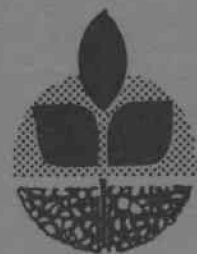


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Productivity Estimates for Alien and Domestic Strawberry Workers and the Number of Farm Workers Required to Harvest the 1988 Strawberry Crop

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Oregon State University, Corvallis**

**Productivity Estimates for Alien and Domestic Strawberry
Workers and the Number of Farm Workers Required
to Harvest the 1988 Strawberry Crop**

**by
Robert Mason**

**Agricultural Experiment Station
Oregon State University
Corvallis, OR 97331**

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AUTHOR: Robert Mason is associated with the Survey Research Center at Oregon State University.

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Introduction

The experience of last year's bumper strawberry harvest, where an estimated 18- to 20-million pounds of fruit remained unpicked, underscores the uncertainty and lack of accurate information about the true demand for and the supply of seasonal farm workers in Oregon. Uncertainty over labor supplies continues to dominate grower fears and the prospect of a labor shortage for hand-picked crops remains a possibility for the 1988 harvest season.

This study of farm labor employed by the state's strawberry growers in 1987 is an effort to describe labor requirements for that industry. Characteristics estimated in this report include the size of the work force that harvested the 1987 crop and its composition by age and legal status. Comparisons of the productivity of different types of workers -- aliens and domestic workers, for example -- are presented so the industry can estimate 1988 labor needs more accurately.

Data were gathered by self-administered questionnaires mailed to all the known strawberry growers in the state. Growers were asked about the number of 1987 acres in production, total pounds of berries harvested and left unharvested, estimated number of worker-days, the age and

legal status of their work force, housing, and planting and harvesting intentions for 1988.

Questionnaire items, marginal frequencies, and other summary statistics are shown in Appendix A. Completion rates are discussed in Appendix B. Methods of analysis for estimating the size and productivity of the work force are given in Appendix C.

Results

Estimates of size and productivity of the work force

We estimate that a total of 36,662 workers will be required to harvest the 1988 strawberry crop (Appendix Table C2, page 22). This assumes that berry production per acre will match that of 1987 and that the 1988 labor force will be composed of the same proportion of age and legal status groupings that were reported for the 1987 harvest. The 1987 proportions, according to our analysis, are shown in Table 1.

Table 1. Frequency distribution for type of farm worker

Type of worker	Number	Percent
Local workers between 12 and 16 years of age	8,270	21
Local workers over 16 years of age	7,600	19
Legal migrant farm workers	5,849	15
Undocumented aliens	<u>17,400</u>	<u>44</u>
Total	39,119	100

Even though undocumented aliens made up 44 percent of the work force in 1987, they picked an estimated 65 percent of the 93.6-million-pound crop. That estimate is unadjusted for acres harvested. However, the data also allow us to pinpoint more precisely the productivity of different work groups, adjusted for acres harvested. These values are reported in Table 2.

Table 2. Productivity values for types of farm workers

Type of worker	Average number of pounds of strawberries harvested per worker during the 1987 season
Local workers between 12 and 16 years of age	1,385
Local workers over 16 years of age	2,689
Legal migrant workers	3,152
Undocumented aliens	3,834

On average, a picker between 12 and 16 years of age harvested 1,385 pounds of berries during the 1987 season, while an undocumented alien picked nearly three times that amount. Moreover, when productivity levels are adjusted for acres harvested, we estimate that undocumented aliens, while representing 44 percent of the work force, picked about 70 percent of the 1987 crop, slightly higher than the unadjusted 65 percent reported earlier.

The importance of the number of acres and the percent of undocumented aliens in the work force on productivity, measured as the number of pickers per acre required to harvest the 1987 crop, is shown in Figure 1 (next page).

The graph shows that the number of pickers decreases as acres harvested per farm and percent undocumented aliens in the work force increase. Hiring aliens to harvest small-acreage strawberry farms has only a limited advantage in reducing the number of pickers required to harvest the crop. The advantage increases dramatically as acreage size increases, as shown in the figure.^{1/} For example, a grower with no alien pickers who farmed 10 acres of berries in 1987 needed about 11.25 pickers per acre to harvest the crop. If his work force was 40 percent alien workers, he needed about 10.25 pickers per acre. However, a grower with no alien pickers who had 200 acres needed about 4 pickers per acre to harvest the crop; with 40 percent aliens, he needed only 2.5 pickers per acre.

The comparative advantage for type of worker on productivity can be assessed by looking at the ratio of pounds harvested for different pairs of worker types. The ratios, multiplied by 100, are given in Table 3. For instance, if one wished to learn the relative advantage of hiring undocumented aliens, compared to other types of

^{1/} Minimum values for pickers per acre and number of acres harvested are 0.65 and 1.0 respectively. Values below those minimums are inappropriate for evaluation of the graph.

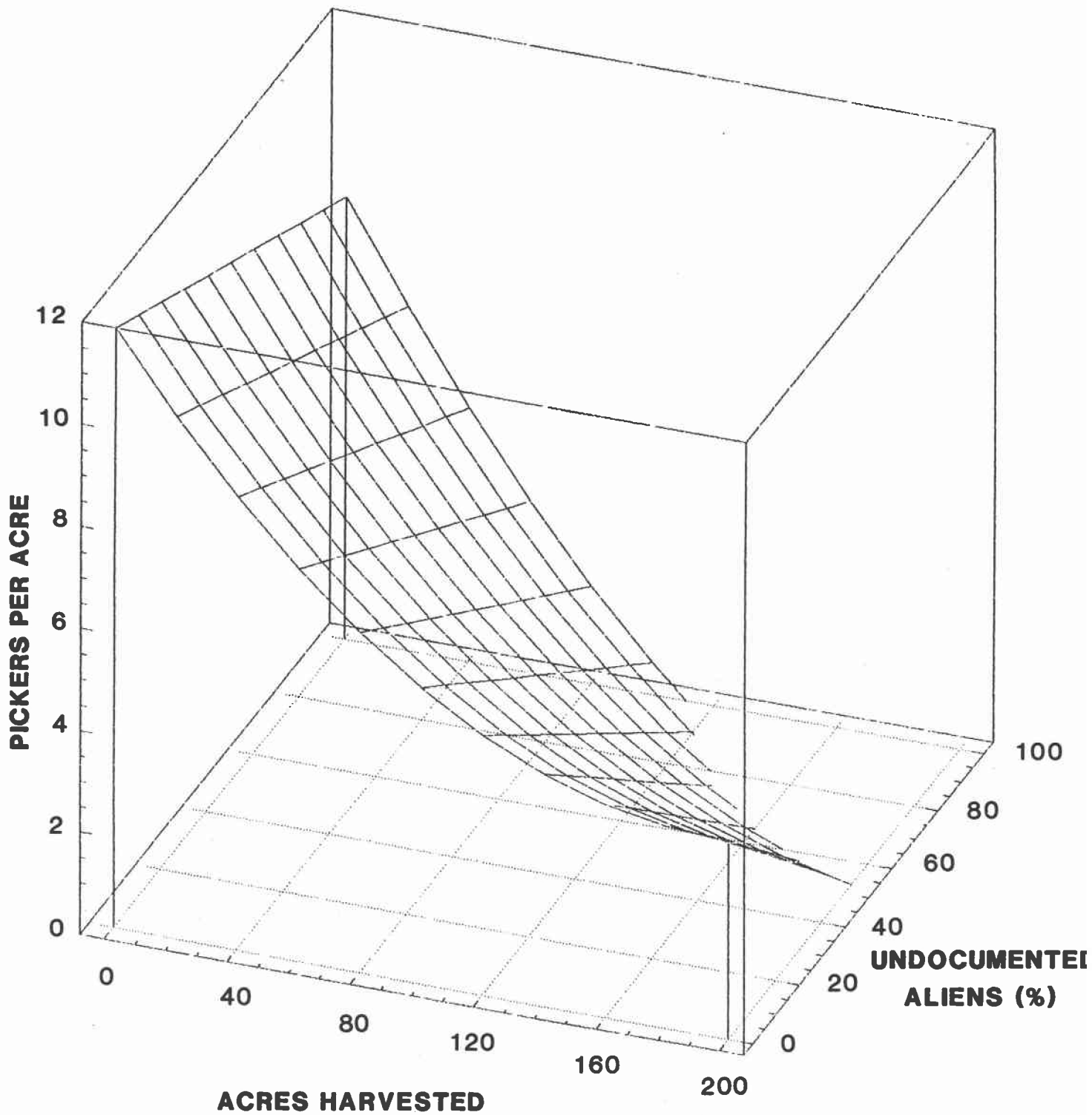


Figure 1. Effect of farm size and percent aliens on productivity of the work force that harvested the 1987 strawberry crop.

workers, one would divide the productivity value of each type of worker in Table 2 into the productivity value for undocumented aliens. The ratios show the relative advantage of undocumented aliens over other types of workers. If we wanted to compare the advantage of legal migrants to other types of workers, we would divide the values for other workers into that for legal migrants, and so on. The comparative advantaged for each combination of farm workers is presented in Table 3.

Table 3. Productivity ratios (X 100) for types of farm workers (read down)

Type of worker hired	Type of worker replaced			
	Locals 12-16 yrs. old	Locals over 16 yrs. old	Legal migrants	Undoc. aliens
Locals 12-16 years old . . .	100	194	228	277
Locals over 16 years old .	52	100	117	143
Legal migrants .	44	85	100	122
Undocumented aliens	36	70	82	100

Reading down the right-hand column of the table allows one to estimate the number of workers required to replace undocumented aliens if shortages occur for that work group in 1988. For example, 277 locals 12 to 16 years old would be required to replace 100 aliens, 143 locals over 16 years old would be needed to replace 100 alien workers, and 122 legal migrants would be needed to do the work of 100 aliens.

The values reported in Table 3 are our best estimate for adjusting the total number of pickers that are required to harvest the 1988 strawberry crop. They show that, compared to the proportions employed in 1987, replacing aliens with different types of farm workers will increase the number of pickers needed to harvest the crop. Replacing them with 12 to 16 year old pickers will drive up numbers the most, while replacement with legal migrants will increase numbers the least. If growers are faced with another 90-million-plus-pound harvest in 1988, the number of pickers could range from 67,000, if all were 12 to 16 years old, to only 24,000, if all were aliens.

Reasons for differences in productivity

One can argue that the higher productivity of aliens is due to their greater staying power in the field, working for one grower until the harvest has been completed. Worker turnover does increase the number of pickers required to harvest the crop for any one grower (see Appendix C). An alternative explanation holds that aliens are faster pickers who are motivated to pick more berries than domestic farm workers. Their perseverance in staying with one grower throughout the harvest certainly contributes to greater productivity per worker, but better performance regardless of staying power can be a reason too. Workers are paid according to the number of pounds picked, with rates established so that migrants are guaranteed a minimum wage.

We have data that allow us to test the persistence and the performance arguments. We cross-tabulated the data in Question 7d (percentage of each grower's work force that stayed two weeks or more) with Question 8 (percentage of labor force by type of worker). The results are graphed in Figure 2 (next page).

Bars for the percentage of pickers who worked two weeks or more for any one grower--the time required to pick most of the berries for the season--are divided into three groups: no aliens, less than 70 percent aliens, and 70 percent or more aliens. Bars are shown for the percentage of pickers who had worked two weeks or more. They range from less than 20 percent to 80 percent or more of the work force, as shown along the bottom of the graph.

Look at the first bar at the left of the graph, the one for growers who reported that less than 20 percent of their labor force had worked the full season for them. About 33 percent of the growers reported a work force of 70 percent or more aliens and 29 percent reported no aliens. Now, look at the bar at the right of the graph, the one for growers who reported that 80 percent or more of their labor force had worked for them the full season. Six out of ten growers in that group had a work force composed of 70 percent or more aliens and 37 percent reported no aliens.

Considering only the growers in the two contrast groups, Table 4 reports the productivity averages (as pounds harvested per picker) between the percent who worked the

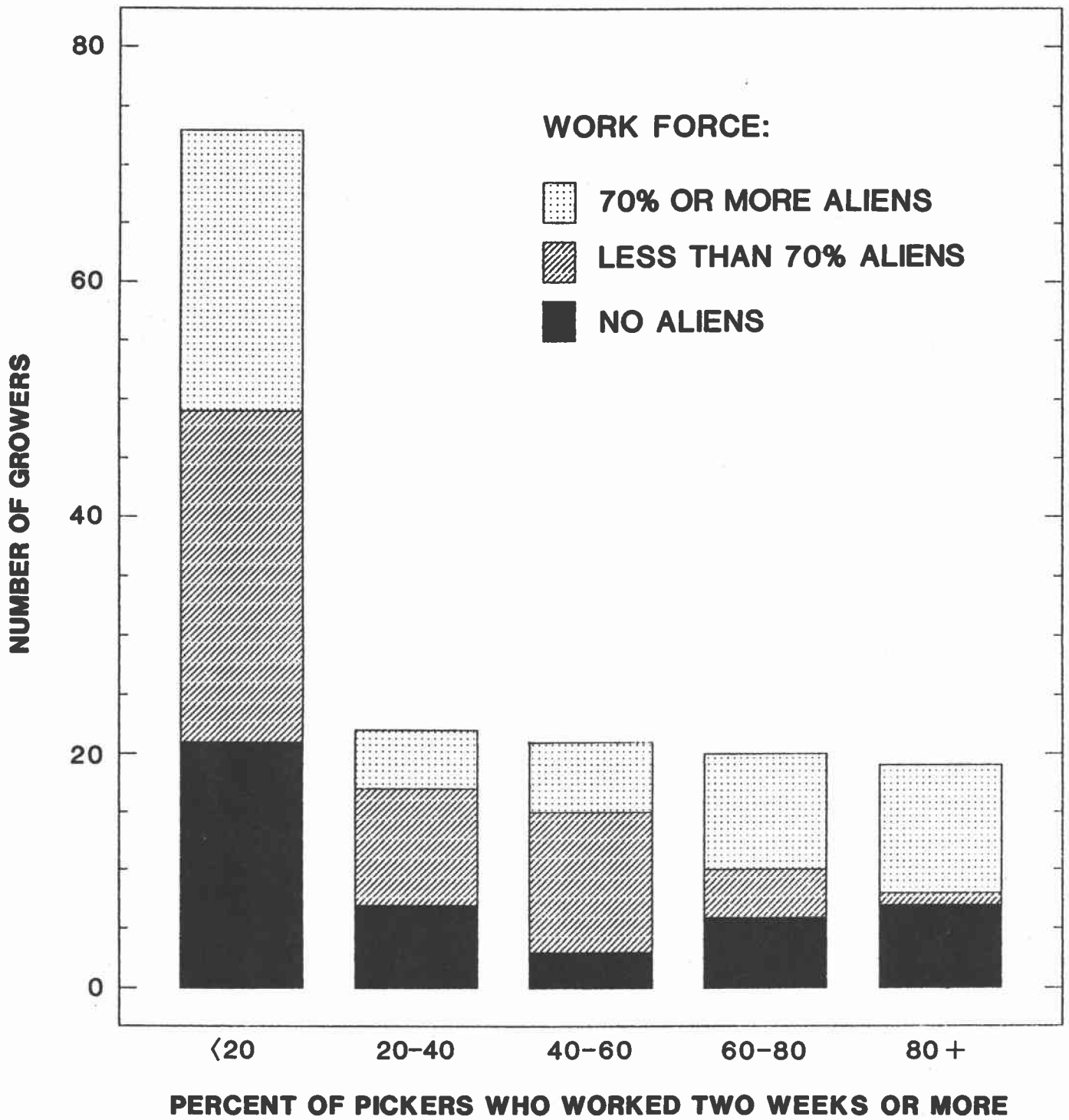


Figure 2. Number of growers whose pickers worked two or more weeks.

full season and who worked less than 20 percent on one farm. Productivity values for alien and non-alien work groups are reported as well.

Table 4. Productivity values for time worked at one farm and for alien and non-alien workers

Comparison	Average number of pounds harvested per picker	Number of growers reporting
Eighty percent or more of the work force that harvested the full season on one farm	4,016	(18)
Less than 20 percent of the work force that harvested the full season on one farm	1,645	(45)
Work force 70 percent or more aliens	3,088	(35)
No aliens in work force	1,347	(28)

It should come as no surprise that workers who pick the full season on one farm harvest more fruit than pickers who work only part of the season. The difference, 2,371 pounds of berries per worker, is statistically significant. The 1,741-pound difference between alien and domestic workers also is statistically significant. Picking the full season (rather than part of the season) contributes slightly more to productivity differences than one's alien/non-alien status. Controlling for the amount of time a worker spends on a farm shows that alien/non-alien differences persist regardless of how long a person picks fruit on one farm. The comparisons are reported in Table 5.

Table 5. Productivity comparisons for different work groups

Comparison	Average number of pounds harvested per picker	Number of growers reporting
Eighty percent or more of the work force that harvested the full season on one farm:		
Work force 70 percent or more aliens	4,671	(11)
No aliens in work force	2,938	(7)
Less than 20 percent of the work force that harvested the full season on one farm:		
Work force 70 percent or more aliens	2,359	(24)
No aliens in work force	852	(21)

Clearly, aliens who work the full season on one farm are the most productive workers. They not only pick more than non-aliens who also work the full season, but they are more productive than aliens who do not work for one grower the full season. Workers who move from farm to farm may be as productive as those who complete the harvest on one farm, but we have no information to test that possibility.

1988 harvesting and planting intentions

We estimate that growers will harvest 7,347 acres of strawberries in 1988, down nearly 7 percent from the 7,830 acres the Oregon Agricultural Statistics Service has

estimated for the 1987 crop. Worries over an adequate supply of farm labor are uppermost in the minds of growers who responded to the questionnaire. For instance, nearly 80 percent of the growers interviewed gave that reason as their major concern about the 1988 harvest. Another 12 percent cited worries over the reliability and quality of workers. Twenty-nine percent said the price for the 1988 crop was uppermost in their minds and 28 percent cited Immigration and Naturalization Service (INS) red tape and uncertainty over the effect of the new Immigration Reform and Control Act (IRCA). Clearly, worries over an adequate supply of farm labor are uppermost in the minds of growers who responded to the questionnaire.

Concerns over future labor supplies directly affect planting intentions for 1988. About a third of the acreage must be re-planted each year. Plantings for 1988 should be near 2,610 acres if 1987 acreage levels are to continue. Planting intentions, however, are down considerably from that figure. Growers say they intend to plant only 937 acres this year and are uncertain about planting an additional 400 acres. If these intentions are translated into action this spring, we can expect major decreases in the state's strawberry acreage in 1989.

Summary

This study of labor productivity sought to estimate the farm labor needs of Oregon strawberry growers for the 1988 harvest. Through a mail survey of all known growers in the state, questions were asked concerning the number of 1987 acres in production, total pounds of berries harvested and left unharvested, estimated number of picker-days required to harvest the crop, the age and legal status of each farmer's work force, housing, and planting and harvesting intentions for 1988.

The results show that growers will need an estimated 36,662 workers to harvest the 1988 strawberry crop. That value assumes berry production per acre is close to that achieved in 1987 and that the labor force is composed of the same proportion of age and legal status groupings that were reported for the 1987 harvest.

Undocumented aliens made up 44 percent of the work force in 1987 and they picked an estimated 65 percent of the 93.6-million-pound crop. A comparative analysis among types of pickers shows that replacing aliens with different types of farm workers will drive up the number of pickers required to harvest the 1988 crop. A total of 277 locals 12 to 16 years old would be needed to do the work of 100 alien pickers. About 144 locals over 16 years old would be required to replace 100 alien workers. And, 122 legal migrants would be needed to replace 100 aliens. If growers

are faced with another 90-million-plus-pound harvest in 1988, the number of pickers could range from 67,000, if all were 12 to 16 years old, to only 24,000, if all were aliens.

High worker productivity is associated with the percentage of the work force that stays with one grower throughout the harvest season and with the percentage of undocumented aliens in the work force. Aliens who work the full season on one farm are the most productive of all types of farm workers. They not only pick more than non-aliens who also work the full season, but they are more productive than aliens who do not pick the full season on one farm.

Growers will harvest an estimated 7,347 acres in 1988, down nearly 7 percent from the 7,830 acres they harvested in 1987. Uncertainty over the 1988 labor supply plays a role in determining acreage reductions. For instance, nearly 80 percent of the growers interviewed mentioned availability of pickers as their chief concern for the 1988 harvest and another 12 percent cited worries over the reliability and quality of this year's work force. Twenty-nine percent said the price paid for the 1988 crop was uppermost in their minds.

Concerns over future labor supplies directly affect planting intentions for 1988. About a third of the acreage must be re-planted each year. Planting intentions for 1988 are down considerably from the 2,610 acres

required if 1987 acreage levels are to continue. Growers say they intend to plant only 937 acres in 1988 and are uncertain about planting an additional 400 acres. If these intentions are carried out this spring, we can expect major decreases in the state's 1989 strawberry acreage.

APPENDIX A. Descriptive statistics for strawberry grower survey

1. Did you harvest any strawberries in 1987? (Circle one number)

<u>N</u>	<u>PERCENT</u>	
(183)	100%	YES
(0)	0%	NO (Please skip now to Question 11)

2. About how many acres of strawberries did you raise in 1987?

MIN = 1	MAX = 450
MEAN = 29.45	SUM = 5,390
(N = 183)	

3. Approximately how many of pounds of strawberries did you harvest in 1987?

MIN = 3,000	MAX = 6,500,000
MEAN = 332,169.6	SUM = 60,122,700
(N = 181)	

4. And, approximately how many pounds of strawberries would you estimate were left in the field unharvested?

MIN = 0	MAX = 900,000
MEAN = 78,963.69	SUM = 14,134,500
(N = 179)	

5. What was the average number of pickers in the field per harvest day? Just your best estimate, please.

MIN = 3	MAX = 1,200
MEAN = 71.96	SUM = 13,025
(N = 181)	

6. And, how many days, altogether, did it take to harvest your crop?

MIN = 2	MAX = 45
MEAN = 21.10	SUM = 3,819
(N = 181)	

7. Considering all your pickers, about what percent would you estimate worked for each of the time periods listed below? (Fill in the percent for each category. If "none," please write 0.)

	<u>MEAN</u>	<u>(N)</u>
a. Percent who worked three days or less . . .	<u>24.8%</u>	(178)
b. Percent who worked four days to one week .	<u>21.4%</u>	(178)
c. Percent who worked from one to two weeks .	<u>22.0%</u>	(178)
d. Percent who worked over two weeks	<u>33.1%</u>	(178)

(PLEASE CONTINUE ON THE BACK)

8. And, about what percent of your workers were from each of the following groups? (Fill in your best estimate for each category. If "none," please write 0.)

	<u>MEAN</u>	<u>(N)</u>
a. Local workers between ages 12 to 16 . . .	20.8%	(180)
b. Local workers over 16 years of age . . .	19.7%	(180)
c. Legal migrant farm workers	18.9%	(175)
d. Undocumented aliens	39.9%	(175)

9. Did you provide any housing for strawberry pickers during 1987?

<u>N</u>	<u>PCT.</u>	
(149)	81.9	NO
(33)	18.1	YES

9a. How many singles (individuals), if any, did you house? (If "none," please write 0.)

MIN = 0 MAX = 590 MEAN = 75.0 SUM = 2,475 (N = 33)

9b. And, about how many picking-age family members, if any, did you house? (If "none," please write 0.)

MIN = 0 MAX = 50 MEAN = 12.09 SUM = 387 (N = 32)

10. Would you give us your best estimate of the total number of individual pickers who worked your strawberry fields during the 1987 harvest?

MIN = 4 MAX = 6,000 MEAN = 327.19 SUM = 55,295 (N = 169)

10a. How certain are you of this estimate -- very certain, somewhat certain, or not too certain?

<u>(N)</u>	<u>PCT.</u>	
(69)	37.3	1 VERY CERTAIN
(73)	44.0	2 SOMEWHAT UNCERTAIN
(18)	10.8	3 NOT TOO CERTAIN
(13)	7.8	4 UNABLE TO ESTIMATE

11. How many acres of strawberries, if any, are you planting in the spring of 1988?

MIN = 0 MAX = 50 MEAN = 4.54 SUM = 800 (N = 176)

12. And, about how many acres of strawberries, if any, do you intend to harvest in the 1988 season?

MIN = 0 MAX = 450 MEAN = 28.90 SUM = 5,231 (N = 181)

13. Finally, what are your major concerns for the 1988 harvest?

<u>PERCENT</u>	<u>CONCERN</u>
79.6	AVAILABILITY OF PICKERS
29.0	PRICE FOR THE CROP
28.4	INS RED TAPE/NEW LAWS
12.3	RELIABILITY/QUALITY OF PICKERS
11.7	COST OF HARVEST/HIGH WAGES
8.6	ENVIRONMENT/YIELD/WEATHER/DISEASE
2.6	HOUSING PROBLEMS
1.2	CAPITAL COSTS/OTHER EXPENSES
0.6	PROMOTION OF STRAWBERRIES/NEED FOR NEW VARIETIES
<u>174.0</u>	(N = 162)

APPENDIX B. Summary of completion rates

Names and addresses of all known strawberry growers in the state were provided by the Oregon Strawberry Commission and the Oregon Department of Labor. Duplicate names were deleted. A total of 535 names remained for contact. An eligible respondent was defined as a grower who had harvested at least one acre of strawberries for processing in 1987. Three waves of mail questionnaires and one face-to-face contact by industry field representatives were made between December 2, 1987, and February 1, 1988.

Results of the mailings and contact were:

Returned	183
No berries harvested in 1987	32
Undeliverable	19
Out of business	14
Duplicate farms	11
Fresh market only	5
Less than one acre of strawberries harvested	5
Experimental farm	1
Not returned	<u>265</u>
TOTAL	535

An adjusted completion rate of 41 percent was achieved, after non-growers and other ineligible were subtracted from the base. The 183 growers who returned their questionnaires represented 69 percent of the 1987 strawberry acreage.

A random subsample of 60 names and addresses was drawn from the group that had not responded. A follow-up telephone interview was completed to determine if they met our definition of an eligible grower. A total of 23 were eligible growers, 38 percent of the subsample. An adjusted completion rate, based on the results of the telephone interviews, increased our completion rate to 65 percent, and the acreage representation to 88 percent. This is quite good, considering the sensitive nature of the study. Only information about the number of acres harvested in 1987 and 1988 planting and harvesting intentions were sought in the telephone interview. Those data were combined with results of our mail questionnaire to estimate planting and harvesting intentions for 1988.

A comparison of population estimates with and without information from the subsample of non-respondents provides an insight into the magnitude and direction of non-response bias, or error, in the data. Projections for the number of acres harvested in 1988 would have been overestimated by about 2 percent and planting intentions by about 20 percent if non-respondents had not been interviewed. The 2 percent overestimation seems trivial but the 20 percent value is more serious. We have no other information to assess the non-response error of other measures.

APPENDIX: C. Measurement of the size and productivity of the work force and the weighting of data

Measures of the work force are not straightforward and explanations are needed to understand them. Different statistical approaches were employed to measure different characteristics and they are described in the following sections.

Size of the work force

Size of the work force is measured by the division of two products. They are Worker-Days, determined by multiplying the value each grower reported for Question 5 and Question 6, and the adjusted number of days required to harvest the crop, determined by multiplying the midpoint of the days picked (Question 7a...7d)^{2/} by the proportion of the work force the grower reported for each time period in Question 7. The four products (Q7a...Q7d) are summed to estimate the adjusted total days required to harvest the crop. That value is divided into the number of Worker-Days the grower reported. The resulting quotient is the total number of pickers employed to harvest a grower's 1987 strawberry crop. Each grower's total was multiplied by the work-group proportions (Locals, 12-16, etc.) reported in Question 8a-d. The results, summed for all growers who responded, are presented in Table 1, page 2.

Productivity of the work force

Dividing the pounds harvested (Question 3) by the number of workers who harvested the crop gives the average pounds harvested per picker. Sorting by type of worker (Question 8a...8d) does not allow one to estimate productivity by type of worker, since pounds harvested for the farm are not segregated by worker type. In order to estimate productivity by type of worker, we considered only those growers who reported that 50 percent or more of their crop was harvested by one type of picker (locals 12 to 16 year old, locals over 16 years, legal migrants, or undocumented aliens). This stratified sample represented 81 percent of the total work force, 80 percent of the acres harvested, and 77 percent of the 152 growers whose responses were used in the analysis.

Regression equations were of the form:

$$Y = a + b_1 (\text{acres}) + b_2 (Q8_i) + b_3 (Q8_i)^2 + e,$$

where Y is the number of pounds harvested for the farm,
a and b are constants or regression coefficients,
Acres are the number of acres harvested for the farm,
Q8_i is the linear and quadratic forms of the number
of workers who are classified as Local 12's, etc.,
and

^{2/}Midpoints employed were: for Q7a, 2; for 7b, 5.5; for 7c, 10.5; and for 7d, ((Q6-15)/2) + 15.

e is error, assumed to be normally and independently distributed with mean equal to zero and constant, finite variance, σ^2 .

Regression coefficients were estimated for four equations, one for each type of worker. The equations were solved at the acre and number of worker means. Adjusted R² values ranged from .98 to .93. The results are productivity by type of worker adjusted for acres harvested. Productivity values are divided by the mean number of workers to obtain the average number of pounds of strawberries harvested per worker during the 1987 harvest season. The results are reported in Table 2, page 3.

The estimates reported may be contaminated by the contribution of other types of workers, since only 50 percent or more of the workers picking the crop was the criterion established to sort the sample. We examined the possibility of confounding from other types of workers by reviewing their frequency in each group selected for analysis. The results are reported in Appendix Table C1.

APPENDIX TABLE C1. Distribution of worker types in each 50%> sample strata

Type of worker in sample	Workers selected by group			
	50%> Locals 12-16 years old	50%> Locals over 16 years	50%> Legal migrants	50%> Undoc. aliens
	%	%	%	%
Locals 12-16 years old.	70	18	3	4
Locals over 16 years. .	24	67	6	6
Legal migrants	1	7	89	11
Aliens	<u>5</u>	<u>7</u>	<u>2</u>	<u>79</u>
Total	100	100	100	100
(Number of workers)	(6,158)	(1,922)	(1,373)	(10,314)
(Number of growers reporting)	(22)	(16)	(15)	(64)

Workers representing the "pure" type of their respective groups were well above the 50 percent cutoff, as shown by the appropriate elements in Appendix Table C1. Values ranged from 67 percent for locals over 16 years old to 89 percent for legal migrants. Some contamination, and therefore error, is observed for each worker-group. For example, looking down the 50%> 12-16 year-old column in Table C1, 70 percent of the sample is 12 to 16 years old, the "pure" type sought, 24 percent locals over 16, 1 percent legal migrants, and 5 percent aliens. The magnitude and direction of error from those who are not in the 12-to 16-year old group is difficult to estimate and suggests caution in the interpretation of differences in worker productivity. A controlled experiment, in which the productivity for each type of worker is observed directly, is suggested to achieve a higher level of error-free information.

Weighting the data

In any survey, responses can vary by respondent memory, recall ability, and other sources of inaccuracy. Our data set is likely to range from fairly accurate values that are based on record-keeping to guesses that are subject to a host of biases and recall error. For instance, the estimate of undocumented aliens can be an imperfect perception that is subject to error.

The data were adjusted for the certainty in which growers believed they were reporting accurate information. The frequency of responses is reported in Question 10a, Appendix A. Even though the responses applied directly to Question 10, they provide critical information for weighting the data. A "very certain" response was scored "3," "somewhat uncertain," "2," "not too certain," "1," and "unable to estimate" a "0." The weights were scaled so the sample size remained unchanged and applied to the data.

Weighted and unweighted estimates were compared to the 93.6 million pound production estimate of the Oregon Agricultural Statistics Service for the 1987 crop. Our weighted estimate is 92.8 million pounds harvested. The unweighted estimate is 87.4 million pounds. Given the greater agreement for the weighted estimate, weighted data were used for estimation purposes in the analysis.

The number of cases for the weighted analysis is 152. Nearly 30 cases were dropped because of missing information on one or more variables. The specific statistics and the calculation of the number of pickers estimated to harvest the 1988 crop are shown in Appendix Table C2.

APPENDIX TABLE C2. Summary of Weighted Estimates of Strawberry Pickers

A. Results based on the number of usable returns (N = 152)

1. Sample total pickers in 1987 (from Q5, Q6, Q7):	24,527.813	
2. Sample total acres harvested in 1987 (Q2):	4,913.600	
3. Pickers per acre	$\frac{24,527.813}{4,913.600}$	= 4.992
4. Sample number of legal pickers in 1987:	13,816.620	} from Q8
5. Sample number of undocumented pickers in 1987:	10,911.194	} and A1 above
6. Proportion of undocumented workers in 1987:	$\frac{10,911.194}{24,527.813}$	= .4448
7. Acres for 1988 (from Q12):	4,708.234	
Pickers per acre:	$\times 4.992$	
Pickers for 1988:	23,503.5	
Proportion undocumented pickers	$\times .4448$	
9. Number of undocumented pickers for 1988:	10,454.4	

B. Our sample, covering 4,913.600 acres, represents 62.7% of the total 7,830 acres harvested in 1987. Using this percentage, we can make estimates about the total population of pickers.

10. Total pickers in 1987:	$24,527.813 \div 62.7\%$	= 39,119.3
11. Total undocumented pickers for 1987:	$39,119.3 \times .4448$	= 17,400.3
12. Acres for 1988 (Q12):	$4,708.234 \div 62.7\%$	= 7,509.1
13. Less 1988 acres for non-respondents: ^{3/}		- 183.7
14. Additional 1988 acres:		+ 21.7
15. Total acres for 1988:		7,347.1
Pickers per acre	$\times 4.99$	
16. Total pickers for 1988:		36,662.0

^{3/} From a telephone survey of a random sample of 60 non-respondents. A total of 23 had raised strawberries in 1987. The remainder had not raised strawberries in 1987, nor were they planning to raise any in 1988.