zones are posted," "the game warden was available to control unsportsmanlike action," or "signing in and out keeps hunters in line."

Dogs.-- "A place to train my new dog," or "a place to run and work my dogs" were mentioned.

Other reasons.-- Many other responses were reasons for hunting in general and not specific to regulated areas. These included reference to "exercise," "the outdoor atmosphere," "just curiosity," "it's free," or "to be with friends."

We combined all reasons given, whether they were listed first, second, or third, for purposes of analysis under the assumption that although hunters did not give the same number of reasons, they did give all major reasons why they hunted a regulated area. Twenty-seven percent of the hunters gave only one reason, 31 percent gave only two reasons, and 42 percent gave three reasons.

The three most often mentioned reasons for hunting the plant-and-shoot regulated areas, "availability of game," "convenience," and "public access" (table 10), *together account for 82 percent of the total reasons given.*

Table 10.--*Motives for hunting on regulated areas*

Regulated area	Availability of game	Convenience	Public access	Regulation of activity	Dogs	Other	Total	Number of responses
	Percent[1/]							
Lake Terrell	45	14	25	8	3	6	101	392
Stillwater	34	29	23	4	4	6	100	760
Fort Lewis	35	23	20	10	3	8	99	365
Scatter Creek	33	22	25	6	5	9	100	458
Average[2/]	36	23	23	6	4	7	99	1,975

[1/] Percent of total responses, not percent of hunters.

[2/] Differences between areas are significant at the 0.001 level. Chi square = 90.6, with 21 degrees of freedom.

The hunters listed availability of game, convenience, and public access as the major reasons for choosing regulated plant-and-shoot areas. Most of the regulated area hunters live near the hunting site. (Courtesy Washington Department of Game).

This makes sense considering the long distance to pheasant-hunting opportunities in eastern Washington and the scarce public access to pheasant hunting and the limited number of pheasants in the Puget Sound region.

A few differences between study areas in the reasons given for hunting regulated areas warrant comment. Proportionately more hunters at Lake Terrell mentioned "availability of game," but fewer listed "convenience." Lake Terrell's remoteness from the population center around Seattle and also its higher success rate may explain this. Conversely, the Stillwater area, which is closest to Seattle, had the most hunters giving "convenience" reasons.

Hunters of different backgrounds use the areas for different reasons. "Availability of game" was more important to farmers-ranchers, students, housewives, and retired and unemployed persons. "Availability of game" was also popular among rural residents and young hunters up to 18 years old, but less popular among the more highly educated hunters.

HUNTER COMPLAINTS ABOUT REGULATED AREAS

Hunters listed up to three major problems they considered important at the regulated plant-and-shoot hunting areas. This identifies shortcomings of the program and provides insights on how the regulated hunting program might better serve its clientele.

Hunters seemed very candid in their responses, yet did not seem obliged to make negative comments merely because the opportunity presented itself. About 5 percent of the hunters did not answer the question, and approximately 8 percent explicitly commented, "no major problems."

We combined all hunter complaints for purposes of analysis. There were 1,996 comments by 1,007 hunters who answered the question. About equal numbers of hunters listed one, two, and three complaints.

Eight conceptually distinct categories of complaints evolved: "no problem," "crowding," "lack of control and enforcement," "game scarcity," "poor management," "poor facilities," "too artificial," and "other." These complaints and examples of each are described below:

Crowding.--The crowding category included reference to excessive numbers of hunters or congestion. Typical complaints included: "too many hunters," "too many people and dogs for small area," or "area is too crowded."

Lack of control and enforcement.--Complaints about lack of control and enforcement usually referred to observed violations of traffic rules, game regulations, littering, and unsportsmanlike conduct. Typical hunter responses included: "there is too much sky busting," "some hunters shoot more than their limit and do not sign out of the area," "some hunters claim birds they did not shoot," or "too many dogs running loose without supervision."

Game scarcity.--Some complained about the absence of game: "too few birds," "I didn't see any game," or "poor hunting due to lack of birds."

Poor management.--Comments in this category were aimed at managers or the Department of Game. Typical responses were: "too many birds planted to favor weekend hunters," "birds not scattered enough because they were released from a single point," "length of season is too short," or "season is too

late in the year."

Poor facilities.--Characteristics of the regulated area prompted complaints about parking, the size of the hunting area, and lack of facilities. Comments included: "not enough parking," "areas are too small," and "not enough sanitation facilities."

Too artificial.-- Some hunters complained about the artificial nature of plant-and-shoot hunting. Their comments included: "planted birds are poor sporting chance," "birds don't fly right without more practice," "birds act too dumb and unnatural," or "birds are too artificial."

Other.-- This category included a variety of responses such as: "didn't like it," "the weather was bad," or "waste of time and money to go."

The most common complaint was crowding; 68 percent of the hunters raised this issue. One-third of the total number of complaints mentioned crowding (table 11). These data imply that reduced crowding might increase hunter satisfaction for a large proportion of the hunters.

Other complaints in order were "lack of control and enforcement," "game scarcity," and "poor management." Each of these categories received less than half as many complaints as "crowding."

The attitudes of hunters about control and enforcement are interesting and important. "Regulation of activity" was listed by some as a reason for hunting regulated areas (table 10), but over twice as many complaints were registered about the lack of control and enforcement (table 11). Hunters complained about traffic and game violations, littering, and unsportsmanlike conduct. *Enforcement efforts are apparently expected and desired by many hunters at the regulated areas.*

Crowding, lack of control and enforcement, and game scarcity were major complaints about regulated-area hunting.

Sixty-eight percent of the regulated area hunters complained about crowding.

Table 11.--*Major complaints at regulated hunting areas*

Regulated area	No problem	Crowding	Lack of control, enforcement	Game scarcity	Poor management	Poor facilities	Too artificial	Other	Total	Number of responses
					Percent[1]					
Lake Terrell	7	32	13	12	13	11	10	3	101	393
Stillwater	3	36	16	14	11	10	6	5	101	793
Fort Lewis	5	34	16	12	8	11	8	6	100	353
Scatter Creek	4	35	16	16	11	7	7	5	101	457
Average[2]	4	35	15	14	11	9	7	5	100	1,996

[1] Percent of total responses, not percent of hunters.

[2] Differences between areas are not significant at the 0.05 level. Chi square = 34.4, with 24 degrees of freedom.

HUNTING SUCCESS AND ITS DISTRIBUTION

A purpose of regulated plant-and-shoot areas is to extend the pleasures and benefits of hunting to persons who otherwise would have fewer hunting opportunities. Thus, questions about the distribution of hunting successes are important to the management objectives of regulated areas. For example: What is the distribution of bird harvest among regulated area hunters? How does the distribution of hunting success on regulated areas compare with that on unregulated areas? What factors or characteristics differentiate high-success from low-success regulated hunters?

It is clear that *a small minority of the hunters harvest most of the birds*. Figure 3 shows the distribution of hunter success based on questionnaire responses, among a representative sample of all upland bird hunters in the State, regulated area hunters while on plant-and-shoot areas, and regulated

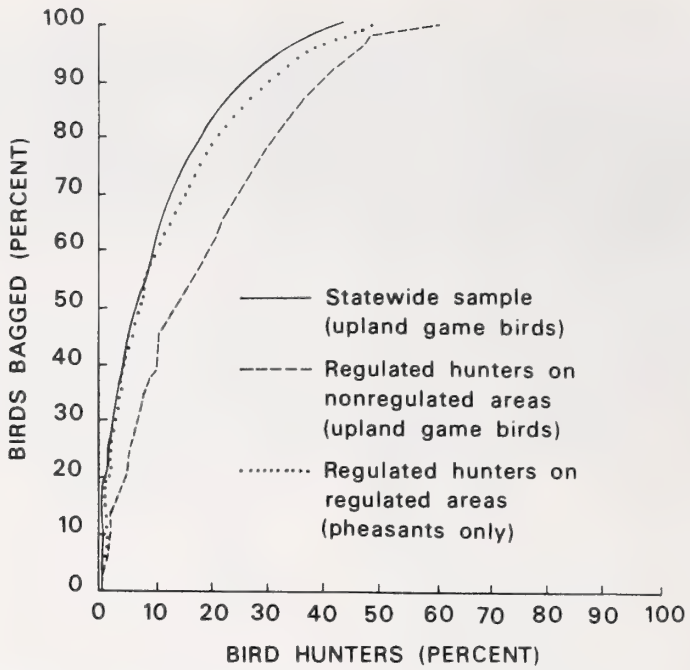

Figure 3.--*Distribution of bird kill among Washington hunters.*

area hunters while hunting on non-plant-and-shoot areas. Results show that on the four regulated areas studied, *half the birds were bagged by only 7 percent of the hunters, with each of these very successful hunters bagging 11 or more planted pheasants during the season.*

There were no significant differences in the distribution of success between the study areas except at Stillwater, where 40 percent of the hunters bagged all the game. At this area, at least 10 percent fewer hunters shared in the total harvest than at each of the other three areas.

The distribution of success for regulated area hunters while pursuing birds on non-plant-and-shoot areas was similar to that of the statewide sample of upland bird hunters.[10/]

[10/] The Washington Department of Game in its statewide annual hunter survey reveals nearly identical results: about 14 percent of the pheasant hunters bagged 58 percent of the ringnecks shot (from personal correspondence).

Only a small proportion of the hunters were successful. Half bagged nothing, and a scant 7 percent shot half of the birds. A man's hunting experience did not affect his success, but the number of days he hunted did. (Courtesy Washington Department of Game).

Perhaps more important than this similarity is that *more than half the hunters at the regulated areas did not bag a single bird.* Little time spent in the field may offer a partial explanation for the lack of success by these hunters. Nearly 60 percent of those who got nothing hunted for 2 days or less (table 12). Hunters who bagged only one bird during the season spent an average 3.6 days hunting. Many hunters may view this as too large an expenditure of time for the sake of success.

Length of hunting experience was not related to success. Almost equal numbers of unsuccessful hunters appeared in all categories of hunting experience which ranged from 1 year to 65 years of hunting (table 13). Controlling for experience and days of hunting effort did not change this finding.

Table 12.--*Unsuccessful hunters at regulated areas and their hunting effort*

Days hunted	Percent unsuccessful hunters
1	33
2	26
3	17
4	10
5	6
6	2
7	0
8	1
9	1
10	1
11+	3
Total	100
Total number of hunters	505

Table 13.--*Unsuccessful hunters at regulated areas and their hunting experience*

Years hunting experience	Percent unsuccessful hunters
1-3	13
4-6	11
7-10	15
11-14	10
15-18	11
19-22	11
23-27	9
28-34	10
35-65	10
Total	100
Total number of hunters	510

The most positive correlate of hunting success was "always hunting with a dog" as opposed to "occasionally" or "never" hunting with one. Table 14 shows that 75 percent of the hunters who never used a dog were unsuccessful, and there was not one hunter in the highest success category who never used a dog. On the other hand, 60 percent of the hunters who reported always using a dog had some success, and one-third of these bagged four birds or more during the season.

Other variables showed no significant relationship with hunting success even when days of hunting effort are held constant. These included age, residence, income, education, occupation, and years of hunting experience. Three exceptions were housewife-mother and armed service occupations and those with family incomes

Table 14.--*Percent of hunters who always, occasionally, or never hunt with a dog and its relation to success at the four regulated areas*

Do you hunt with a dog?	Pheasants bagged per season					Number of hunters
	0	1-3	4-10	11-70	Total	
	Percent					
Always	40	27	23	10	100	583
Occasionally	65	28	6	2	101	337
Never	75	20	5	0	100	127
Average	52	27	16	6	101	1,047

Hunting with a dog was the biggest factor associated with success. (Courtesy Washington Department of Game).

of less than $3,000, all of whom experienced proportionately lower success than other hunters.

The foregoing data show similar distributions of success between regulated and unregulated areas. Success was concentrated among a small minority of hunters and nearly half the hunters bagging no birds at all. These data challenge the validity of minimizing "birds per hunter days" as an appropriate measure of hunting enjoyment or as a management objective because hunting success is so sharply concentrated among a minority of hunters. Nevertheless, other satisfactions apparently do not fully compensate for lack of success among the many hunters citing "scarcity of game" as a complaint about regulated areas.

REVENUE POTENTIAL OF PUBLIC PLANT-AND-SHOOT AREAS

Financing a public plant-and-shoot program is expensive, and costs continue to rise: raising and releasing pheasants cost the Washington Department of Game about $3.50 apiece. Areas must be maintained and administered and adequate enforcement provided.[11/] The revenue potential of regulated plant-and-shoot areas under different levels of stocking and congestion was determined from willingness-to-pay data. Hunters answered three questions, checking amounts ranging from $0 to $7 per day in increments of $1. These questions were:

"(1) Based on your experiences and success this year on regulated hunting areas, how much would you pay per day to hunt one of these areas in the future?
(2) If the number of birds planted on regulated areas were doubled, how much would you be willing to pay?
(3) If there were half as many hunters allowed at one time on regulated areas but the number of birds stayed the same, how much would you pay?"

It is noteworthy that hunters are willing to pay the most under the hypothetical managed conditions of reduced congestion and increased number of birds. As table 15 shows, 41 percent of the hunters are willing to pay something under present conditions of bird stocking and hunting pressure. If number of birds were doubled but the number of hunters remained constant, 62 percent would pay something. *If the number of hunters were reduced by half, with no change in bird stocking, 68 percent would pay. It is significant to note, however, that under reduced hunter congestion, more hunters were willing to pay at each price from $1 to $7 than with increased bird stocking.*

In calculating the total revenue potential at the $4 fee, for example, we assumed that hunters willing to pay higher fees would also pay the $4 fee. Therefore, when figuring the total revenue potential at the $4 price, hunters willing to pay $5, $6, or $7 were included. The total revenue at the $5 price included hunters who stated a willingness to pay $6 and $7 and so forth. Figure 4 shows total revenue potential based on willingness to pay at each price ($0-$7) for the three management conditions. The total revenues in this figure include only the 27-percent survey sample (1,216 hunters); total revenue

11/ In Washington, beginning in 1971, a $2 upland bird permit was required of all bird hunters (not just regulated area hunters) to help defray costs and shift more of the financial burden of raising game birds to the hunters who benefit.

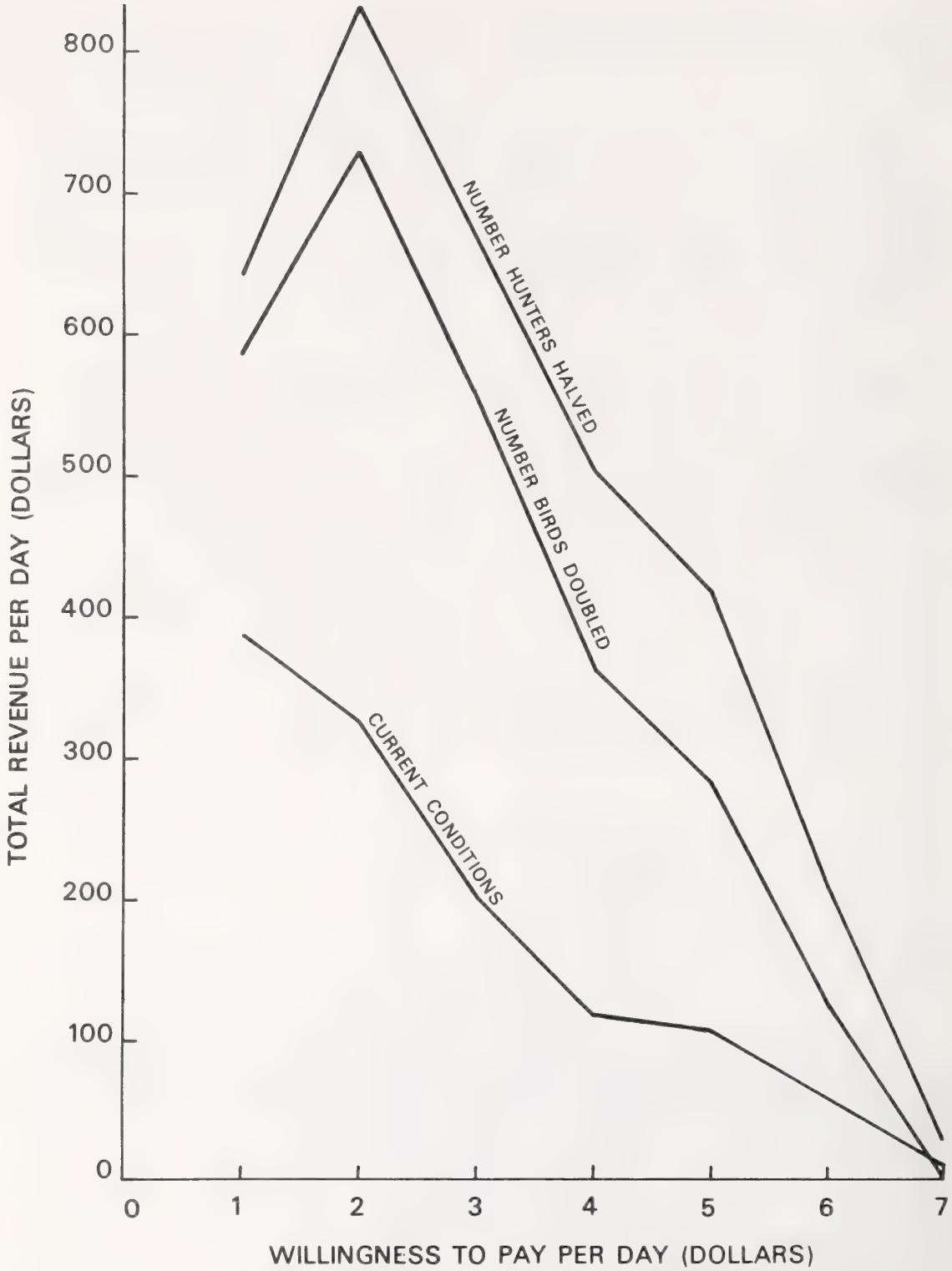

Figure 4.--*Potential revenue under three willingness-to-pay management alternatives (based on 27-percent sample of hunters on four plant-and-shoot areas).*

Table 15.--*Income potential of four regulated areas under three management conditions*

Amount hunters are willing to pay per day (dollars)	Number of hunters	Percent
Under current conditions:		
0	595	59.0
1	220	21.9
2	97	9.6
3	37	3.7
4	8	.8
5	12	1.2
6	8	.8
7	2	.2
Other[1/]	28	2.8
Total	1,007	100.0
If number of birds were doubled:		
0	382	38.2
1	220	22.0
2	180	18.0
3	96	9.6
4	33	3.3
5	36	3.6
6	21	2.1
7	0	0
Other[1/]	32	3.2
Total	1,000	100.0
If number of hunters were reduced by half:		
0	316	32.1
1	226	22.9
2	194	19.7
3	96	9.7
4	43	4.4
5	49	5.0
6	31	3.1
7	4	.4
Other[1/]	26	2.6
Total	985	99.9

[1/] Includes hunters who stated a willingness to pay on a seasonal or per-bird-shot basis.

potential for the four areas (based on these data) can be approximated by multiplying by 4.

The greatest revenue potential is under reduced hunter congestion, followed closely by doubled stocking. A $2 fee would generate the most revenue, provided hunter congestion was reduced or birds doubled. Our calculation, under a hypothetical condition of reduced hunters, assumed that the number of hunters willing to participate at alternative fee levels would be accommodated, but that some hunters might be encouraged through management techniques to shift their hunting from high weekend congestion to very low congestion periods during the week (see fig. 2). One technique might be to charge a fee for hunting only on weekends when areas are most crowded.

Hunters were more willing to pay if the number of hunters allowed at one time were cut in half or the number of planted birds were doubled. Willingness-to-pay data indicated the most revenue could be collected with a $2-per-day fee.

The income potential calculated in table 15 should be interpreted with caution. Willingness-to-pay questions under hypothetical situations do not always reflect real behavior. For example, hunters may be tempted to understate their true willingness-to-pay for participating in an existing free program. Yet many of the same hunters might pay more when faced with an actual fee rather than forgo hunting altogether.

The idea of charging fees for public plant-and-shoot programs is not unreasonable, considering the relatively high income levels of the hunters and the fact that license fees represent a very small portion of other hunting costs. Nationally, hunters spend only 3.6 percent of their total hunting expenditure on licenses (U.S. Bureau of Sport Fisheries and Wildlife 1972). Charges for plant-and-shoot hunting are not without precedent. During the mid-1950's, Illinois charged $4 per day (in addition to a general license fee) for hunting planted pheasants (Titus and Laycock 1955).

Another analysis investigated the correlation between success and willingness to pay. It seems reasonable to expect that successful hunters might be willing to pay more. Surprisingly, *the results showed the less successful hunters willing to pay as much as other hunters*. This supports the notion that hunting opportunity is valued as much by low success hunters as by those harvesting the most birds.

SUMMARY

Hunters visiting four public plant-and-shoot pheasant-hunting areas in Washington's Puget Sound basin were studied by use of a mail questionnaire which yielded 1,062 hunter responses to questionnaires. The response rate after three followup mail contacts was 87.3 percent.

Hunter characteristics studied were sex, age, education, occupation, income, and residence. The regulated area hunters are 98 percent male, predominantly middle-aged, with higher than average educations and incomes. Over 40 percent have at least some college education, and 21 percent are college graduates. About half earn more than $12,000 per year and 15 percent more than $18,000 per year. As many hunters hold white-collar jobs as blue-collar ones. Over half the hunters reside in large cities or suburbs, as one would expect due to the metropolitan concentration along Puget Sound.

Hunters frequently read sporting magazines, but few belong to clubs relating to wildlife-sportsman activities. Eighty-one percent of the hunters read at least one of 39 different hunting, wildlife, gun, or other sportsman publications and a regional hunting and fishing newspaper. In contrast to their reading habits, only 18 percent of the hunters belonged to a hunting, fishing, or wildlife club.

They reported learning about the regulated plant-and-shoot program mainly from secondary sources such as word-of-mouth. Only 24 percent got information directly from the Department of Game.

Reasons for hunting regulated areas and complaints about problems at the areas varied, although they centered around a few issues. Hunters said they visited the areas because of the availability of game, convenience, and because public access to hunting is difficult to find elsewhere. Two-thirds of the hunters saw crowding as a problem. They also

Washington's regulated plant-and-shoot hunting program is a popular supplement to natural pheasant hunting opportunities. This study suggests a need for more intensive management to improve hunting quality. (Courtesy Washington Department of Game).

cited problems such as lack of enforcement of rules and game scarcity.

The distribution of hunting success was highly skewed with 7 percent of the hunters bagging half the birds and over 50 percent of the hunters not getting anything. Hunting with a dog was associated with success more than any other factor, with 60 percent of those who "always use a dog" getting birds. In contrast, 75 percent of those who "never use a dog" were unsuccessful. Hunting success bore no significant relation to other factors such as age, residence, income, education, occupation, and years of hunting experience.

When asked about their willingness to pay for regulated hunting, 41 percent of the hunters said they would pay something under current conditions of crowding and stocking. But more than 60 percent said they would pay if twice as many birds were planted or if the number of hunters were cut in half. Under reduced hunter congestion, more hunters were willing to pay at each price from $1 to $7 than for increased bird stocking. Revenue potential was greatest at $2 per day for both increased stocking and reduced crowding conditions. There was no difference in willingness to pay between highly successful hunters and the very low or unsuccessful hunters.

MANAGEMENT RECOMMENDATIONS

(1) The regulated plant-and-shoot program should be continued, as it apparently makes a positive contribution to pheasant hunting satisfaction of a large number of western Washington hunters. Most hunters cited "availability of game," "convenience," or "public access" as reasons for hunting the areas. There is heavy use of the areas by a predominantly urban clientele removed from other hunting opportunities. The areas serve as a popular supplement to other bird hunting opportunities as they are generally used by nearby urban residents, most of whom also hunt elsewhere. We recommend that the program be continued but, where possible, private shooting preserves be encouraged to expand hunting opportunities that could help relieve the heavy use pressures on the regulated public plant-and-shoot program.

(2) Hunter crowding on the regulated areas should be reduced to increase hunting quality. This seems justified by several pieces of evidence revealed in the study. Over two-thirds of the hunters expressed displeasure with crowding. Individuals are willing to pay more if the number of hunters is reduced. The extent of crowding appears to approach unsafe levels during weekend periods. Efforts might seek to redistribute use from weekends to weekdays through strategic use of information about bird stocking, a small charge for weekend use, limits on the number of hunters allowed on an area at one time, or special temporary limitations such as father-son hunts. Other controls might be strategically applied, not to deprive people of the chance to hunt, but to regulate, for the good of all, conditions under which hunting is allowed. The counterpart to this scheme in fishing is the fly only or barbless hook fishing streams found in many States. Attentive, positive administration of the regulated areas could help control some of the aversive effects of crowding and congestion during periods of heavy use.

(3) Management should spread the harvest of birds more equitably among regulated hunters, as only a minority of hunters are now successful. Only 7 percent of the hunters bagged half the pheasants on the four areas studied, and all of these hunters shot 11 or more birds apiece during the season. Nearly one-fourth of the hunters mentioned "scarcity of game" as a complaint, which indicates that other hunting satisfactions are not fully compensating the unsuccessful hunters for their frustration. Distribution might be spread by setting a reasonable season bag limit and imposing a punchcard such as used with steelhead and salmon. A season bag limit of nine birds, for example, would have left half the total number of pheasants shot for the less successful hunters, thereby increasing their probability of success and more equitably distributing the harvest.

(4) A user fee for hunting regulated plant-and-shoot areas should be considered as a source of revenue to finance the program and as a possible means of distributing use. The expense of financing a pheasant rearing and planting program concerns both the game managers and sportsmen. Questionnaire response indicates that hunters would be willing to pay, particularly if stocking of birds was increased and congestion reduced. Charging regulated pheasant hunters would provide a source of revenue from the beneficiaries to help support their program. The discriminating effects of a charge would be slight considering the above-average income of the regulated area hunters. Charging weekend-only fees might help redistribute use to less crowded weekdays and might eliminate casual and uncommitted hunters who place less value on the opportunity to hunt but nevertheless contribute to congestion and the dissatisfaction of ardent sportsmen.

(5) Stocking techniques that will reduce pheasant escapes to posted or private hunting areas should be explored. This would increase the efficiency of the regulated areas in providing success-related benefits. The harvest of planted pheasants ranged from 52 percent at Stillwater to 71 percent at Lake Terrell and Scatter Creek. Obviously many birds succumb to natural elements or escape to adjacent areas. This illustrates a crucial factor in the management of plant-and-shoot areas--the probability that planted birds may not be harvested by the target clientele. If birds escape to land open for public hunting, then the result is an allocation to the general hunting population. However, if birds escape to an adjacent hunting club or closed private land, the result is public distribution to a private clientele. The fact that one-third to one-half of the birds planted are not harvested by the target clientele suggests an opportunity to increase efficiency in meeting public plant-and-shoot program objectives.

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The FOREST SERVICE of the U. S. Department of Agriculture is dedicated to the principle of multiple use management of the Nation's forest resources for sustained yields of wood, water, forage, wildlife, and recreation. Through forestry research, cooperation with the States and private forest owners, and management of the National Forests and National Grasslands, it strives — as directed by Congress — to provide increasingly greater service to a growing Nation.