

AN ABSTRACT OF THE THESIS OF

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Title: The Economic Impact of the Douglas-fir Tussock Moth
on Private Recreation Businesses in Northeastern Oregon

Abstract approved: _____

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An outbreak of the Douglas-fir tussock moth caused severe defoliation in northeastern Oregon during the period from 1972 to 1974. Aerial application of DDT was used to control the outbreak in 1974. Much of the infected area has been logged to salvage the dead and damaged timber.

The purpose of this study was to determine the economic impact of the Douglas-fir tussock moth, the control program and the salvage logging on private recreation businesses in the area of the tussock moth damage.

Personal interviews and mailed questionnaires were used to obtain data from the operators of the businesses. Linear regression analysis was done using gross income data from before, during and after the tussock moth infestation to determine if there was a statistical relationship between changes in gross income and the presence of the tussock moth. Business trends in the area affected by the tussock moth

were also compared with state park visitation and motel occupancy in all of Oregon.

The operators of businesses were questioned about possible reasons for changes in business volume, changes in normal operations as a result of the tussock moth infestation, and visitors' actions during the period.

Although there was a decrease in business volume during the tussock moth problem there was no evidence to indicate the tussock moth had any appreciable effect on overall business volume or operations in the study area.

The Economic Impact Of The
Douglas-fir Tussock Moth On Private
Recreation Businesses In Northeastern Oregon

by

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THE ECONOMIC IMPACT OF THE
DOUGLAS-FIR TUSSOCK MOTH ON PRIVATE
RECREATION BUSINESSES IN NORTHEASTERN OREGON

I. INTRODUCTION

The Tussock Moth Situation

In 1970 an outbreak of the Douglas-fir tussock moth (Orygia pseudotsugata McDonnough), the larval stage of which feeds on the needles of Douglas-fir (Pseudotsuga menziesii) and true firs (Abies spp.), was discovered in eastern Washington. By 1973 the infestation had covered 800,000 acres (Graham et al 1975) in eastern Washington, northeastern Oregon, and northern Idaho, and aerial treatment with DDT (dichlorodiphenyl-trichloroethane) was used in the summer of 1974. Since then much of the area damaged has been salvage logged.

Beginning in 1973 there was considerable media coverage of the tussock moth problem. New releases were issued by public agencies involved and articles appeared in local and regional newspapers. Television and radio stations reported on the public meetings held to get citizen input and included personal interviews concerning the problem. Articles appeared in nationwide publications including Time, National Wildlife, and Conservation (Kelley and Rompa 1973).

As a result of the tussock moth epidemic and DDT spray program, which generated considerable public controversy, there has been a strengthening of ongoing research and initiation of a number of investigations (USDA 1974). A total of 43 grants has been awarded under the

U.S. Department of Agriculture Expanded Douglas-fir Tussock Moth Research and Development Program to investigate all aspects of the problem (Baugh 1975).

Impacts of the Tussock Moth

The immediate damage from the tussock moth, as discussed in the environmental impact statement prepared in support of DDT spraying, consists of tree mortality, top-kill, and radial growth reduction. It may cause a reduction in big game cover, impair recreation and scenic areas, reduce land values, and increase the fire hazard. It was reported that some people working in the infested areas experienced an allergic reaction to the hairs of the tussock moth larvae and pupae (USDA 1974).

Objective of the Study

The objective of this study is to evaluate economic impacts of any changes in recreation use patterns and visitor satisfactions on private firms that supply recreation services in areas damaged by the tussock moth.

The study is part of a larger investigation at Oregon State University undertaken to assess the impact of the Douglas-fir tussock moth on outdoor recreation activities. Funding has been provided by the USDA Douglas-fir Tussock Moth Research and Development Program.

Scope of the Study

The businesses included in this study were those offering a service or the use of facilities to people recreating. Recreation serv-

ices, as used in the objective statement, is intended to include the following:

- (1) hunting on private land
- (2) overnight camping
- (3) overnight facilities other than camping (cabins, lodge, motel)
- (4) packing and guide services
- (5) picnic area
- (6) swimming
- (7) horseback riding

Other business types, such as grocery stores and restaurants, were initially considered for the survey. They were not included because of time limitations, the amount of information, and the type of information required for the analysis. It is doubtful that restaurants and grocery stores know, with any degree of accuracy, if business volume has changed directly as a result of changing recreation patterns. They generally lack the personal contact with customers which is necessary in service oriented businesses. Restaurants and stores were included in the analysis if they were associated with a business providing other services from the list above.

Research concerning the private sector of the outdoor recreation industry; such as reported by Foster (1962), Bevins et al (1974), Kottke et al (1975), Owens (1974), Callahan and Knudson (1966), and Osterli et al (1969); has been primarily concerned with aspects of marketing, pricing, and survivability of those enterprises. The effort in this study was to determine the direct impact of a specific external factor, the tussock moth infestation, on private recreation businesses. The study is limited to an analysis of direct effects occurring immediately during the period the tussock moth was active or

as a result of the control operations and the salvage logging.

Changes in Recreation Use

The environmental impact statement for the tussock moth control program estimated a reduction in recreation use of 50 percent in state parks and ten percent in National Forests in areas associated with the tussock moth outbreak if the control program was not used (USDA 1974). The time period during which the reduction in use would occur was not specified. There might be both short term and long term impacts on recreation use patterns.

A change in recreation use depends on people's awareness of the problem and if it is considered disagreeable. Some people may have avoided the tussock moth area for health reasons; for example they may have wanted to avoid an allergic reaction like that reported by loggers. When the tussock moth is gone the hazard no longer exists and the area could be used again. Hunters were informed through news releases by land managers of possible excessive DDT residue in animals because of the control program (USDA 1974). As a result they may have avoided areas sprayed with DDT preferring not to take animals with high levels of DDT.

Another reason for a change in recreation use might be due to safety reasons. There is increased hazard from falling trees and tree limbs in areas damaged by the tussock moth. This is particularly significant in high density use areas such as campgrounds. If the hazards are removed the area will be safe again.

Areas damaged by the tussock moth may be less desirable aesthetically to visitors. They may prefer to avoid areas with dead and dying trees or areas which have been salvage logged. The extent to which this happens in damaged areas of this kind is unknown. A review by Murtha and Greco (1975) of research into aspects of forest aesthetics indicated there is much to be answered about visitor perceptions and aesthetic values.

In the long run changes in recreation use may depend on whether the character of the forest is substantially altered. If mortality is such that the forest canopy is completely eliminated and danger exists from standing snags people may avoid an area for a long time. However, due to salvage logging of dead and dying trees the roads which are constructed provide access to previously unused areas. The opportunities for dispersed type of recreation along the roads will increase and may cause an increase in recreation use.

Economic Implications

The economic implications of the tussock moth problem may include more than losses due to tree mortality and decreased wood production. Many types of businesses may be affected if there is a change in recreation use. Recreation businesses, such as resorts and campgrounds, and other retail businesses which depend on a seasonal tourist trade as an important contribution to business volume may suffer a decline because of a decrease in recreation use. Because of interactions among businesses in a regional economy a decline in recreation busi-

ness receipts may affect other sectors, and the local economy may suffer indirect losses also.

The Study Area

The area included in the study is that portion of northeastern Oregon associated with the tussock moth infestation (Figure 1). It includes Wallowa, Union, and Umatilla counties and the northern half of Baker County.

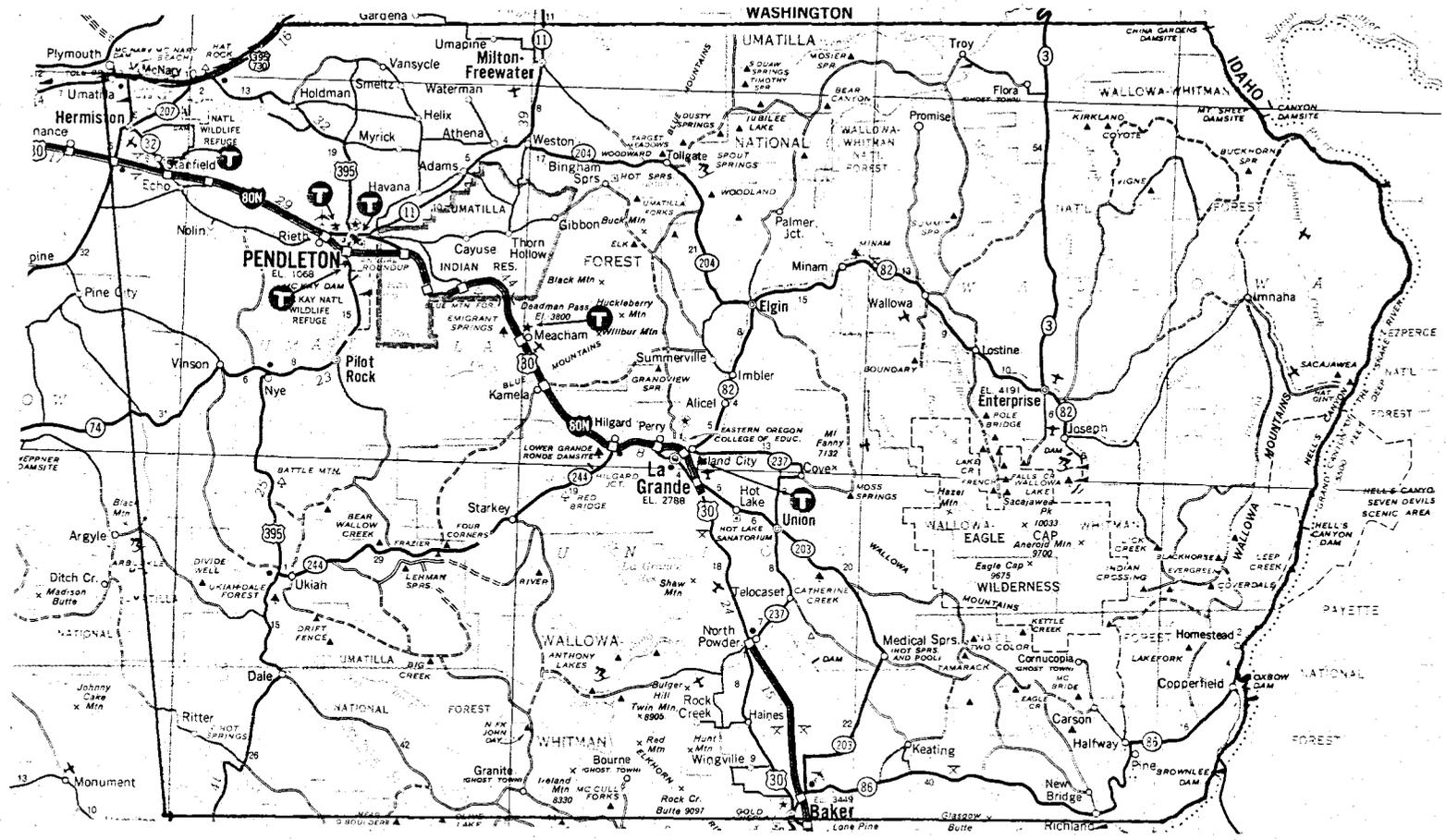


Figure 1. The study area.

II METHODS

The method chosen to collect the data was a survey of the businesses using personal interviews and mailed questionnaires. This chapter describes the design of the interview schedule and the questionnaire and the variables which were included. The methods used in the analysis are also explained.

Identification and Stratification of Businesses

The initial list of firms was compiled using information from the Oregon State University Extension Service, U.S. Forest Service, Oregon State Health Department, Soil Conservation Service, Oregon State Highway Division, Oregon Motor-Hotel Association and Oregon Guides and Packers, Inc. The most complete listing of businesses was obtained from the Extension Service, the license records from the Recreation and Housing Section of the Oregon State Health Department, and Oregon Packers and Guides, Inc. Also contacted, but unable to provide much information, were the Farmers Home Administration, Small Business Administration, Census Bureau of the U.S. Department of Commerce, and the Oregon State Forestry Department. A list of motels was obtained from the license records of the Oregon State Health Department.

The businesses were stratified, based on the nature of the services offered, into three groups: motels, resorts, and packer-guides. The resort classification included businesses which have privately owned facilities for staying overnight, such as camping sites, cabins,

or lodges. It includes guest or "dude" ranches but does not include motels. A resort may have associated with it a store, dining-room facilities, and any number of other recreation attractions for visitors. The packer-guide classification includes those individuals who offer packing and guide services either full time or on a part-time basis.

Data Collection

There were two major complications in collecting data. The first involved the time of impact. The tussock moth problem occurred over a three year period culminating with the aerial spraying, which occurred one year prior to the survey. Thus, there was the problem of reconstructing effects of past events. The second complication was the occurrence of other events which may have affected the businesses. There were gasoline shortages and the combined economic problems of recession and inflation during the same time period as the tussock moth problem.

Resort and Packer-Guide Survey

The operators of resorts and packer-guides were interviewed personally, as opposed to using a mailed questionnaire. This was done for several reasons. The rationale was that the amount of information needed would make a mailed questionnaire too long and some of the information was considered personal; therefore, the questionnaire would probably not be returned. It was apparent that the original list of businesses contained duplications due to change in ownership, some probably no longer operating, and uncertain addresses. The small size of the population made it necessary to get as many responses as

possible. Also, considering the diversity of the businesses it would be extremely difficult to design a mailed questionnaire applicable to each business; whereas a personal interview offers more flexibility.

An introductory letter describing the type of information desired was sent to each business. Each individual was contacted by telephone to establish an appointment for the interview. A follow-up letter was sent in March, 1976 in order to obtain 1975 data which were not available at the time of the interview.

Interview Schedule and Variables

The interview form (Appendix A) was designed to first obtain a description of the business and data on business volume for the period, than to elicit any unprompted comments about the tussock moth, and finally to ask specific questions about tussock moth influences. The questions included were intended to provide data on the following variables:

- (1) services and facilities available
- (2) total number of visitors
- (3) length of visitors' stay
- (4) proportion of repeat customers
- (5) area used in the business operations
- (6) gross receipts
- (7) net receipts, or expenses
- (8) capital value of the business
- (9) explanation of any change in business volume
- (10) owner's perception of the extent of the tussock moth problem
- (11) owner's perception of the effect of the tussock moth relative to other external influences
- (12) visitors' inquiries about the tussock moth

Questions concerning net receipts and capital value of the business were initially included in order to evaluate the ability of the

business to withstand detrimental external influences. In a pretest with eight businesses in August, 1975 six of those interviewed would not provide data on income or expenses. The interview form was revised and the remaining interviews were completed in September, 1975. The most significant revision was a decision not to request information on net receipts and capital value of the business.

Motel Questionnaire

A questionnaire (Appendix C) was mailed to motels in Wallowa, Union, Umatilla, and Baker counties. A postcard follow-up (Appendix D) was sent to those who had not responded three weeks after the questionnaire was mailed.

The questionnaire was shorter and more direct than the interview form. There was a significant difference in the data requested from motels; rather than requesting gross income or total number of guests the owners were requested to provide occupancy data for the motel. Occupancy is defined as the percentage of unit-days rented during the period in question. This is a common statistic used in the hotel and motel industry. It was thought that occupancy data would be more readily available than the total number of visitors and more likely to be provided than gross income. The motel owners were asked to estimate the percentage of their guests who were on recreation trips to the local area. The intent was to compute the contribution to gross income by recreation visitors using the formula:

$$\begin{array}{l} \text{occupancy} \times \text{number of motel units} \times \text{percentage} \\ \text{of recreation visitors} \times \text{average room rate} = \\ \text{contribution to gross income from recreation visitors} \end{array}$$

Data Analysis

Realizing that other factors which might have affected business receipts such as a recession, inflation, and fuel shortages were present during the tussock moth problem the most desirable method of analysis was a comparison of data from the area affected by the tussock moth with a similar but unaffected area. The unaffected area should necessarily have similar recreation businesses and be of comparable distance from major population centers. Initially the survey was enlarged to include all of the four northeastern Oregon counties and Grant County in an attempt to find a comparable cross-section of businesses. That method was unsuccessful due to the low number of businesses available in the area unaffected by the tussock moth.

The alternative method was a time series analysis comparing business volume and trends before, during and after the tussock moth problem. Information was requested from each business for each year back to 1970. A comparison of two similar areas could have been accomplished using data back to 1972 only, which would have made the business operators more receptive to providing gross income data.

Gross Income Analysis

All businesses interviewed raised prices during the period from 1970 to 1975. In order to determine if gross income changed due to a change in business volume (i.e. a change in the number of visitors or in the length of visitors' stay) it was necessary to adjust real gross

incomes for price changes. Real gross income for each business was reduced proportionately, according to the amount of the price increase, to make it equivalent to gross income at 1970 prices. An example of the adjustment formula used for a price change in 1972 is:

$$1972 \text{ gross income} \div \frac{1972 \text{ price}}{1970 \text{ price}} = \text{adjusted 1972 gross income}$$

Gross income for resorts which included receipts from a store or a restaurant were adjusted to 1970 dollars for the portion of the income from the store or restaurant using consumer price indices for "all commodities" and for "food purchased away from home" (U.S. Bureau of Labor Statistics 1976).

The range between adjusted gross incomes both within and among business types was large. The total annual adjusted gross income for resorts was larger than the total for packer-guides during the entire period. To establish a better basis for analysis the annual data were converted from dollars to a percent of 1970 gross income. The analysis was performed using this as an "index" reflecting the change in gross income.

Business Location

The pattern and intensity of the tussock moth infestation varied in the affected areas. Because of their location some businesses might have been influenced by the tussock moth problem more than others. It was difficult to tell in many cases (particularly after the fact) where and how evidence of the tussock moth might have been visible to the visitor. This was especially a problem with the

packer-guides who make an effort to disperse their customers as much as possible. An "in" and "out" classification scheme was used in the analysis to differentiate between resort and packer-guide businesses which were very close to tussock moth damaged areas, and those which were not. For a resort to be classified as "in" the tussock moth damage had to be visible by guests using the facilities or when in the immediate vicinity of the facilities. A packing and guide operation was "in" if, normally, visitors used tussock moth areas or passed through tussock moth areas. The classification was made based on personal observations and on the results of the interview questions. A more refined classification of location was not practicable.

Regression Methods

Single and multiple regression analysis were used in an effort to explain the changes which occurred in business volume of resorts and packer-guides. A linear model of the form:

$$Y = b_0 + b_1X_1 + \dots + b_nX_n + e$$

was used where Y is the dependent variable, adjusted gross income expressed as an index of 1970 income, and X_1, X_2, \dots, X_n are various independent variables thought to influence business volume.

The independent variables tried, either individually or in various combinations, in the model were:

- (1) $X_{(1)t}$, an index of the retail price of refined petroleum products in the U.S.
- (2) $X_{(2)t}$, percent of the Oregon labor force employed

- (3) $X_{(3)t}$, average weekly payroll of Oregon manufacturing workers
- (4) $X_{(4)t}$, average weekly payroll of Oregon manufacturing workers adjusted for inflation
- (5) $X_{(5)t}$, a dummy variable indicating the presence of tussock moth activity
- (6) $X_{(6)i}$, a dummy variable indicating proximity of the business to areas infested by the tussock moth
- (7) $X_{(7)i}$, a dummy variable indicating business size
- (8) $X_{(8)i}$, the gross income index, from the previous year (lagged)
- (9) $X_{(9)i}$, per capita disposable income for Oregon (only available for 1970 through 1974)

The index of refined petroleum products in the U.S. was used to introduce the gasoline shortage into the model. Prices specifically for the Pacific Northwest or for Oregon were not available. The price index does not reflect the fact that there may have been a decline in travel because of a fear of not being able to obtain gasoline, at any price.

The percentage of the labor force employed, average weekly payroll of manufacturing workers (adjusted and unadjusted), and per capita disposable income were used as economic indicators to introduce the effects of inflation and recession into the model. Per capita disposable income was only available for 1970 through 1974.

The three dummy (indicator) variables were used to quantitatively identify the classes of each qualitative variable. The values of the dummy variables are defined as:

$$x_{(5)t} = \begin{cases} 1 & \text{if } t \text{ is a year when the tussock moth was serious} \\ 0 & \text{otherwise (1970, 1971, and 1972)} \end{cases}$$

$$x_{(6)i} = \begin{cases} 1 & \text{if business } i \text{ is located "in" tussock moth damage} \\ 0 & \text{if it is "out" of tussock moth damage} \end{cases}$$

$$x_{(7)i} = \begin{cases} 1 & \text{if business } i \text{ is small} \\ 0 & \text{if it is large} \end{cases}$$

The "in" and "out" classification was defined previously. The classification of business size, small or large, is based on the number of facilities at the resort. Nine or more resort units is a large business in that area. Packer-guides who operated full time are classified as large; part-time operations are classified as small.

Qualitative Variables

Because of the high percentage of responses to perceptual questions about business influences and visitors' actions, descriptive statistics were used exclusively in the analysis of qualitative variables.

III ANALYSIS OF RESULTS

The purpose of this study was to answer four questions:

- (1) Did businesses in the study area experience a change in business volume, as reflected by adjusted gross income, during the tussock moth infestation?
- (2) If there was a change, is there any evidence that the tussock moth caused any of the effects?
- (3) Did visitors inquire about the tussock moth and try to avoid tussock moth areas?
- (4) Did the tussock moth cause any change in normal business operations?

The chapter describes the response to the survey methods and the results of the survey with respect to the questions above.

Response to the Survey Methods

Interview Response

It is believed that 30 resorts and packer-guides were in operation in the study area during the particular period of concern. The number is not known definitely because many of the ranchers and "old-timers" in the area keep their guide licenses current even though they may not operate or only do so on a part time basis. Some of the packer-guides could not be located. Twenty-four productive interviews were conducted, 22 in person and two by telephone. The individuals not interviewed either could not be located or were unable (or unwilling) to make time available. August and September were not the best time for the interviews as it was in the busy season for most of the businesses. The

telephone interviews were a result of time constraints and location of the businesses: they were somewhat successful but it was evident that personal interviews were better due to the extent of the information requested. Figure 2 shows the distribution of the resorts and packer-guide operations from which data was obtained.

The conclusions drawn from the pre-test, as to the willingness of the owners to provide financial information, did not hold for the entire study area. As was indicated previously it was decided to eliminate questions concerning net receipts and capital value of the business because of the response to the interview during the pre-test. That decision may not have been necessary. The individuals interviewed after the pre-test were more receptive to the interview and were more willing to provide gross income data. Although they were not asked, it is believed that many of them would have provided a complete financial picture of their operation.

Response to the Motel Survey

Sixty-five questionnaires were mailed to motels in the study area. Thirty-eight were returned with varying amounts of usable data for a response of 58 percent. Figure 3 shows the general location of those who responded. Twenty-seven (42 percent) were returned with data on occupancy but only seven provided occupancy statistics for five years or more. Only two questionnaires were returned with estimates, for every year back to 1970, of the percentage of their guests who were on recreation trips. Those who did provide estimates for more than

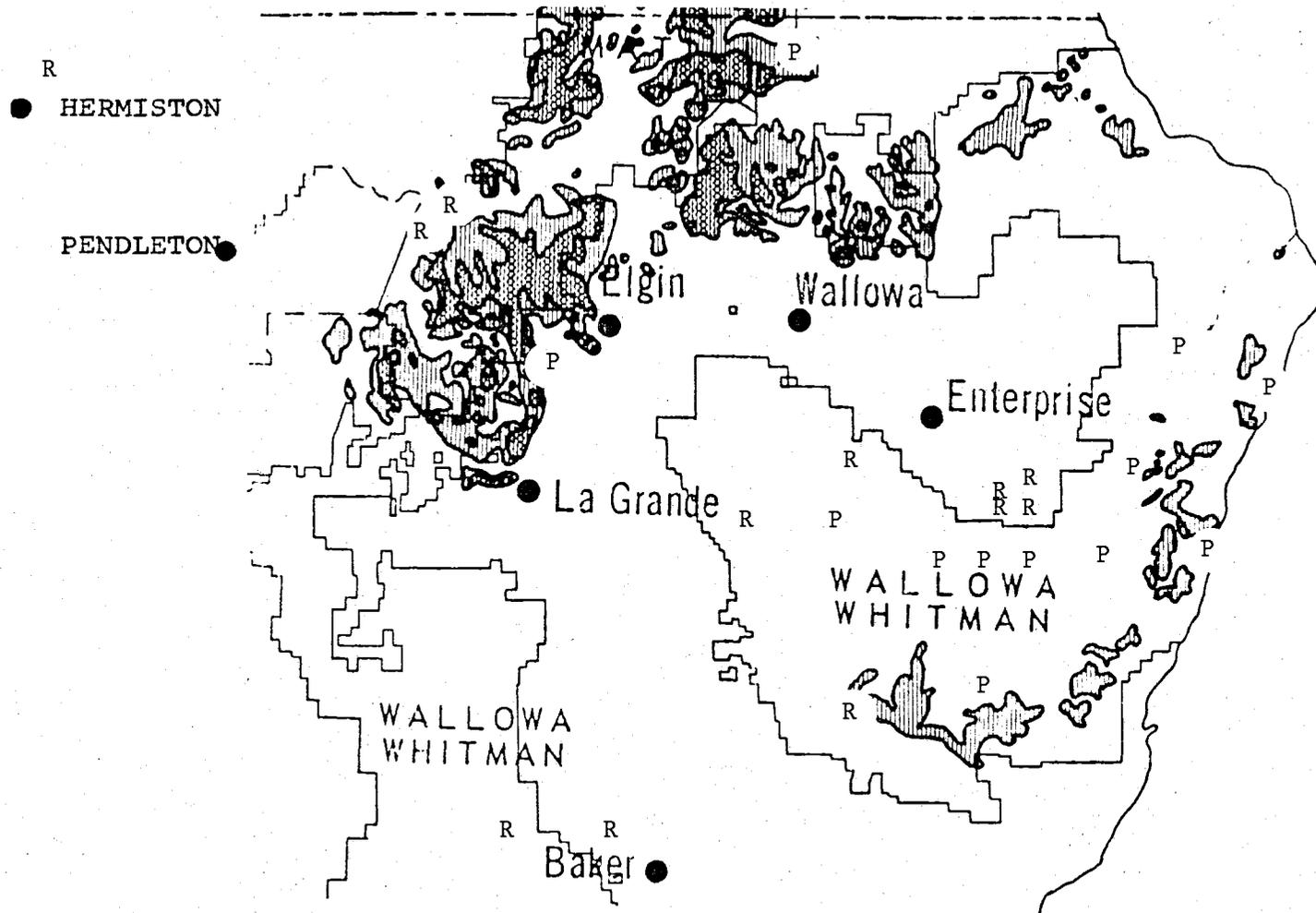


Figure 2. Distribution of resorts and packer-guides.
 R = location of a resort P = location of a packer-guide operation
 (stippled) visible defoliation 1972 (hatched) visible defoliation 1973

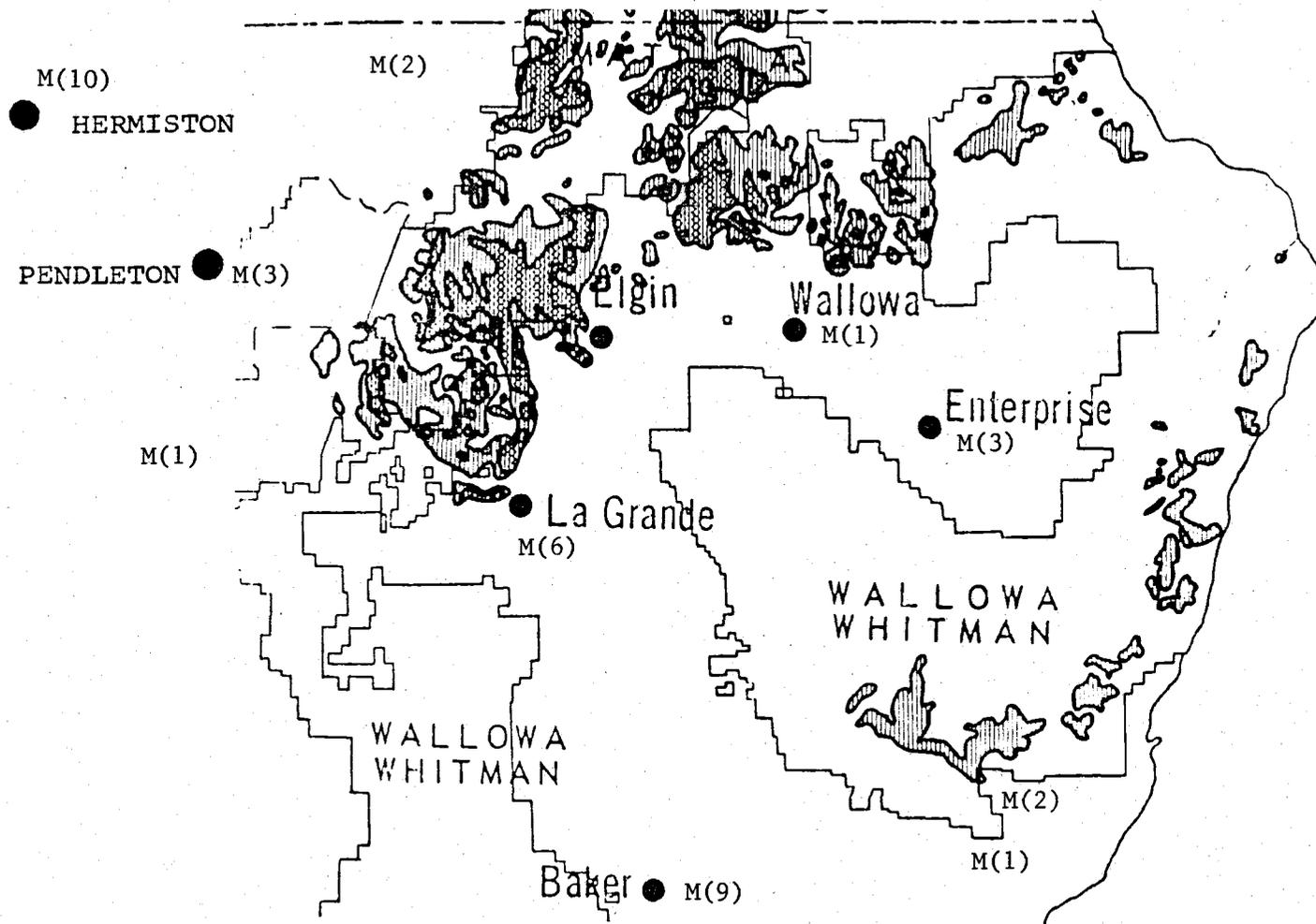


Figure 3. Distribution of motels.
 Number in parentheses is the number of motels in that area who responded.
 ● visible defoliation 1972 ▨ visible defoliation 1973

one year did not discriminate between years; they generally gave the same estimate for each year. Because of the lack of data on the percentage of recreation visitors the contribution to gross income from recreation visitors could not be computed.

Data Analysis

Several of the questions asked during the interviews could not be answered at all or with enough certainty to be of much use in this study. For example, only very sketchy information was obtained from resorts concerning the length of time visitors spent in the area and the proportion of return visitors, or concerning any noticeable changes in either of the two variables. As would be expected packer-guides had a better knowledge of "length of stay" and "return visits" but, in general, reported very little change. More surprising was the fact that no resorts in the tussock moth area were able to report the total number of visitors in any year; three reported the number of days each resort unit was occupied (more of the resorts might have done the same if they could have been motivated to do so). Only half of the packer-guides were able to provide information on the number of people using their services during the years in question and much of that information was of questionable accuracy. Only three individuals appeared to have complete records of the number of people served. The packer-guides who provided numbers without having records did so entirely from memory.

Gross Income Analysis

Gross income figures were obtained for 19 of the recreation businesses interviewed. Six of the businesses provided information directly from their tax records and ten of the owners gave gross income figures, without checking their records. Those are assumed to be very close to the actual amounts. Gross income for four businesses was estimated using the number of units rented each year or the number of people served (in the case of a packer-guide) times an average price per type of service or per unit as provided by the owner.¹ Table 1 shows the total adjusted gross income by recreation business category for the ten resorts and nine packer-guides.

Table 1. Recreation Businesses
Total Adjusted Gross Income*

| | <u>1970</u> | <u>1971</u> | <u>1972</u> | <u>1973</u> | <u>1974</u> | <u>1975</u> |
|---------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Resorts | 173,942 | 175,430 | 190,297 | 164,416 | 160,403 | 176,219 |
| Packer-guides | 74,341 | 78,459 | 86,469 | 96,332 | 91,871 | 119,183 |
| Total | 248,283 | 253,889 | 276,756 | 260,748 | 252,274 | 295,402 |

*Adjusted to 1970 dollars for the individual businesses.

¹Three resorts provided the total number of days each unit was rented and the gross income was estimated by multiplying the average unit price per person X the number of days rented X 3.41, the average family size in Oregon (U.S. Dept. of Commerce 1970). This assumes that the usual rental is to a family, an assumption believed to be valid.

The indices of adjusted gross income (adjusted gross income as a percentage of 1970 gross income) were graphed (Figure 4). The curve for both business types combined shows a decrease in business volume for 1973 and 1974. Business volume for resorts increased in 1971 and 1972; this was followed by a decline, to below the 1970 level, in 1973 and 1974. Business volume increased slightly in 1975. Packer-guides as a whole had a steep increase in business volume during the period except for a decline in 1974. There are three small stores and a restaurant associated with three of the resorts. A change in business volume would result from a change in the purchasing habits of customers, i.e. the amount purchased per customer. The gross income from the stores account for a small percentage of the total gross income each year; therefore a change in the amount purchased per customer would only account for a small percentage of the change indicated in Figure 4. The primary cause for a change in adjusted gross income is a change in the number of customers served by the businesses.

There are several factors which may have contributed to the business declines. The tussock moth reached serious proportions in 1972, spread even more in 1973, and control measures were used in 1974. A gasoline shortage, thought by some to be a contributing factor, occurred in late 1973 and 1974. Economic problems of recession and inflation were also present in the latter part of the period under investigation. The inflation problem is readily apparent when observing the change in average weekly earnings of selected workers (Figure 5) after the earnings have been adjusted for inflation using the con-

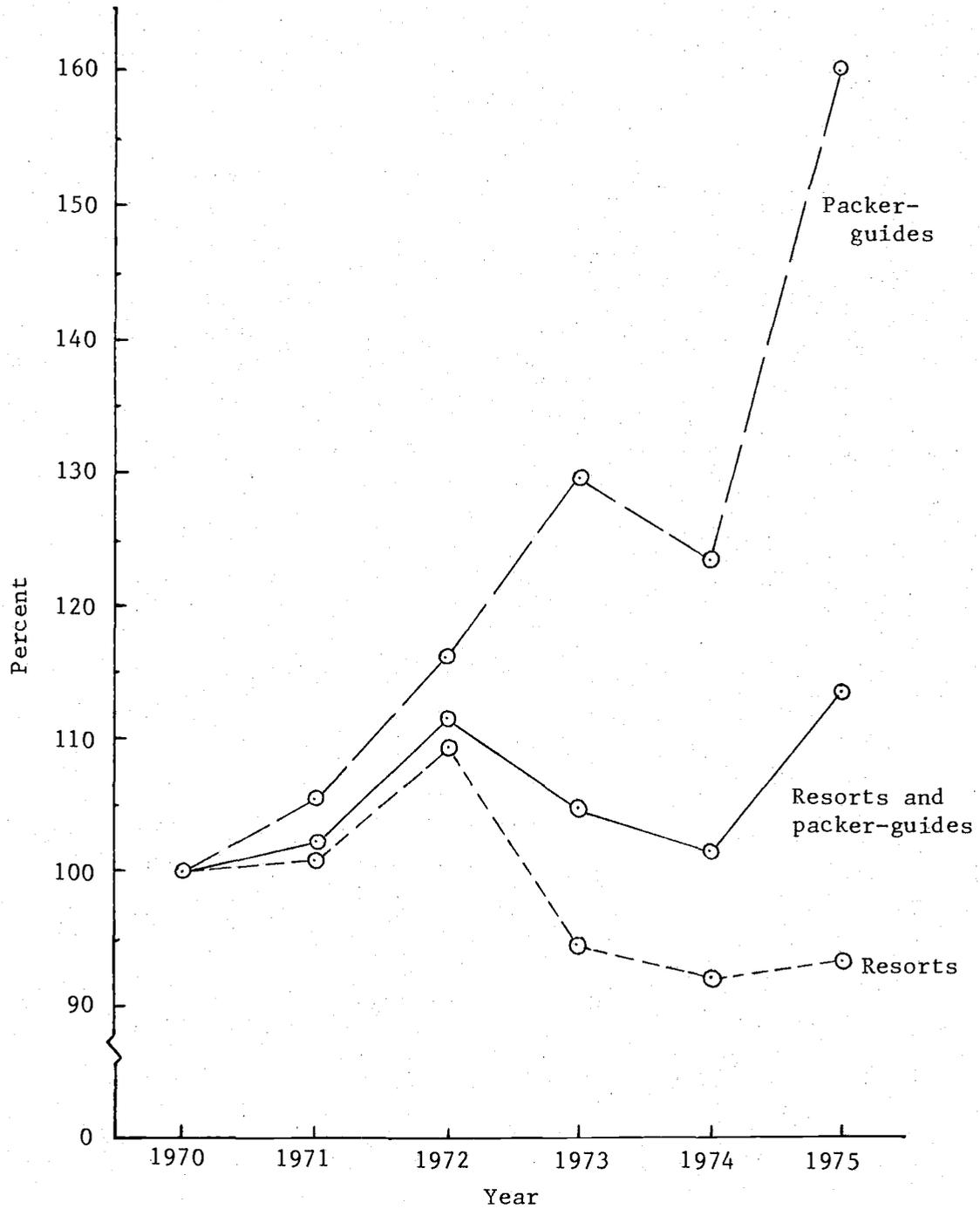


Figure 4. Adjusted gross income as a percentage of 1970 gross income for 19 businesses in northeastern Oregon (9 packer-guides and 10 resorts).

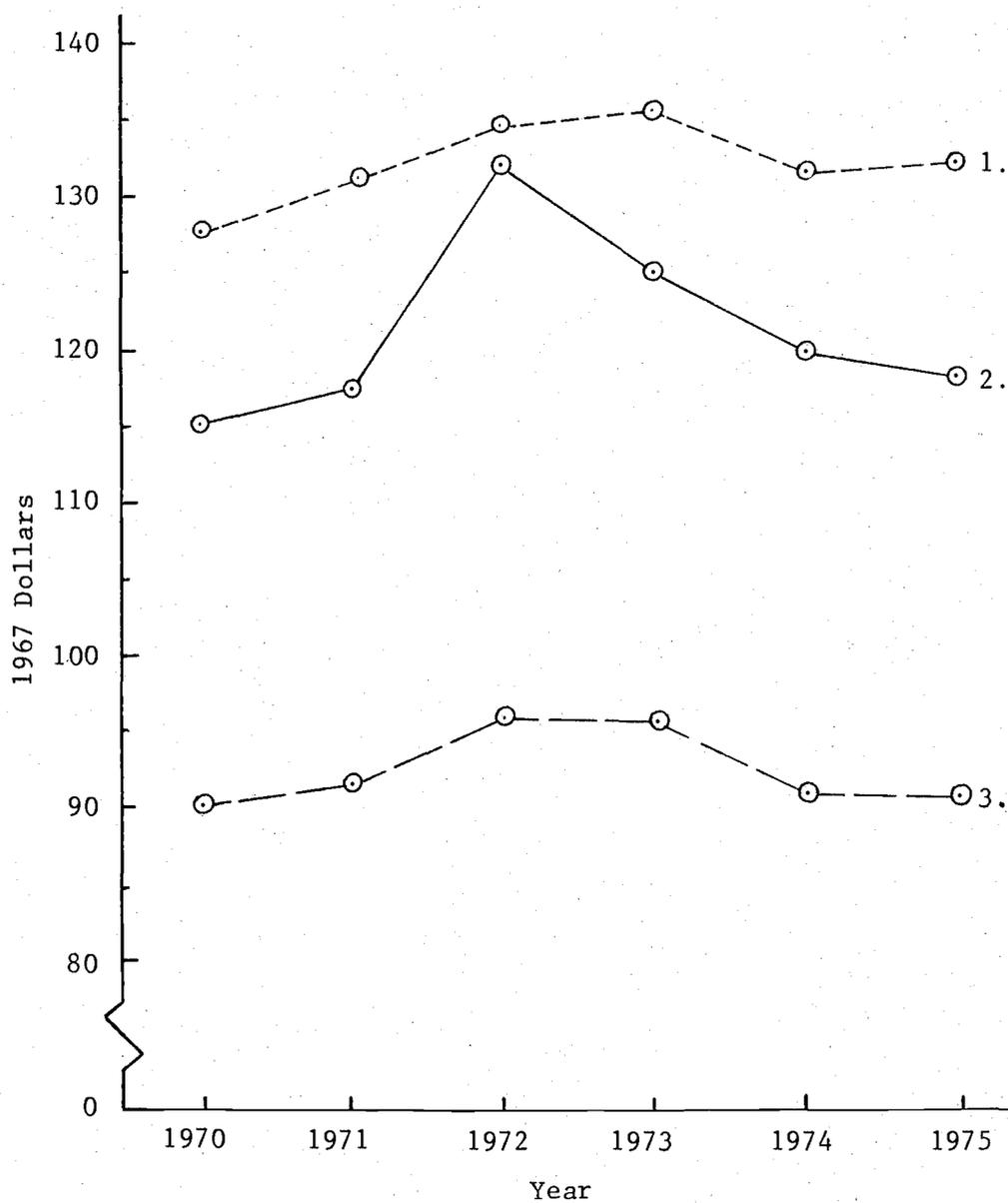


Figure 5. Average weekly earnings of workers in 1967 dollars.

1. Manufacturing workers in Oregon (Oregon Employment Division 1976)
2. Manufacturing workers in the U.S. (U.S. Department of Labor 1976)
3. Spendable weekly earnings for private nonagricultural workers in the U.S. (with three dependents) (U.S. Department of Labor 1976)

sumer price index for all items (U.S. Bureau of Labor Statistics 1976). Wage increases for manufacturing workers in Oregon were less than the inflation rate causing the constant (1967) dollar value of wages to be lower in 1974 and 1975 than in the two previous years.

The value of Figure 5 is to give an idea of the effect of inflation on income purchasing power over time; it is not intended to imply that manufacturing workers are the usual visitors to the area. A profile of the average visitor or customer using the recreation services in the area is not available. The differences in clientele may partially account for the difference between business volumes for the resorts and the packer-guides. Undoubtedly the average user of packer-guide services is generally better off financially than the average middle class worker; for hunting the services are fairly expensive, \$500 to \$800 a week for a guided elk hunt. The prices are less for other services but still rather expensive.

There were six packer-guides operating full time in the study area; three of them, for which gross income data is available, made an effort to expand their business operations through advertising during the period covered by this study. It is believed that the effort explains the increase in gross income shown by packer-guides as a whole.

Comparison with State Park Data

Visitor data were obtained for all Oregon state parks for 1970 through 1975 (Oregon State Highway Division 1976). The state parks

in the study area are in Region 5 of the state park system. The number of visitors, as a percentage of 1970 total visitors, was graphed (Figure 6) for all state parks and for Region 5. The changes in the number of visitors to state parks is very similar to the changes in business volume for resorts (Figure 4). The direction of the change for all state parks is the same, each year, as the business change for resorts. The decline in visitors to Region 5 state parks began a year earlier, 1972, than the decline in resort business. Region 5 visitation continued to decline in 1975; it did not show the slight increase which resort businesses experienced in 1975. The state park data shows that there was a statewide decrease in recreation trips in 1973 and 1974. It suggests that the business decline in northeastern Oregon was not limited to that area.

Regression Analysis

Resorts and packer-guides were treated separately in the regression analysis. The general form of the regression model and the variables used were given previously (page 14). Very little of the change in business volume of resorts was explained by the regression model using any of the variables. The best model is:

$$Y_{it} = 135.6 - 44.1X_{(6)i} - 29.6X_{(7)i}$$

where Y = the index of adjusted gross income for business i in year t . The two variables in the model are the dummy variables for business location and for business size. Table 2 gives the results of significance tests for the resort model. The coefficient of multiple

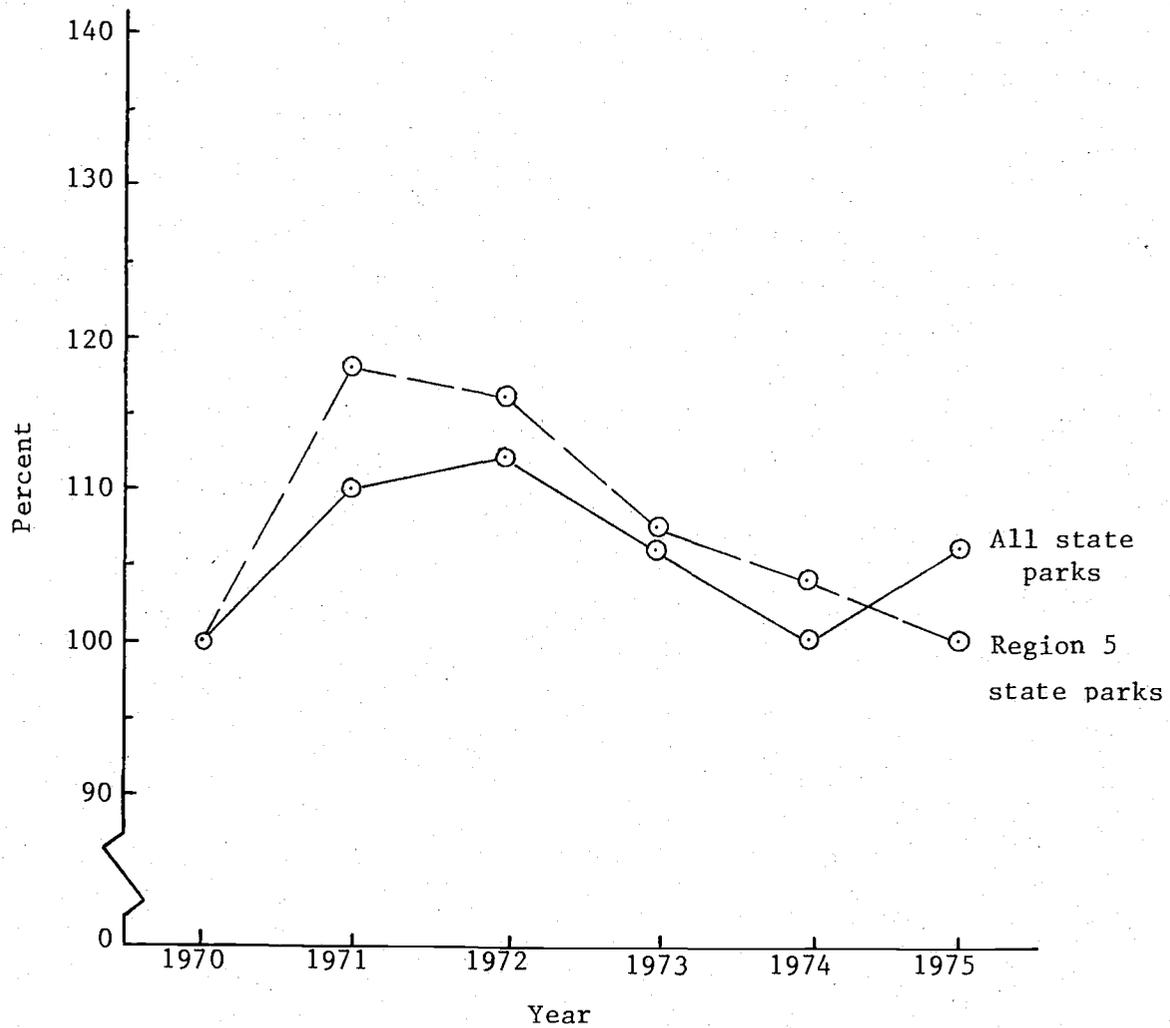


Figure 6. Number of visitors to Oregon state parks as a percentage of visitors in 1970.

Table 2. Results Of Significance Tests Of Regression Models

| Variables in the Model | Standard Error of Regression Coefficients | t-value | Significance level | R ² | Error Mean Square | Degrees of Freedom | Significance of Model (F-test) |
|------------------------|---|---------|--------------------|----------------|-------------------|--------------------|--------------------------------|
| Resort Model | | | | | | | |
| location | 17.8 | -2.47 | .05 | 0.10 | 2706 | 2,57 | 0.10 |
| size | 16.5 | -1.79 | .10 | | | | |
| ----- | | | | | | | |
| Packer-Guide Model | | | | | | | |
| location | 44.4 | 4.34 | .01 | 0.42 | 19206 | 2,51 | 0.01 |
| size | 44.4 | -5.89 | .01 | | | | |

determination for the model is 0.10; it is significant at 0.10.

The tussock moth dummy variable added nothing to the model; it had a coefficient of determination of 0.0009 and was significant at a level of 0.45 when brought into the model first. The sign of the coefficient for the variable was positive in the model; a negative sign would be expected if there was a negative impact on business because of the tussock moth.

The regression analysis using the packer-guide data was more successful, in terms of the percent of the variation in adjusted gross income which was explained by the model. The best model is:

$$Y_{it} = 207.9 + 191.4X_{(6)i} - 261.2X_{(7)i}$$

The variables in the model are the dummy variables for business location and size, the same as in the resort model; however, the model for packer-guides explains 42 percent of the variation in gross income as compared to ten percent in the model for resorts. Table 2 also shows the results of significance tests for the model.

Including the tussock moth dummy variable in the packer-guide model produced results similar to those from the resort model. It was not significant and essentially added nothing to the model. When brought into the model first the significance level was 0.20, lower than in the resort model; but the coefficient of determination was only 0.016. The regression coefficient of the tussock moth variable had a positive sign in the model; a negative sign would be expected.

The business location variable is present in both the resort and packer-guide models. The location variable has a negative regression

coefficient in the resort model; this would be expected if there was more of a decline in business volume for those businesses classified as "in" the tussock moth damaged areas than for those classified as "out". There were three resorts coded "in". One of them experienced no business declines during the 1970-75 period, one is believed to have suffered a decline as a result of management problems, and the third apparently suffered a decline because of the economic problems relating to inflation and the recession.

The regression coefficient for the business location variable is positive in the packer-guide model which means that packer-guides classified as "in" the tussock moth damage had an increase in business over the other packer-guides. Again, if the tussock moth caused business to decline a negative regression coefficient would be expected. In this situation the dummy variable for business location is, by chance, representing the packer-guides who made an effort to expand business as well as indicating proximity to the tussock moth damaged areas. It is believed that the tussock moth situation did not cause a decrease in business for the "in" resorts or an increase in business for the "in" packer-guides.

The petroleum price index, employment percentage, unadjusted payroll and adjusted payroll variables did not contribute to the explanatory power of the models. A model using logarithmic transformations of those four variables provided no useful results for either business type.

Including the lagged index of gross income and per capita dis-

posable income did not produce useful results in the packer-guide model. When the two variables were brought into the resort model alone the coefficient of determination was .66, indicating that 66 percent of the variation in adjusted gross income was reduced by using the two variables, and both variables were significant at .01 or less. A lagged index of gross income was not available for 1970 because data was not obtained for 1969 and per capita income data was not available for 1975. Therefore, when the two variables were used there were only observations from four years--1971, 1972, 1973, 1974. Business location and size were not useful in the models with data from only four years.

Motel Occupancy

Occupancy statistics were obtained in the motel survey for three periods in each year: summer (July through August), fall (October and November), and the entire year. The average of the occupancy statistics obtained from the motel survey are listed in Table 3 and are presented graphically in Figure 7. The curve for the summer season shows a decline in occupancy from 96 percent in 1971 to a low of 82 percent in 1973. Summer occupancy then increased in 1974 and 1975. Fall occupancy, although lower each year than in the summer, generally follows the trend of the summer occupancy. The average occupancy for the entire year follows the similar pattern of a decline reaching a low point in 1973 followed by an increase in 1974; the exception is the decline again in 1975.

Table 3. Occupancy Statistics for Motels

| Year | Average occupancy for the year | Number of responses | Average summer occupancy | Number of responses | Average fall occupancy | Number of responses |
|------|--------------------------------|---------------------|--------------------------|---------------------|------------------------|---------------------|
| 1970 | 73 | 4 | 96 | 6 | 79 | 6 |
| 1971 | 74 | 5 | 96 | 7 | 78 | 7 |
| 1972 | 71 | 7 | 94 | 11 | 74 | 12 |
| 1973 | 69 | 13 | 84 | 17 | 68 | 17 |
| 1974 | 76 | 17 | 88 | 21 | 69 | 21 |
| 1975 | 75 | 19 | 90 | 25 | 74 | 25 |

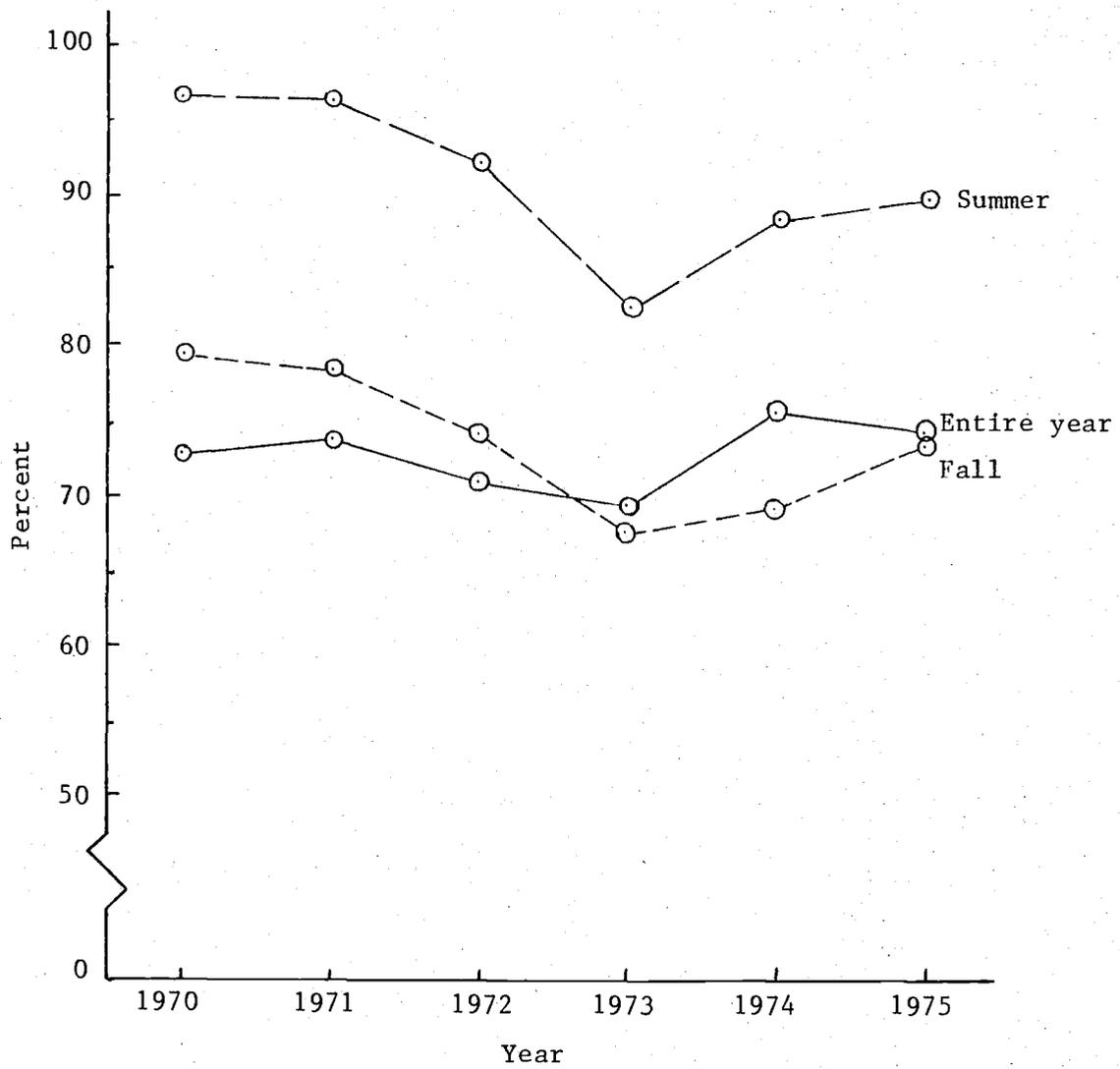


Figure 7. Average occupancy for motels in northeastern Oregon.

Limitations of Motel Statistics

By comparing the number of responses, in Table 2, between years it is evident that more people were able to respond with statistics for 1973, 1974 and 1975 than for the previous three years; this was evidently due to ownership changes. It is believed that the average of the occupancy statistics for the first three years are not as accurate as those for the last three years based on the number of responses and precision of the figures obtained. However, the trends in the motel business are probably depicted correctly.

There is no way of knowing if the decline in motel occupancy was a result of decreased recreation travel, less travel for business reasons, or a combined decrease in all traveling. As it was designed, the questionnaire would have provided an answer; however, the motel operators were not able to supply the information requested.

Comparison with all Oregon Motels

The accounting firm of Laventhol & Horwath compiles statistics for motels in Oregon. Figure 8 shows the occupancy statistics for Oregon and eastern Oregon obtained for 1971 through 1975 from them.² Eastern Oregon essentially consists of the area east of the summit of the Cascade Mountains. Occupancy for eastern Oregon, computed from a sample of only eight motels, shows no fluctuation from 1972 to 1975.

The Laventhol & Horwath statistics for the entire state of Oregon show more fluctuation than do their eastern Oregon statistics;

²Data used with the permission of Laventhol & Horwath, Portland, Oregon

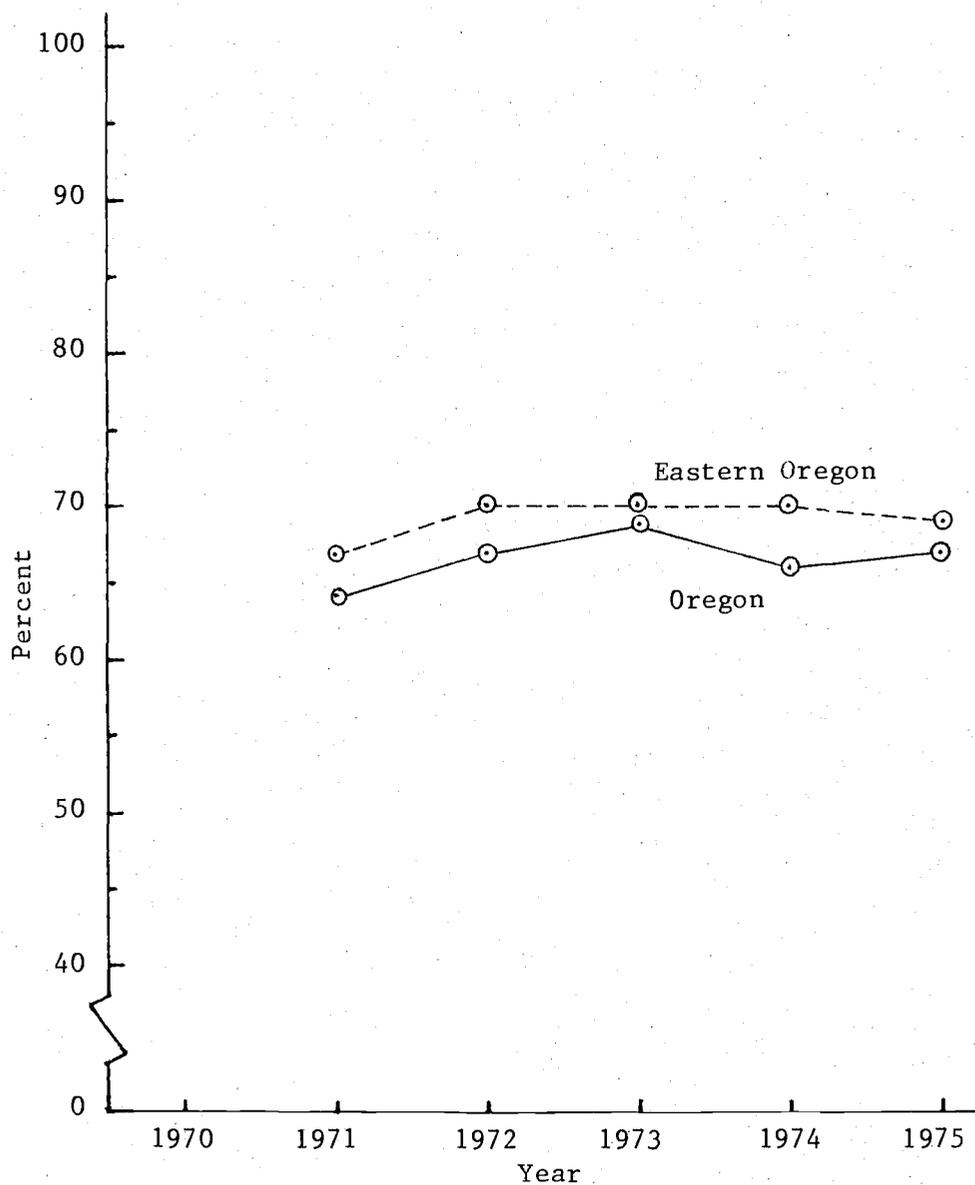


Figure 8. Occupancy for motels in Oregon and eastern Oregon (from Laventhol & Horwath, Portland, Oregon).

show more fluctuation than do their eastern Oregon statistics; however, the state-wide statistics do not show the decrease in 1973 that the data in this study shows for northeastern Oregon. Although the statistics from Lavenhol & Horwath do not correspond to what was obtained for northeastern Oregon motels, they do show a slight decline in 1974, a year of decreased business volume for resorts and packer-guides.

Owners' Opinions Concerning Business Influences

The operators of recreation businesses were asked several open-ended questions with the intention of drawing unprompted responses concerning the tussock moth. The first of these questions was concerning reasons people visit the area. The responses can be generalized as relating to the aesthetic qualities of the area, the beauty, quiet, and solitude. Frequently mentioned was the presence of the Eagle Cap Wilderness Area and a relatively abundant elk population (for hunters).

At another point in the interview they were asked what might explain any decrease in the number of visitors or in the length of visitors' stay in the area.³ The most frequently mentioned factors were the general economic conditions, gasoline shortages, and weather. Weather seemed to be mentioned because the spring and early summer of 1975 had been particularly wet and some areas had experienced mud and rock slides. Up to that point there was no indication that the tus-

³If there was no decrease for the particular business the owner was asked what would cause a decrease in visitors.

sock moth or any associated factors discouraged people from visiting the area.

Reported Inquiries by Visitors

Next the owners were asked specific questions about factors that might have had an effect on business, such as the number of game present, availability of gasoline, presence of the tussock moth, DDT spraying in the tussock moth control program, a local epidemic of the mountain pine beetle (another insect causing damage in the area), and logging operations. They were first asked if visitors had inquired about any of the factors above and then asked to indicate the relative number of inquiries they had received using an ordinal scale of none, very few, some, moderate, and many.

The distribution of responses to the specific questions about visitors' inquiries is given in Table 4. Resort operators and packer-guides reported a relatively large number of inquiries about game populations, gasoline availability, and the tussock moth. Packer-guides reported fewer inquiries. Both business types received few questions about the mountain pine beetle and logging operations. The responses to the motel questionnaire indicate fewer inquiries about all six factors than were received by resort operators or by packer-guides; however, they did report the most inquiries about the game populations and availability of gasoline. The results of the questions concerning visitors inquiries indicate that people inquired about the

Table 4. Relative Number Of Inquiries About Possible Influences

| External Factor | Business Type | Response Categories | | | | | | | | | | Total Responses* |
|----------------------|---------------|---------------------|----|----------|----|--------|----|----------|----|--------|----|------------------|
| | | Many | | Moderate | | Some | | Very Few | | None | | |
| | | Number | % | Number | % | Number | % | Number | % | Number | % | |
| Game Population | Resort | 4 | 40 | 2 | 20 | 1 | 10 | 1 | 20 | 1 | 10 | 10 |
| | Packer-guide | 10 | 83 | 2 | 17 | 0 | 0 | 0 | 0 | 0 | 0 | 12 |
| | Motel | 6 | 16 | 7 | 19 | 9 | 24 | 9 | 24 | 6 | 16 | 37 |
| Gasoline | Resort | 3 | 30 | 2 | 20 | 1 | 10 | 1 | 20 | 1 | 10 | 10 |
| | Packer-guide | 2 | 17 | 3 | 25 | 2 | 17 | 4 | 33 | 1 | 8 | 12 |
| | Motel | 1 | 3 | 5 | 14 | 7 | 19 | 12 | 32 | 12 | 32 | 37 |
| Tussock | Resort | 3 | 30 | 2 | 20 | 3 | 30 | 1 | 10 | 1 | 10 | 10 |
| | Packer-guide | 6 | 50 | 2 | 17 | 2 | 17 | 2 | 17 | 0 | 0 | 12 |
| | Motel | 2 | 5 | 0 | 0 | 3 | 8 | 7 | 18 | 26 | 68 | 38 |
| DDT | Resort | 1 | 10 | 2 | 20 | 2 | 20 | 2 | 20 | 3 | 30 | 10 |
| | Packer-guide | 5 | 42 | 2 | 17 | 1 | 8 | 3 | 25 | 1 | 8 | 12 |
| | Motel | 3 | 8 | 1 | 3 | 2 | 5 | 6 | 16 | 26 | 68 | 38 |
| Mountain Pine Beetle | Resort | 0 | 0 | 1 | 10 | 2 | 20 | 1 | 10 | 6 | 60 | 10 |
| | Packer-guide | 0 | 0 | 1 | 8 | 1 | 8 | 0 | 0 | 10 | 83 | 12 |
| | Motel | 0 | 0 | 0 | 0 | 1 | 3 | 2 | 6 | 28 | 90 | 31 |
| Logging | Resort | 0 | 0 | 0 | 0 | 1 | 11 | 3 | 33 | 5 | 56 | 9 |
| | Packer-guide | 1 | 10 | 1 | 10 | 1 | 10 | 3 | 30 | 4 | 40 | 10 |
| | Motel | 2 | 6 | 4 | 11 | 3 | 8 | 5 | 14 | 22 | 61 | 36 |

*Sample size: Resorts 12, Packer-guide 12, Motels 38
 Sum of percentages in each row may not total 100 due to rounding.

tussock moth about as often, generally, as about the status of the game populations and gasoline availability. This would seem to indicate a concern or curiosity about the tussock moth. There appears to have been less concern about the use of DDT, the mountain pine beetle, and logging operations.

The results of the questions about visitors' inquiries should be interpreted cautiously. The responses may be biased by the operators' own feeling about the situation. Discussion about the various factors may have been between residents of the area rather than initiated by visitors while the respondent only remembers that there was discussion. There is the possibility that questions were prompted by the operators; however, 90 percent of the resort operators and 67 percent of the packer-guides, who responded to the question, indicated that they did not tell visitors about the tussock moth problem if they were not asked about it.

Owners' opinions about specific external factors

The owner of each business was next asked specifically if any of the factors had influenced business, either negatively or positively. There were considerably more responses (Table 5) indicating that fluctuations in the game populations and the gasoline problems influenced business than there were indicating the tussock moth, DDT spraying, mountain pine beetle, or logging affected business.

Thirty-six percent of the resorts and 42 percent of the packer-guides reported negative effects on business due to low game populations; 33 percent of the packer-guides reported a positive effect on

Table 5. Responses to Questions Concerning Influences On Business

| Subject Of Inquiry | Business Type | Negative Effect | | Positive Effect | | No Effect | | Total Responses* |
|-----------------------|------------------|-----------------|---------|-----------------|---------|-----------|---------|---------------------|
| | | Number | Percent | Number | Percent | Number | Percent | |
| Game Population | Resort | 4 | 36 | 0 | 0 | 7 | 64 | 11 |
| | Packer-guide | 5 | 42 | 4 | 33 | 3 | 25 | 12 |
| | Motel | 1 | 3 | 20 | 59 | 13 | 38 | 34 |
| Gasoline | Resort | 7 | 70 | 0 | 0 | 3 | 30 | 10 |
| | Packer-guide | 5 | 42 | 0 | 0 | 7 | 58 | 12 |
| | Motel | 9 | 28 | 6 | 19 | 17 | 53 | 32 |
| Tussock Moth | Resort | 0 | 0 | 0 | 0 | 10 | 100 | 10 |
| | Packer-guide | 0 | 0 | 0 | 0 | 12 | 100 | 12 |
| | Motel | 2 | 6 | 2 | 6 | 28 | 88 | 32 |
| DDT | Resort | 0 | 0 | 0 | 0 | 11 | 100 | 11 |
| | Packer-guide | 1 | 8 | 0 | 0 | 11 | 92 | 12 |
| | Motel | 2 | 6 | 2 | 6 | 29 | 88 | 33 |
| Mountain Pine | Resort | 0 | 0 | 0 | 0 | 11 | 100 | 11 |
| | Packer-guide | 0 | 0 | 0 | 0 | 12 | 100 | 12 |
| | Motel | 1 | 3 | 0 | 0 | 31 | 97 | 32 |
| Logging | Resort | 0 | 0 | 0 | 0 | 11 | 100 | 11 |
| | Packer-guide | 1 | 8 | 0 | 0 | 11 | 92 | 12 |
| | Motel | 0 | 0 | 8 | 25 | 24 | 75 | 32 |

*Sample size: Resorts 12, Packer-Guide 12, Motels 38
 Sum of percentages in each row may not total 100 due to rounding

business because the game population was high in their areas. Seventy percent of the resorts and 42 percent of the packer-guides reported negative effects on business due to the gasoline problems. There were no resorts or packer-guides who reported any effect on business because of the tussock moth directly. One packer-guide believed he had suffered a loss of revenue due to the spraying for the tussock moth. This individual offers single day trips and felt that the personnel associated with the control program filled the motels in the area and recreation visitors could not stay in the area to take advantage of his services. One packer-guide reported a negative impact as a result of salvage logging in the tussock moth area. That individual cancelled his operations for 1975 because the logging roads build into the area he used were not closed; therefore the area was accessible to anyone with a suitable vehicle.

Two motels indicated that the tussock moth and DDT spraying had a negative effect on business. Also, two motels reported that the tussock moth and spraying increased business. It is believed that this was due to an increase in people in the area studying the problem and administering and monitoring the control operation. Eight motels reported increased business as a result of logging operations; salvage logging was not specifically mentioned.

Only four individuals out of 62 who were interviewed or returned a questionnaire believed there was a negative effect on business as a result of the tussock moth itself, the control operation, or the salvage logging. Two of those affected negatively were indirectly

affected due to occupied motels and the construction of logging roads. It is important to note that operators of the businesses did discriminate among factors possibly affecting business. By indicating, as many did, that the gasoline shortage and game populations had an effect on business, they give some credibility to the responses of no effect from the tussock moth.

Motel operators were asked to list other factors having an effect on business. There were 13 responses to that question. Three respondents indicated the effects of the nationwide recession and inflation caused a decrease in traveling. This was the only response received more than once.

Shifts in Areas Used

The resort operators and packer-guides were asked if they or their guests had shifted areas of primary use. Two resorts reported changes because of changes in the location of deer and elk herds. Five packer-guides reported shifts; one individual's reason was to move closer to home, another began using the Eagle Cap Wilderness Area, and three shifted within the wilderness area to avoid high concentrations of people.

All businesses were asked if visitors tried to avoid tussock moth areas. With the exception of packer-guides the majority reported (Table 6) that they did not know; 67 percent of the packer-guides said people did not try to avoid the tussock moth. There was one "yes" response (eight percent) in each of the resort and packer-

Table 6. Responses to the Question: "Did visitors try to avoid tussock moth areas?"

| Business Type | "No" | | "Yes" | | "I Don't Know" | | Total Responses* |
|---------------|--------|---------|--------|---------|----------------|---------|------------------|
| | Number | Percent | Number | Percent | Number | Percent | |
| Resort | 3 | 25 | 1 | 8 | 8 | 67 | 12 |
| Packer-guide | 8 | 67 | 1 | 8 | 3 | 25 | 12 |
| Motel | 11 | 32 | 2 | 6 | 21 | 62 | 34 |

*Sample size: Resorts 12, Packer-guides 12, Motels 38

guide categories and two "yes" responses (six percent) from the motels.

IV CONCLUSIONS AND RECOMMENDATIONS

The conclusions from this study are presented as answers to the four primary questions asked at the beginning of the previous section.

- (1) Did businesses in the study area experience a change in business volume (a change in the number of customers) during the tussock moth infestation?

There was a decrease in business volume, as reflected by a decrease in adjusted gross income; this indicates that recreation use in the study area decreased during the tussock moth problem.

- (2) Is there any evidence that the tussock moth caused any of the effect?

Only four out of 62 owners of businesses thought the tussock moth caused any direct change in business volume; two motel owners thought there was a negative impact and two thought business activity increased. Two packer-guides reported indirect effects on business as a result of the tussock moth problem. Some thought the game population fluctuations, gasoline shortages, and other economic factors influenced business. Introduction of the tussock moth dummy variable into the regression models did not indicate a significant relationship between the change in business volume and the tussock moth.

- (3) Did visitors inquire about the tussock moth and try to avoid tussock moth areas?

The individuals who were interviewed and who returned question-

naires reported a relatively high number of inquiries about the tussock moth or tussock moth damaged areas.

- (4) Did the tussock moth cause any change in normal business operations?

The tussock moth did not cause any change in the normal operations of businesses. People using the services of the businesses, particularly when hunting, did use areas where the tussock moth was evident and which had been sprayed to control the tussock moth.

There is little evidence to point to the 1972-74 tussock moth outbreak, or resulting activities, as having a widespread or persistent effect on recreation businesses. Either there was no effect or the changes caused by the tussock moth were not discernible when combined with the effects of the overall economic problems of recession and inflation and the gasoline limitations of late 1973 and 1974. Apparently the tussock moth or tussock moth damage did not cause a disagreeable experience for people staying at a resort. Even though the damage was close to some businesses there was little damage directly in and around resort areas. The tussock moth did not create an unpleasant experience for the summer user of packing and guide services; their summer operations are generally concentrated in the Eagle Cap Wilderness Area which only suffered peripheral damage on the eastern and southern boundaries. Several of the packer-guides operated during hunting seasons in areas damaged by the tussock moth and sprayed with DDT. Concerns about DDT residue in deer and elk or

about the tussock moth damage (the moth itself is in the egg stage in the fall) were either absent or were overridden by the desire to hunt in the areas. This does not imply that some people did not avoid the area because of the tussock moth; although the results of this study indicate that this was not a widespread occurrence. Neither does it imply that more severe tussock moth damage directly around a resort or a public campground would not decrease recreation use of that facility.

The business operators' perceptions of their clients actions or concerns may have been inaccurate. In some cases owners may have unconsciously responded to questions based more on their own feelings rather than on objective assessment of how they thought visitors felt or acted. This does not seem to be a significant problem in the overall results of this study. If the responses were influenced by personal feelings about the tussock moth situation, their concerns were not so strong as to cause them to report an impact, either positive or negative, on business because of the situation. A vast majority reported no effect on business. Still, it might be desirable to undertake a comparison study which surveys the users of the resorts and the packer-guide services. The study would require the cooperation of the owners of the businesses by their providing the names and addresses of previous customers.

If management decisions, such as the initiation of an insect control program, are to be based, even in part, on the possible effects on recreation activities more knowledge is required about what

people are aware of when they are in the outdoors, of what they consider to be disagreeable, and what is so distasteful as to cause a trip to be shortened or cancelled.

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APPENDICES

APPENDIX A
INTERVIEW SCHEDULE

Interview # _____

INTERVIEW SCHEDULE FOR PRIVATE RECREATION FIRMS
BLUE MOUNTAIN RECREATION STUDY

First, I would like to ask some general questions about the type of business which you operate here.

1. What services and facilities do you have to offer? (check those applicable)

a. How many (facilities) do you have?
(name items checked)

b. What do you consider is your daily capacity in _____.
(name items checked)

| | <u>Number of Facilities</u> | <u>Daily Capacity</u> |
|--|---------------------------------|---------------------------|
| ___ hunting on your land | | _____ |
| ___ packing and guide services | | _____ |
| ___ day use (picnic, etc.) | _____ | _____ |
| ___ overnight camping | _____ | _____ |
| ___ resort facilities (such as lodge, cabins, etc.) | _____ | _____ |
| ___ restaurant | | _____ |
| ___ store | | |
| ___ horseback riding | _____ | |
| ___ swimming | | _____ |
| ___ hiking trails | | |
| ___ other (specify): | | _____ |

c. During what part of the year is your business in operation?

d. What do you consider to be your peak business season?

e. How long have you operated this business? _____

-2-

2. How much land do you own which is available for people to use? _____
 - a. Do you use other land in private ownership to support your business? _____
 - b. To what extent do you rely on public land, i.e. National Forest, to support your business?
 - c. Can you show me on this map any specific areas you, or your guests, use? (Use a map with grid drawn on it.)

3. Have you or your visitors shifted primary use areas in the past? _____
 - a. If so, from where? (use map)
 - b. What was the reason for the change?

 - c. Would you have preferred to change to another area?

4. What do you feel are the most important features of your business and its location for attracting visitors? (Why do people visit the area?)

-3-

Now I would like to get some information concerning the trends in numbers of visitors over the past five years. I realize that you may not have the information readily available but your best rough estimates are acceptable for all of the following questions.

5. What was the total number of visitors using each type of facility and service in 1974?

(Ask for the same information for each year back to 1970.)

PROBE TO GET TRENDS AT LEAST!

| | <u>1974</u> | <u>1973</u> | <u>1972</u> | <u>1971</u> | <u>1970</u> |
|-------------------|-------------|-------------|-------------|-------------|-------------|
| hunting | | | | | |
| packing and guide | | | | | |
| campsites | | | | | |
| resort | | | | | |
| day use | | | | | |
| other | | | | | |
| <hr/> | | | | | |
| Total Visitors | | | | | |

6. Would you estimate the percent of total capacity occupancy used during your 1974 business season.
(Do the same for each year back to 1970.)

| | <u>1974</u> | <u>1973</u> | <u>1972</u> | <u>1971</u> | <u>1970</u> |
|------------------|-------------|-------------|-------------|-------------|-------------|
| a. Entire season | | | | | |
| <hr/> | | | | | |
| b. Prime season | | | | | |

7. What percentage of your visitors stay for longer than 7 days? _____
- a. What is the percentage whose length of stay is 4 to 7 days? _____
- b. What percentage stay 3 days or less? _____
- c. (IF THE BUSINESS IS DIVERSIFIED:) Are the figures just given approximately the same for all types of visitors? _____
(If not, what are the differences?)
- d. Has the length of stay changed in the past, or has there been any noticeable trend?

-4-

8. What portion of your guests have visited this area of Oregon previously?

a. What portion have been previous guests of yours? _____

b. Has there been any noticeable change in the number of people returning to visit this area since (1970)?

9. What might explain any changes in the number of visitors (or in their length of stay)? (PROBE)

10. Have visitors, or prospective visitors, inquired about:

- 1) Deer or elk population
- 2) Fuel/gasoline situation in Eastern Oregon
- 3) Douglas-fir Tussock Moth
- 4) DDT (in favor of or opposed to spraying?)
- 5) Mountain Pine Beetle
- 6) Logging operations

a. Was there any particular time (year, etc.) when the number of inquiries were especially noticeable?

b. Would you classify the number of inquiries as:

| | (1) Many | (2) Moderate | (3) Some | (4) Very Few | (5) None |
|----------------------|-------------|-----------------|-------------|-----------------|-------------|
| Deer and elk | | | | | |
| Fuel | | | | | |
| Tussock Moth | | | | | |
| DDT | | | | | |
| Mountain Pine Beetle | | | | | |

-5-

11. Do you feel that any of the factors I have just mentioned affected your business in any way? (Probe for reasons for either answer.)
- a. Deer and elk population - _____yes _____no
 - b. Fuel situation - _____yes _____no
 - c. Tussock Moth - _____yes _____no
 - d. DDT - _____yes _____no
 - e. Mountain Pine Beetle - _____yes _____no
 - f. Logging operations - _____yes _____no
12. Is there anything I have not mentioned which has affected your business?
13. If visitors did not inquire about the Tussock Moth, did you tell them about the moth and areas where the moth was evident?
- a. Did they avoid the areas?
 - b. Can you show me (using the map) any nearby areas which have been infested by the Tussock Moth?
14. Were you in favor of spraying for the Tussock Moth?
15. Can you show me the areas which have problems with the Mountain Pine Beetle?

-6-

16. May I ask what your gross receipts from the sale of services (and goods) were for each year beginning with last year and going back to 1970?

This information will be kept strictly confidential and the results will be tabulated for all businesses -- not for any one person or business. As was the case with previous questions, your best rough estimates, and rounded figures are acceptable.

| | <u>1974</u> | <u>1973</u> | <u>1972</u> | <u>1971</u> | <u>1970</u> |
|---------------|-------------|-------------|-------------|-------------|-------------|
| Hunting | | | | | |
| Packing guide | | | | | |
| Day use | | | | | |
| Camping sites | | | | | |
| Resort | | | | | |
| Restaurant | | | | | |
| Store | | | | | |
| Other: | | | | | |
| Total | | | | | |

- a. (IF THE BUSINESS IS DIVERSIFIED) Is it possible for you to break down the total receipts into the amount from each area of your operation?

17. Have you changed your prices for any of your major services any time since 1970? _____
If so, by how much and when?

(Depending on the answer to Question 9, probe for reasons for any fluctuations in receipts, etc.)

-7-

18. What do you see as the outlook for your type of business?
(Probe: increase, decrease, remain the same? Why?)

19. Do management decisions on public land affect your business?
(How have they? How might they?)

20. What are your plans for the future, concerning your business?
(Probe: Do you intend to stay in business?)

21. Can your business be identified by name in a list of businesses that participated? yes no

APPENDIX B
LETTER OF INTRODUCTION

School of Forestry



Corvallis, Oregon 97331

Dear

The School of Forestry at Oregon State University is conducting a recreation study in Northeastern Oregon. The purpose of the study is to examine changes in recreation use of your area over the last few years.

Part of the study, is concerned with the use of private recreation enterprises such as resorts, guest ranches, private campgrounds and services from packers and guides. We have compiled a list of about 50 businesses and plan to interview owners or managers. We need your help.

We would like to visit with you and obtain information relating to:

1. A description of your facilities and services provided
2. Areas of public land used in your business or by your guests
3. Total number of guests each year for 1970 to 1975
4. Average length of stay of guests
5. Receipts and expenses each year for 1970 to 1975

In addition to this information we would be interested in your views about recent local or national events which might have had an influence on your business. All information obtained will be kept completely confidential. The results of the survey will be aggregated and summarized so that no individual business will be identified with specific data.

If you are interested, a summary of the study report will be sent to you. We hope the study will provide information about recreation trends which will be of interest and value to you.

In the latter part of August or in September Bill Williams, Research Assistant at Oregon State, will contact you to set a convenient time for an interview. We hope you can participate.

Sincerely,

Kent B. Downing
Assistant Professor
Forest Recreation

KBD:lb

APPENDIX C
LETTER OF INTRODUCTION AND QUESTIONNAIRE FOR MOTELS

Department of
Forest Management



Corvallis, Oregon 97331

Dear

The School of Forestry is studying outdoor recreation use patterns in Northeastern Oregon. In particular we are attempting to identify recent changes in recreation use and the reasons for the changes.

Part of the study is concerned with the use of motels by people on recreation trips and we need your help in this investigation. Enclosed is a short questionnaire. We hope you will take a few minutes to answer the questions and return it to us in the envelope provided.

Several of the questions pertain to occupancy percentages; your best estimates of the percentages will be acceptable and valuable in our effort to describe recreation use of your area. All information will be kept completely confidential. The results will be aggregated and summarized so that no individual business will be identified with specific data.

After the analysis is complete a summary of the study report will be sent to you. The study should provide information about recreation trends which hopefully will be of interest and value to you.

Sincerely,

Signature redacted for privacy.

Kent B. Downing
Assistant Professor
Forest Recreation

KBD:lb
Encs.

OREGON STATE UNIVERSITY

1. How long have you operated your motel business? _____
2. What period during the year do you consider to be your peak business season?

3. What do you feel are the most important features of your business location for attracting guests?
4. Have any of your guests ever inquired about the following:
(if the answer is "yes" please indicate when the inquiries were most noticeable)

| | no | yes | when? |
|------------------------------------|----|-----|-------|
| a. deer or elk population | | | |
| b. gasoline situation in your area | | | |
| c. Douglas-fir Tussock Moth | | | |
| d. spraying for the Tussock Moth | | | |
| e. Mountain Pine Beetle | | | |
| f. logging operations | | | |

5. Please classify the number of inquiries you received by checking the appropriate box below.

| | many | moderate | some | few | none |
|-----------------------------|------|----------|------|-----|------|
| a. deer and elk population | | | | | |
| b. gasoline situation | | | | | |
| c. Douglas-fir Tussock Moth | | | | | |
| d. Tussock Moth spraying | | | | | |
| e. Mountain Pine Beetle | | | | | |
| f. logging operations | | | | | |

-2-

6. Do you feel that any of the factors listed below have affected your business, either positively or negatively?

| | positive | negative | no effect |
|----------------------------|----------|----------|-----------|
| a. deer and elk population | | | |
| b. gasoline situation | | | |
| c. Tussock Moth | | | |
| d. Tussock Moth spraying | | | |
| e. Mountain Pine Beetle | | | |
| f. logging operations | | | |

7. Please list any outside influences, not included above, which have had an effect on your business.
8. Did visitors to your area try to avoid recreation activities in Tussock Moth areas?
 yes no I don't know
9. Were visitors to your area in favor of spraying for the Tussock Moth?
 yes no I don't know
10. Were you in favor of spraying for the Tussock Moth? yes no

-3-

11. Please estimate the percentage of your total annual guests in each category listed below and for each of the years listed.

| | business trips* | recreation trips to your area** | other trips |
|------|--------------------|------------------------------------|----------------|
| 1975 | | | |
| 1974 | | | |
| 1973 | | | |
| 1972 | | | |
| 1971 | | | |
| 1970 | | | |

12. What was the percent of occupancy during each of the periods shown in the table below?

| | entire year | Summer (June, July, August) | October & November |
|------|-------------|--------------------------------|--------------------|
| 1975 | | | |
| 1974 | | | |
| 1973 | | | |
| 1972 | | | |
| 1971 | | | |
| 1970 | | | |

13. Please estimate the percentage of your guests who were on recreation trips to your area** in each period shown in the table below.

| | October-November | Summer |
|------|------------------|--------|
| 1975 | | |
| 1974 | | |
| 1973 | | |
| 1972 | | |
| 1971 | | |
| 1970 | | |

* The percentage of guests requesting or receiving a commercial rate.

** Those people taking part in outdoor recreation activities within a two hour drive (approximately 80 to 100 miles) of your motel.

APPENDIX E
FIRST REMINDER SENT TO MOTELS

Dear Motel Owner:

About three weeks ago you were mailed a questionnaire requesting information about your motel business.

This is just a reminder that we have not yet received your questionnaire. Your response is very much needed and we would appreciate hearing from you.

If you have already returned the questionnaire, please disregard this follow-up. Thank you for your cooperation.

Sincerely, —

Signature redacted for privacy.

Kent B. Downing
Assistant Professor
Oregon State University

APPENDIX E
SECOND REMINDER SENT TO MOTELS

Department of
Forest Management



Corvallis, Oregon 97331

January 2, 1976

In November you were mailed a questionnaire asking you about your motel business. Perhaps the questionnaire was misplaced or lost in the mail.

You are one of a small sample and your response is important to our study of recreation in Northeastern Oregon. We are enclosing another questionnaire and would be very grateful if you would complete and return it in the enclosed post paid envelope.

Thank you for your cooperation.

Sincerely,

Signature redacted for privacy.

Kept B. Downing
Assistant Professor
Forest Recreation

KBD:lb
Enc.