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Job Quality in Logging and Forestry Services in Oregon

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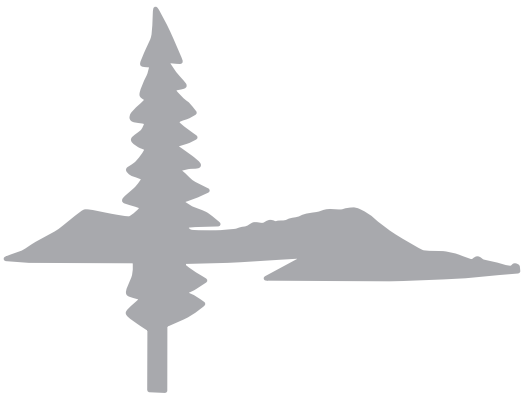

Institute for a Sustainable Environment

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Introduction

The American rural economy was long dependent on agriculture, natural resource extraction, and manufacturing for its well-being. In recent decades, however, these sectors of the economy have suffered considerable decline. In addition, society as a whole has become less comfortable with the notion of resource extraction, especially from public lands, as an engine for rural economic growth. Unwilling or unable to become solely tourist-based economies, some communities have begun to pursue conservation-based development. In public lands communities this has often meant working at forest and watershed restoration as an alternative to large-scale timber extraction. The hope has been that by pursuing forest and watershed restoration, rural communities can continue to work on the land and create jobs that are of equal or greater quality than those they had harvesting timber. If forest restoration is to replace or supplement logging as an economic development opportunity for rural communities, it is important to understand how job quality in forest restoration compares to job quality in logging.

Some restoration jobs are similar to the traditional logging and road construction activities that paid relatively high wages. For example, tree plantation restoration can involve logging of medium-sized trees. Stream restoration and road decommissioning activities that involve heavy equipment are, in many ways, similar to road construction in skill and equipment requirements. Restoration activities that involve these kinds of skills and equipment might offer job quality that is similar to their predecessors. Other activities, especially labor-intensive activities, such as small diameter, precommercial tree thinning, tree planting, brush clearing, and the like, are potentially more troublesome. These activities are similar to traditional reforestation activities that have a long history of providing low wages and poor job quality (Bowman and Campopesco 1993; Knudson 2005; Mackie 1990).

This working paper compares the job quality of logging and forestry services, which represent one segment of the forest restoration industry. The forestry services sector includes much of the labor-intensive and some of the technical work associated with forest restoration. Unfortunately, there is no clearly defined standard industrial code or other categorization that can be used to identify equipment-intensive restoration companies and jobs, such as road or stream restoration.

Job quality can be measured in numerous ways. Some studies have focused on subjective measures, such as interesting work and independence, whereas other studies focus on objective measures, such as wages, opportunity for advancement, or job durability—the extent to which a job lasts over time and provides a reliable source of employment (Doeringer and Piore 1970; International Labor Organization n.d.; Kalleberg, Reskin, and Hudson 2000). Among advocates of forest restoration as an economic development opportunity, the focus has been on wages and benefits, job durability, training, opportunity for advancement, and the ability to work close to home (Ecosystem Workforce Program 2003). The hope has been that a restoration industry would create career opportunities that would provide consistent living-wage income in forest communities.

This study uses the Unemployment Insurance (UI) data from the Oregon Employment Department to examine two job quality measures—wages and job durability. The reasons for focusing on wages are fairly straightforward—people need jobs that pay enough to enable them to support themselves and their families. Simply understanding wages is not enough, however. Even if hourly wages are relatively high, if employment is highly erratic or seasonal, workers may find that their actual income is low or that they expend considerable resources hunting for new work or waiting to be called for jobs that they do have. Evaluating wages is also relatively straightforward—we can consider wages per unit of time, such as the hour, quarter, or year.

In contrast, job durability is a more complex concept. We can readily imagine a durable job—one that provides reliable full-time, year-around employment, year after year. People might come and go from jobs and from the industry because of personal circumstances or shifts in particular companies. But, there are a number of different ways that a sector could provide jobs with low durability. A job might be seasonal, involving work only part of the year. It might be part time. A job might be full time, but the industry may be structured so that people tend to leave the industry after only short periods. Also, jobs may be irregular enough that people change employers frequently. People may work frequently in other sectors to make up for irregular employment. Literature about the forest restoration industry suggests that job durability in logging and forestry services may well face one or more of these challenges (Brown and Martín-Hernández 2000; Freudenburg and Gramling 1994; Mann 2001; Moseley 2006).

Methods

Data

This study examines employees and employers in the sectors of forestry services and logging to understand the potential and progress of using forest and watershed restoration as an economic development strategy. To reach conclusions about the sector, we examined unemployment insurance (UI) wage file data from the Oregon Employment Department that covers workers in the woods.

Unemployment insurance wage file data come from employer-reported payroll figures for all employees who are covered by the federal unemployment insurance program. It is estimated that the dataset contains information on more than 90 percent of all employment in Oregon but does not include the wages of the self-employed, sole proprietors, family workers, or people working in the informal economy who are paid "under the table" (Ackerson and Ayre, 2004).

The UI wage file provides information on each individual's wages earned and the number of hours worked each quarter for a specific firm. Each quarter, employers covered by UI in Oregon submit reports that provide hours worked and wages earned for each worker employed by the firm during the quarter. The Oregon Employment Department staff assigns an industry and county code to each employer. Firms with separate establishments in multiple counties are assigned a unique county code. Using these data, it is possible to track each individual's work history over time and by area, including industry of employment, hours worked, number of employers, and earnings.

This study compares logging and forestry services—two industrial sectors that have been assigned Standard Industrial Codes (SIC) and therefore can be examined in detail using the wage file data. Logging (SIC 2411) includes employees and employers who are "primarily engaged in cutting timber and in producing rough, round, hewn, or riven primary forest or wood raw materials, or in producing wood chips in the field" (U.S. Department of Labor Occupational Safety and Health Administration). Forestry services (SIC 0851) include workers and businesses that are "primarily engaged in performing, on a contract or fee basis, services related to timber production, wood technology, forestry economics and marketing, and other forestry services, not elsewhere classified, such as cruising timber, firefighting, and reforestation" (U.S. Department of Labor Occupational Safety and Health Administration). Typically, this includes activities such as thinning, tree planting, wildland fire suppression, brushing, and other labor-intensive activities. In addition, small amounts of more technical activities, such as native grass seed collection and the like seem included in this SIC. Unfortunately, this category does not include many of the equipment-intensive activities associated with forest management. We attempted to identify another industrial work code that would capture the companies that perform heavy-equipment restoration work but could not identify a code where this type of company tended to congregate.

The study considers wages earned hourly, quarterly, and annually, for each worker employed in forestry services (SIC 0851) or logging (SIC 2411). Wages are tracked both within and outside of forestry services and logging. Finally, the study considers the number of firms in each industry.

The forestry services sector has a history of employing undocumented workers (Bowman and Campopesco 1993; Knudson 2005; United States Congress House 1993). Although many undocumented workers may provide a social security number to their employers and therefore are likely to be included in the data, forestry services data are likely to be less reliable than logging data, where the use of undocumented workers seems to be less common. For this reason, records for workers who had huge total hours or annual wages were eliminated from the dataset because, in a sector with undocumented workers, it was likely that these were multiple workers using a single social security number. In addition, firms that participate in the forestry services sector in Oregon also have a history of underreporting payroll. In the 1990s, there were a number of cases in which companies were caught underreporting payroll figures (Anonymous 1989; Associated Press 1993; Detzel 1989; Robertson 1989, 1990, 1990).It is unclear to what extent this was a problem during our study period, but data may underreport both employees and payroll by an unknown amount.

Scope

This study compares loggers (SIC 2411) and forestry services workers (SIC 0851) in Oregon in 1997, 1999, 2001, and 2003. However, we found that patterns were quite similar across years. Often, reporting data for all years created incomprehensible tables and figures. When this was the case, we reported only 2003 results, even though all years were analyzed. UI data are reported quarterly as well as annually. Quarters are three months of the calendar year with January, February, and March constituting the first quarter.

For confidentiality reasons, we could not evaluate differences in areas as small as counties. However, to get a sense of differences across the state, we divided the state into east and west with the divide along the

county boundaries closest to the crest of the Cascade Mountains. These regions were chosen because of the ecological divide along the Cascade crest.[1] Approximately one-third of the state is in western Oregon but contains the majority of the state's population. Ecologically, western Oregon is temperate, wet, and largely forested, whereas eastern Oregon is arid, forested only at higher elevations, and contains only a small fraction of Oregon's population.

Measures

As suggested above, we evaluated wages and durability. In addition, to understand the general health of the two sectors, we also considered employment and business trends.

To understand employment and business trends, we used published data to examine the number of employees and employers in each sector during the study period as well as trends since 1976. To evaluate wages, we considered annual wages, hourly wages, and regional differences among the wage categories. We also examined wages that workers may have earned outside of logging and forestry services. All dollar values were converted to 2002 dollars to adjust for inflation.

We measured employment durability in five ways—job turnover, outside employment, hours worked, seasonality, and retention. First, we considered how many different employers employees have. Second, we considered how frequently people work outside of logging and forestry services. To understand the role that logging and forestry services play in a worker's year-round employment strategies, we examined the extent to which loggers and forestry service workers work outside of their industry over the course of a year. We considered the types of employment they take outside of these sectors and how much money they earn outside of our target sectors, compared to the amount earned in logging and forestry services. Third, we compared how many hours people work each year. Fourth, we evaluated seasonality by considering how many quarters people work each year. Fifth, we evaluated retention to the sector by comparing the rate at which employees leave the sector over time. Retention is defined as appearing in a given SIC in 1997 and 2003. We placed attachment constraints on workers to ensure that people working in the early period were actually serious workers in the field rather than people who had simply worked in the sector for a few hours or weeks. An "attached worker" is someone who worked in both 1997 and 1999 or 2000 and 2003 and worked in a given SIC for at least two quarters, earning at least $1,000 in a specified forestry-related SIC, with greater than one-half of his total wages earned in a specified forestry-related SIC.

Results

Business and Employment Trends

Number of workers

The data showed more jobs in logging than in forestry services. However, employment opportunities declined in logging but increased in forestry services during the study period. This follows much longer-term trends of declining logging employment and increasing forestry services employment.

Annual total employment ranged from a low of 2,288 in 1997 to a high of 7,054 in 2003, whereas employment in logging ranged from a high of 13,279 in 1997 to low of 11,237 in 2001 (Table 1).

The published data show that, over the past 25 years, logging employment declined whereas employment in forestry services increased (Fig. 1). The average annual employment in the forestry services sector increased from 1,473 in 1976 to 5,037 in 2003, about a 30 percent increase over 27 years, or an average, annual increase of almost 1.1 percent. On the other hand, average employment in logging declined from 12,706 positions in 1976 to 7,576 positions in 2003, an almost 60 percent decline, or an average, annual decline of nearly 2 percent.

Table 1 - Total Number of Employees and Employers

	Period			
	1997	1999	2001	2003
Employees				
Logging	13,279	12,249	11,237	11,308
Forestry Services	7,574	8,080	9,917	12,110
Employers				
Logging	1,129	1,043	936	819
Forestry Services	276	274	264	261

Number of businesses

There are more logging companies than forestry services companies in Oregon. However, the number of logging companies has long been declining, whereas the number of forestry services companies has increased. Between 1976 and 2003, there was a 66 percent decline in the number of logging companies, an average, annual rate of decline of 2.2 percent. At the same time, there was a 45 percent increase in the number of forestry services companies, or an average, annual increase of 1.5 percent (Fig. 2). During the study period itself, the number of logging companies declined from a high of 1,129 in 1997 to a low of 819 in 2003. Although the

longer-term trend was toward increasing forestry service companies as a fraction of the two sectors studied. The number of forestry services companies declined slightly during the study period, from 276 in 1997 to 261 in 2003 (Table 1). This decline occurred even though employment in forestry services increased during the study period, suggesting a consolidation in the industry.

Size of businesses

Most companies in both logging and forestry services are quite small. In 2003, for example, 80 percent of logging firms and 62 percent of forestry services firms had fewer than 20 employees. Only 1 percent of logging firms had more than 100 people in 2003. Larger forestry services firms are more common, with 16 percent of businesses having more than 100 employees (Fig. 3).

Regional differences in companies and employees

Most logging and forestry services companies were located in western Oregon, and this is also where most employees worked. An average of 80 percent of logging employers were located in western Oregon, and they employed, on average, 83 percent of workers during the study. The trend was similar for forestry services—78 percent of forestry services companies were located in western Oregon and employed 78 percent of workers. Twenty percent of logging and 21 percent of forestry services firms were located in eastern Oregon. Eastern Oregon firms employed 16 percent of logging employees and 17 percent of forestry services employees (Table 2).

Although the concentration of both forestry services workers and loggers appears striking, it is important to note that, in 2001, 83 percent of Oregon's population is located in western Oregon—even excluding the Portland metropolitan area (Bradbury 2002). This suggests that there are proportionately more businesses and workers in eastern Oregon, compared to the population.

Wages

Wages—income earned working—is an important measure of job quality. This section considers hourly, quarterly, and annual wages. It finds that loggers typically earn considerably more than forestry services workers, although wages in both industries are often below the median annual wages for Oregon. For forestry services, wages are typically below the federal poverty level as well.

Hourly wages

The median hourly wage was consistently lower for forestry services than for logging. The inflation-adjusted, median hourly wage in forest services increased from $9.81 in 1997 to $11.31 in 2003. The median hourly wage for logging decreased from $16.49 in 1997 to $15.79 in 2003 (Table 3).

The distribution of hourly wages also shows that wages were consistently lower for forest services than for logging. In 2003, for example, nearly 60 percent of forestry services workers earned less than $12.50 per hour, whereas only 18 percent loggers earned less than $12.50 per hour. Similarly, 17 percent of loggers earned more than $24.50 an hour, whereas only 6 percent of forestry service workers did (Fig. 4).

Annual wages

As with hourly wages, both the average and median annual wages were considerably higher in logging than in forestry services. The average annual wage in forestry services ranged from $9,097 in 1997 to $9,243 in 2003. The median annual wage for forestry services ranged between $3,085 in 1997 and $4,258 in 2003. In contrast, the average wage for logging ranged between $20,529 in 1997 and $22,253 in 2003. The annual median ranged between $15,135 in 1997 and $17,410 in 2003 (Table 4)[2]. Annual wages were lower in eastern Oregon than in western Oregon for both logging and forestry services. In 2003, for example, the median wage in forest services in western Oregon was $9,459, whereas the median wage earned was $4,503. As with average and median wages,

Table 2 - Employers and Employees by Region, 2003

	Logging				Forestry Services			
	Employers		Employees		Employers		Employees	
	Number	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
Western Oregon	654	80%	9,437	84%	203	78%	9,548	78%
Eastern Oregon	164	20%	1,804	16%	56	21%	2,031	17%
Total	818	100%	11,241	100%	259	99%	11,579	95%

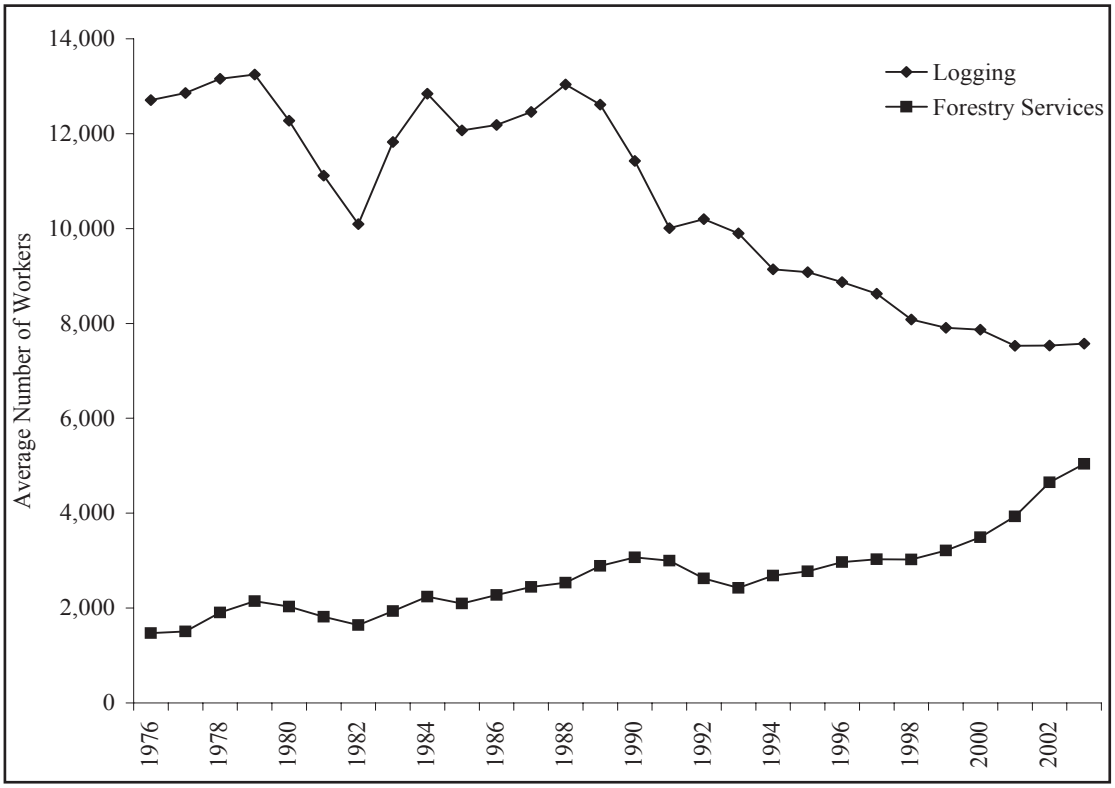

Figure 1 - Average Annual Employment, 1976-2005

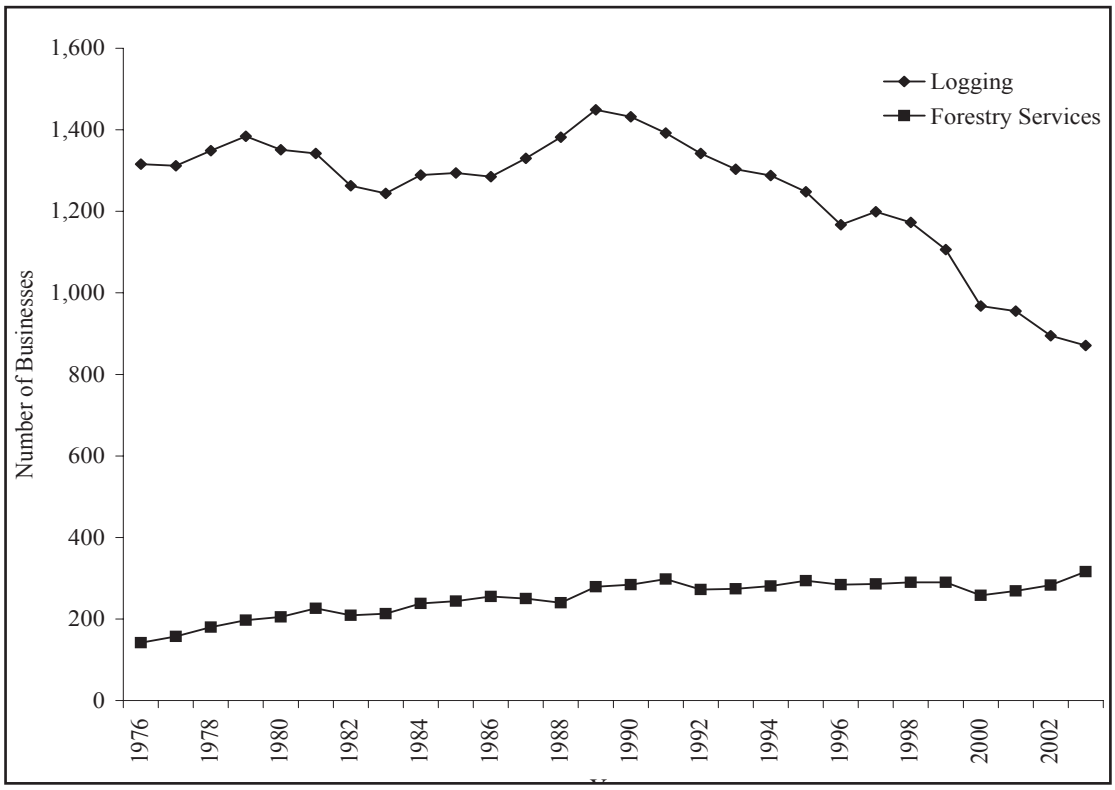

Figure 2 - Average Annual Business Units, 1976-2005

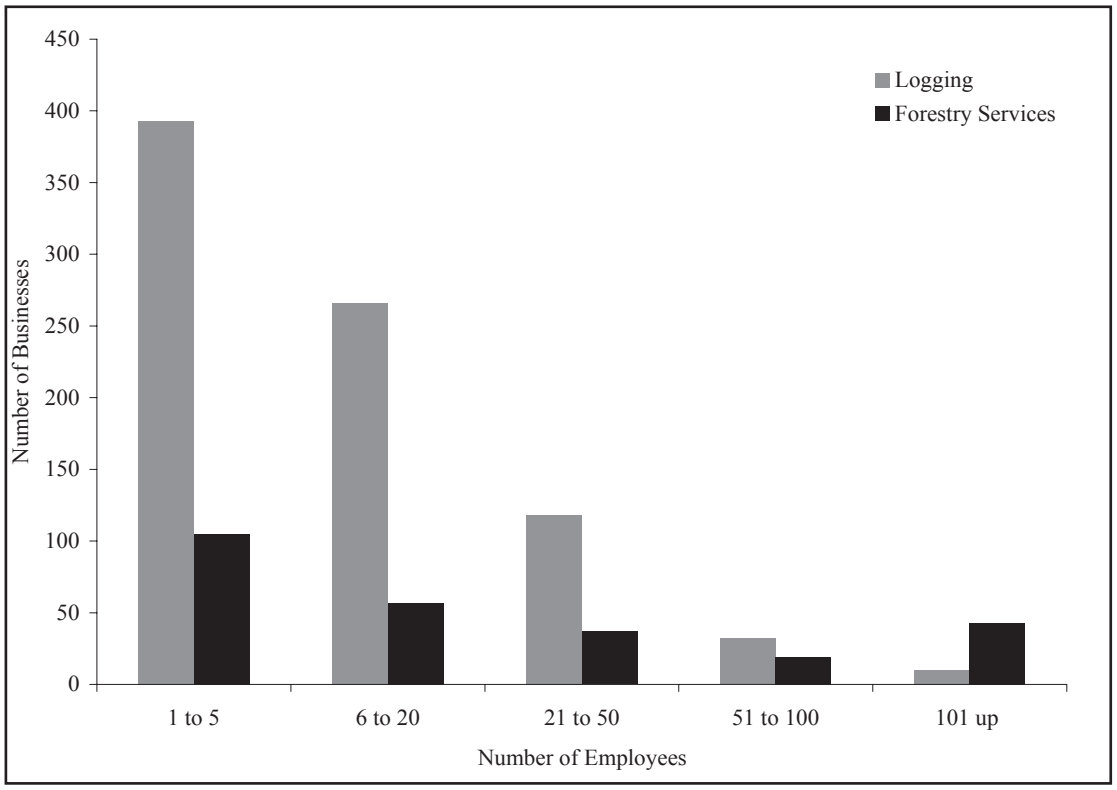

Figure 3 - Business Size by Number of Employees

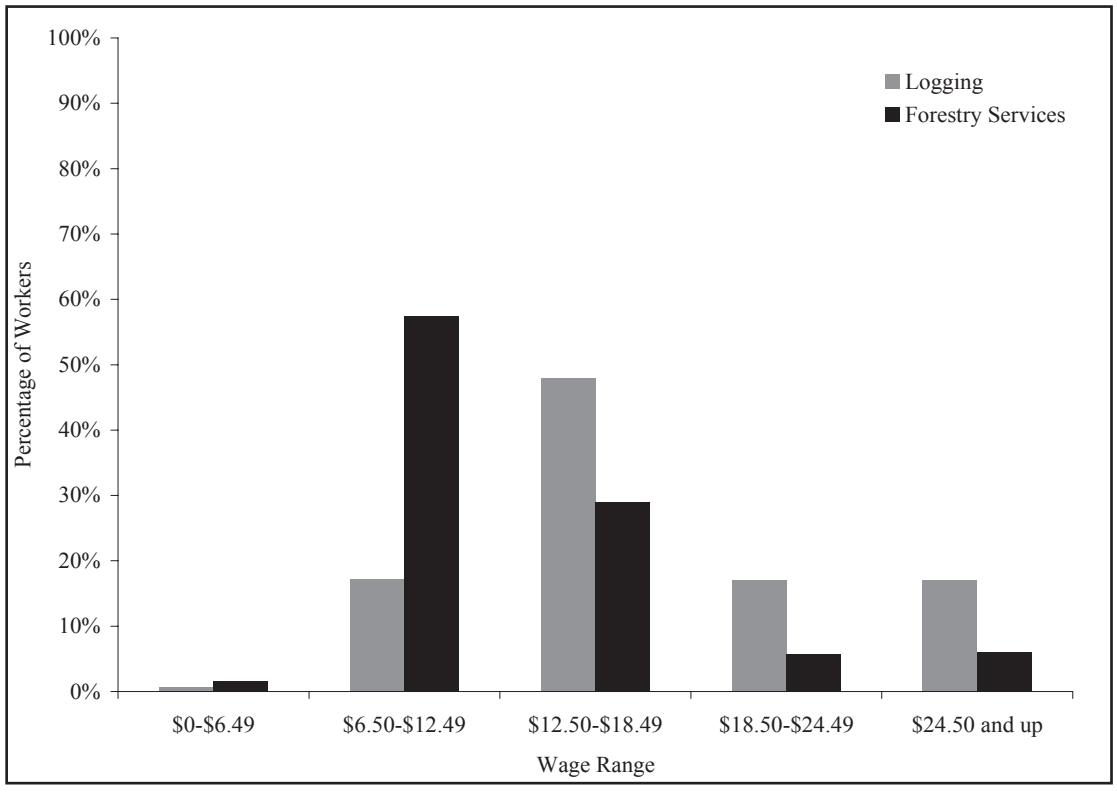

Figure 4 - Distribution of Hourly Wages, 2003

the distribution of annual wages also reveals a distinction between forestry services and logging. In 2003, 54 percent of forestry services workers earned less than $5,000 annually, and 74 percent earned less than $10,000. Between 26 percent of loggers earned less than $5,000, whereas 48 percent earned $20,000 or more. Only 11 percent of forestry services workers earned $20,000 or more (Fig. 5).

Although the wages were higher in logging, the median wages for both logging and forestry services were considerably lower than the national and statewide median annual wage across all sectors. The median annual wage in the United States was $35,560 in 2002 and $35,050 in Oregon (Bureau of Labor Statistics, 2002). Not only are these wages below the national and statewide median wages, but most workers in both logging and forestry services earned wages below the federal poverty line. During the study period, more then 70 percent of forestry services workers earned less than the wages deemed by the federal government to be poverty wages for a single adult. In 2003, 85 percent of forestry services workers earned less than the poverty-level wages for a family of four. Even though the median annual wage was substantially higher in logging than in forestry services, between 45 and 50 percent of employees in this sector were still paid below the federal poverty level if they had one or more dependents. Between 1997 and 2003, the federal poverty threshold ranged between $8,350 and $9,573 for a single adult and $16,276 to $18,660 for a family of four (U.S. Department of Health and Human Services 2002).

Hourly and annual wages compared

A comparison of hourly wages and average and median annual wages suggests that many workers are employed only part time or seasonally. For example, the median hourly wage in forestry services was $11.31 in 2003 (Table 3). If the median worker had been employed full time (40 hours a week, 50 weeks a year), the median annual wage would be $22,620. However, the median annual wage for an employee in forestry services in 2003 was $4,258 (Table 4). In logging, the median hourly wage was $15.79 in 2003, which means the annual wage would be $31,580 for an employee working full time (Table 3). The reported median annual wage for an employee in logging in 2003 was $17,410 (Table 4).

Given the discrepancy between hourly and annual wages, employees in both sectors must be either unemployed or working outside their respective sector for a considerable amount of time during the year. These patterns have numerous implications related to the quality of jobs in these sectors. For forestry services workers, many earned a minimum wage or slightly above, but annual wages were below the poverty level most of the time, suggesting employment in this sector is of low durability. For loggers, many employees made considerably higher than minimum wage, but annual wages were below the poverty level if employees had dependents, which also suggests low durability in this sector.

Outside wages

With this evidence of part-time employment, workers may be earning a considerable proportion of their wages outside these sectors. Consequently, we also consider wages earned from outside employment. In forestry services, approximately half of all employees worked in outside employment for some time during the year, whereas about one-third of employees in logging reported working outside their sector.

For most loggers and forestry services workers who work in other sectors, logging and forestry services are their primary sources of income. In 2003, for example, 85 percent of loggers and 75 percent of forestry services workers who worked outside their sectors earned more in their respective industries than they did working in other sectors. In 2003, 43 percent of loggers who worked outside of logging earned less than $5,000 outside of logging, and 62 percent of forestry services workers earning income in other sectors earned less than $5,000 outside of forestry services (Fig. 6). Thus, for most loggers and forestry services workers, these sectors are their primary sources of income rather than a supplement to other employment.

Job Durability

Durable jobs provide constant, reliable employment over time. To evaluate durability, we consider the amount of time that employees work annually, the seasonality of work, frequency of movement from one employer to another, outside employment, and the extent to which people continue to work in the industry across multiple years.

Changing jobs within forestry services and logging

One measure of duration is how frequently workers change employers. If workers change jobs frequently, they may face income insecurity because workers may lose days or weeks of income while they look for a new employer. Within forestry services and logging, we find low rates of job turnover; the vast majority of people worked for the same employer in forestry services or logging throughout their work season.

In forestry services, a few employees had up to nine employers annually but, by far, most workers had only one employer in a single year. Between 85 and 88 percent of forestry services had one employer. Between

Table 3 - Average and Median Hourly Wages

	Period							
Hourly Wage	1997		1999		2001		2003	
	Average	*Median*	*Average*	*Median*	*Average*	*Median*	*Average*	*Median*
Logging	$18.60	$16.49	$21.20	$16.16	$20.03	$15.90	$19.53	$15.79
Forestry Services	$13.18	$9.81	$16.00	$12.82	$18.56	$12.10	$14.73	$11.31

Note: Wages are adjusted for inflation to 2002 dollars

Table 4 - Average and Median Annual Wages

	Period							
Annual Wage	1997		1999		2001		2003	
	Average	*Median*	*Average*	*Median*	*Average*	*Median*	*Average*	*Median*
Statewide Logging	$20,529	$15,135	$21,761	$16,606	$21,799	$16,698	$22,253	$17,410
Statewide Forestry Services	$9,097	$3,085	$9,237	$3,290	$9,388	$3,633	$9,243	$4,258
Western Oregon Logging	$21,230	$15,971	$22,209	$17,003	$22,752	$18,194	$23,277	$19,128
Western Oregon Forestry Services	$9,127	$3,157	$8,857	$3,103	$9,503	$3,652	$9,459	$4,503
Eastern Oregon Logging	$16,316	$10,565	$18,519	$12,975	$16,130	$10,148	$17,581	$11,686
Eastern Oregon Forestry Services	$7,940	$1,547	$9,337	$2,836	$7,400	$2,332	$6,931	$2,620

Note: Wages are adjusted for inflation to 2002 dollars

8 and 11 percent of forestry services workers had two employers during the year, and between 4 and 6 percent of employees had three or more employers annually. In logging, some workers had up to 7 employers. But, between 83 and 90 percent of employees had only one employer each year, which is about the same rate as for forestry services. Between 9 and 14 percent of logging employees had two employers, and between 2 and 3 percent of employees had 3 or more employers annually.

Outside employment

A second measure of job durability is the rate at which employees leave one sector to work in another. As suggested above, about half of the forestry services workers also worked in another sector each year during the study period. In contrast, approximately 30 percent of loggers worked in another industry during the year.

As a group, forestry services workers were employed in roughly 74 different sectors each year during the study period. The most frequent outside sectors in the study period included help supply services (SIC 7363), eating and drinking places (SIC 5812), deciduous tree fruits (SIC 0175), farm labor contractors and crew leaders (0761), and logging (SIC 2411). Help and supply services and agriculture-related jobs were the most frequent outside jobs. As with forestry services, these sectors typically provide low-wage, temporary employment opportunities. (Table 5).

Employees in logging worked in 78 to 79 different sectors each year. Help supply services (SIC 7363) was the sector where employees most frequently worked during the year. Other common outside sectors included local trucking without storage (SIC 4212), saw mills and planing mills (SIC 2421), forestry services (SIC 0851), and eating and drinking places (SIC 5812). Although help supply services was the most frequent outside sector for loggers, the highest total outside wages were earned in local trucking jobs (Table 6).

There was little overlap in employment between loggers and forestry services workers. Logging accounted for about 4 percent of all outside employment for forestry services workers; forestry services represented about 4 percent of outside logging employment.

Seasonality

We measure seasonality of employment by considering the number of quarters that people work over the course of a year. In this section, if someone is employed at anytime during a quarter, regardless of how much he worked, he is considered to have worked that quarter. This allows us to distinguish seasonal employment (working part of the year) from year-around, part-time employment.

Most people in both sectors do not work year around. Forestry services workers are less likely to work

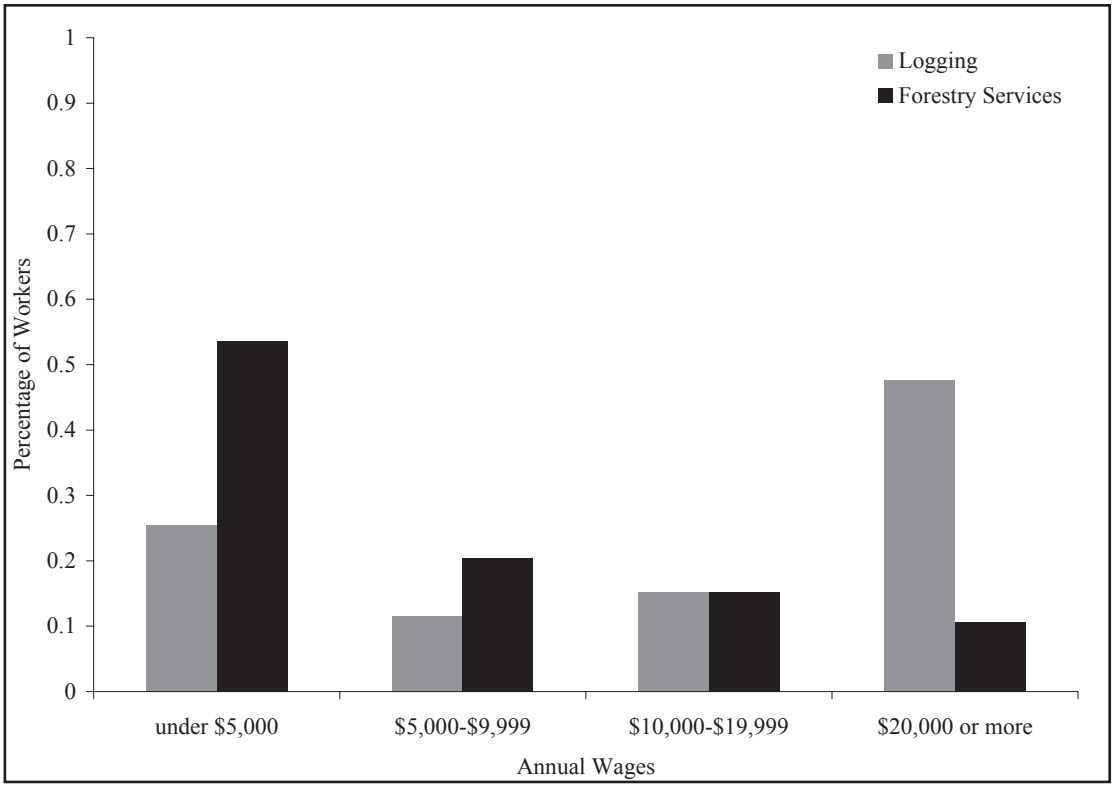

Figure 5 - Distribution of Annual Wages, 2003

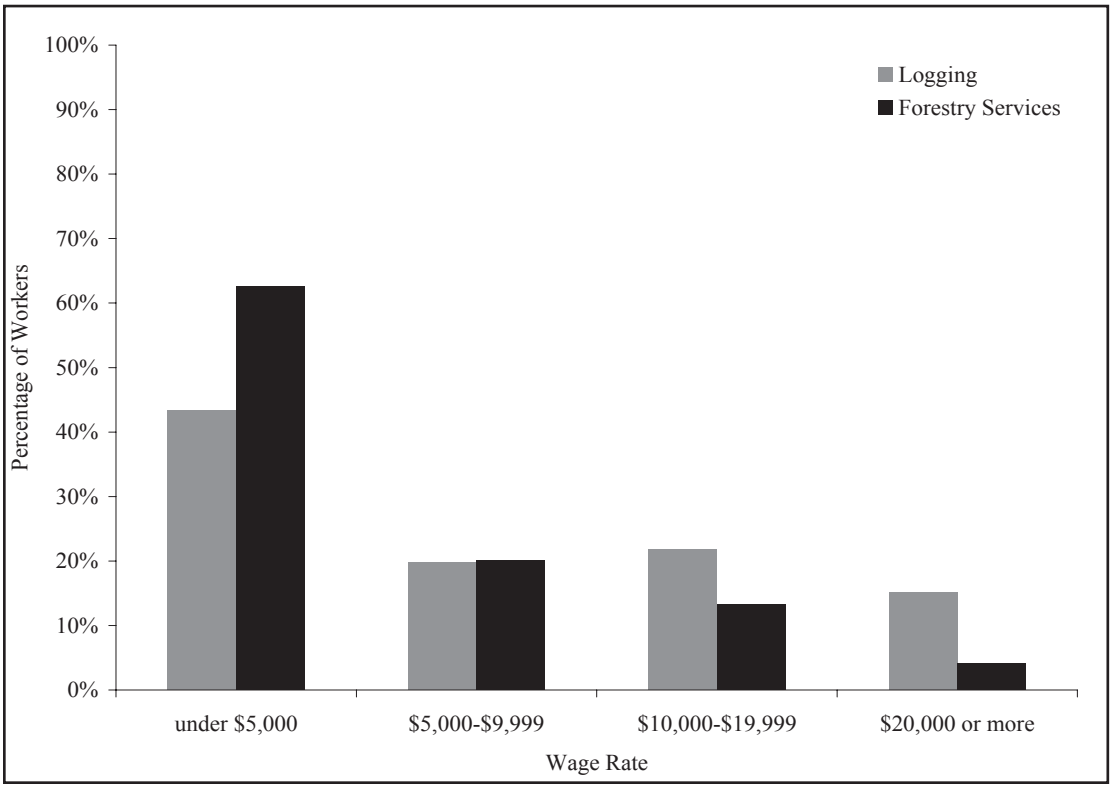

Figure 6 - Distribution of Annual Outside Wages, 2003

Table 5 - Top Five Outside Employment Activities for Forestry Services by Year

Industry	Period							
	1997		1999		2001		2003	
	Job Count	*Total Wages*	*Job Count*	*Total Wages*	*Job Count*	*Total Wages*	*Job Count*	*Total Wages*
Forestry Services	17,078	$61,432,053	18,707	$69,078,411	21,743	$91,603,500	26,502	$115,060,446
Help Supply Services	2,154	$2,681,105	1,865	$2,696,734	2,273	$2,517,316	2,681	$3,376,376
Eating and Drinking Places	601	$767,347	782	$1,120,864	1,330	$1,865,616	1,034	$1,530,905
Deciduous Tree Fruits	822	$896,654	769	$941,798	632	$728,394		
Farm Labor Contractor and Crew Leader	727	$472,528	615	$530,895	936	$591,334		
Logging	599	$2,197,301	581	$2,213,300	474	$1,856,134	750	$1,341,575
Berry Crops					660	$341,447	965	$460,588
Non-classifiable Establishments							1,110	$1,835,083
Ornamental and Floriculture							750	$1,341,575
Other	4,654	$8,088,210	4,459	$9,119,960	5,601	$11,204,596	5,609	$134,390,124

Table 6 - Top Five Outside Employment Activities for Loggers by Year

Industry	Period							
	1997		1999		2001		2003	
	Job Count	*Total Wages*	*Job Count*	*Total Wages*	*Job Count*	*Total Wages*	*Job Count*	*Total Wages*
Logging	40,022	$242,889,671	37,336	$246,604,948	34,237	$240,688,830	34,404	$259,491,038
Help Supply Services	1,122	$1,990,968	1,096	$2,004,190	779	$1,628,909	780	$1,461,855
Local Trucking without Storage	1,023	$4,458,262	1,017	$4,413,167	687	$2,928,094	759	$3,444,853
Sawmills and Planning Mills	533	$2,561,137	529	$2,941,965	456	$2,757,360	410	$2,391,199
Forestry Services	480	$1,475,194	436	$1,504,538	386	$1,578,754	274	$990,848
Eating and Drinking Places	446	$457,972	446	$546,458	378	$479,220		
Nonclassifiable Establishments	460	$2,392,896					560	$2,624,381
Other	3,272	$11,533,999	3,197	$12,527,755	2,725	$11,059,378	2,267	$9,454,817

four quarters than loggers. In 2003, for example, 51 percent of employees worked during all four quarters in logging, whereas only 17 percent of employees worked all four quarters in forestry services. In contrast, 44 percent of employees worked only one quarter in forestry services, and only 21 percent of employees worked only one quarter (Fig. 7). The difference in the number of quarters worked in each sector suggests that forestry services are more seasonal than logging. By combining in-sector and out-of-sector employment, we find that over 60 percent of employees reporting wages in logging worked in all four quarters in any industry, but less than 40 percent of forestry services workers were employed in all four quarters in any industry during each year (Fig. 8).

During the study period, we can see variation in the quarterly employment in both forestry services and logging (Fig. 3). Forestry services appear to have more variation in quarterly employment than logging, with seasonality increasing over time. This pattern is even more striking if we examine long-term trends in monthly employment in the published data. Most striking is the dramatic increase in the number of people employed in forestry services in recent years. This may be the result of the growing use of contract fire fighters and several big wildfire years in a row (Fig. 9).

In addition to looking at the number of quarters worked per year, we can also see seasonality by observing changes in employment across particular quarters.

The number of people who worked only in logging in any given quarter was fairly constant over the course of the year as was the number of people working both inside and outside of logging in any given quarter (Fig. 10). The forestry services sector had a different pattern. There was considerable variation from quarter to quarter in the total employment of people who work in forestry services. Forestry services workers were most likely to work the third quarter of the year (July to September). The number of employees working only in forestry services and both inside and outside forestry services was greatest in the third quarter. In contrast, the greatest number of workers employed outside of forestry services occurred only in the first (January to March) and fourth quarters (October to December) (Fig. 11)

Hours worked

An examination of the number of hours each employee worked annually and quarterly reveals that both logging and forestry services typically provided part-time work. Part-time employment was more common in forestry services than in logging. Forestry services employees worked an average of between 439 and 572 hours annually. This means that forestry services employees worked the equivalent of between 8.8 and 11 hours a week, assuming a 50-week work year. The median annual number of hours worked by forest services workers was between 194 and 301. Loggers, in contrast, worked an average of between 949 and 1,083 hours annually. This translates into roughly between 19 and 22 hours per week, if the work were spread across a 50-week work year. For loggers, the median annual hours worked ranged between 711 and 858 during the study period. In addition to forestry services employees working fewer total hours per year, the amount they worked varied considerably more across the study period. This suggests that work is more erratic and variable from year to year in forestry services than in logging (Table 7).

The distribution of annual hours worked for employees in logging and forestry services further illustrates the differences between the two industries. Between 67 and 74 percent of forestry services employees worked 1 to 520 hours annually (up to 12 hours per week if spread over a 50-week work year). Only 10 to 12 percent worked the equivalent of 20 to 40 hours per week. In logging, between 40 and 44 percent of employees worked 520 hours or less annually, whereas between 23 and 31 percent of loggers worked between 20 and 40 hours per week (Fig. 12).

By comparing annual and quarterly hours, it is possible to further examine durability. The median quarterly hours worked for forestry services workers ranged from 144 hours to 307 hours, with the highest number of hours worked in the third quarter of each year. This translates to roughly between 12 to 25 hours per week during any given quarter. The median quarterly hours worked in logging ranged from 362 to 592 hours, also with the highest number of hours worked in the third quarter (except in 2003, when the highest number of hours worked occurred in the fourth quarter). Employees in this sector worked between approximately 30 to 50 hours per week during any given quarter, which is much higher than the hours worked in forestry services (Table 7).

Table 7 - Quarterly and Annual Hours Worked, 2003

	Number of Hours Worked				
	Quarter				Year
	1st	2nd	3rd	4th	
Forestry Services					
Average	246	265	328	231	507
Median	215	239	307	168	301
Logging					
Average	366	392	394	402	1,044
Median	409	445	434	457	858

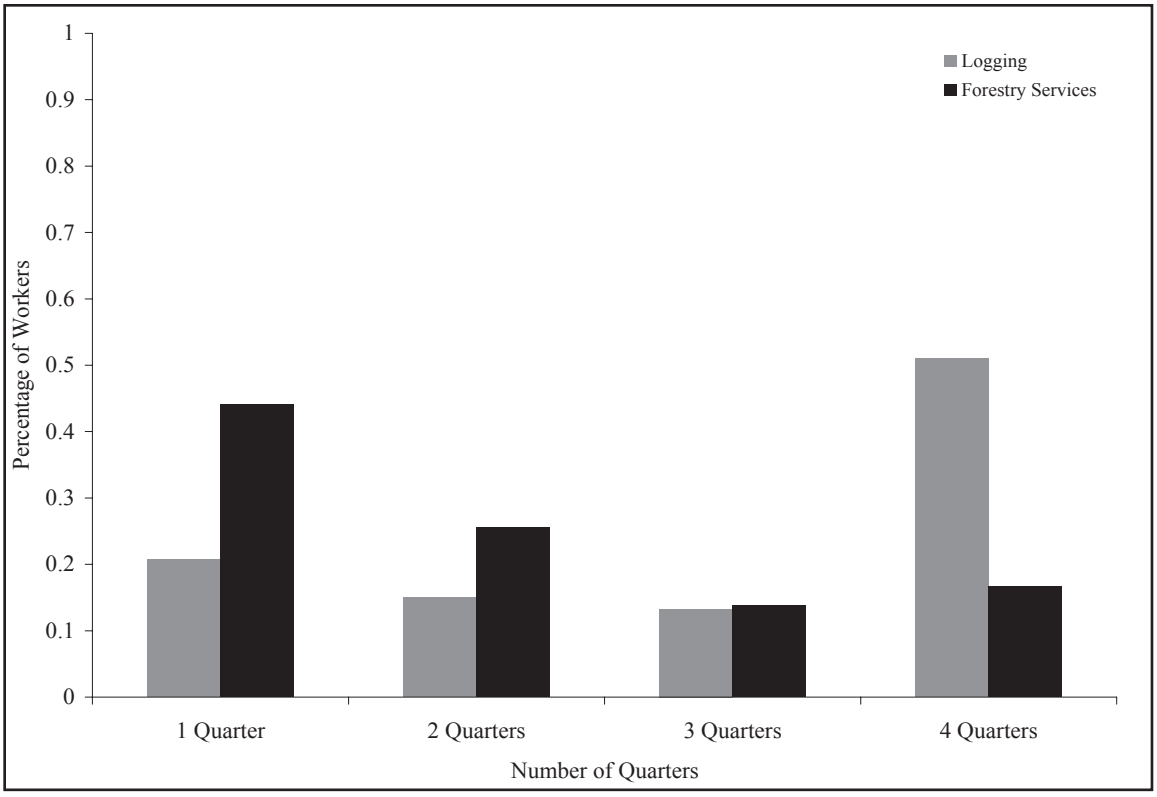

Figure 7 - Percentage of Workers that Worked in Logging and Forestry Services 1 to 4 Quarters, 2003

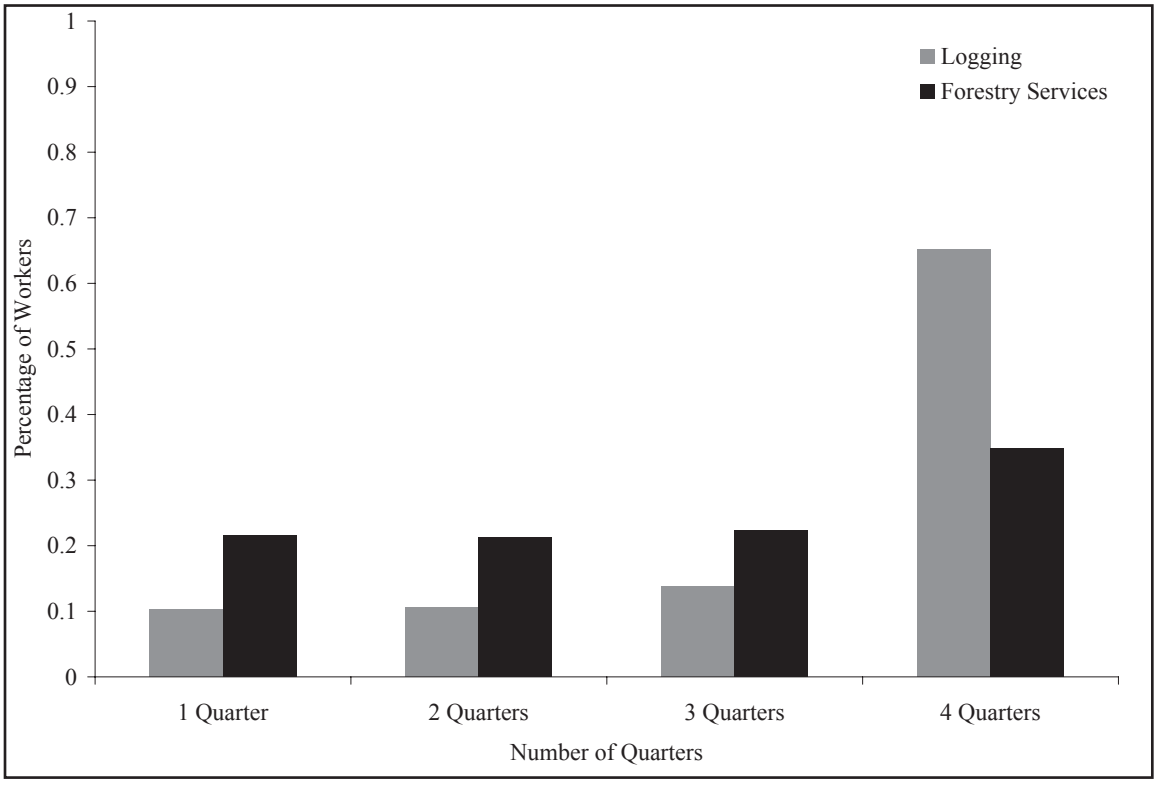

Figure 8 - Percentage of Workers that Worked 1-4 Quarter Inside or Outside of Logging and Forestry Services, 2003

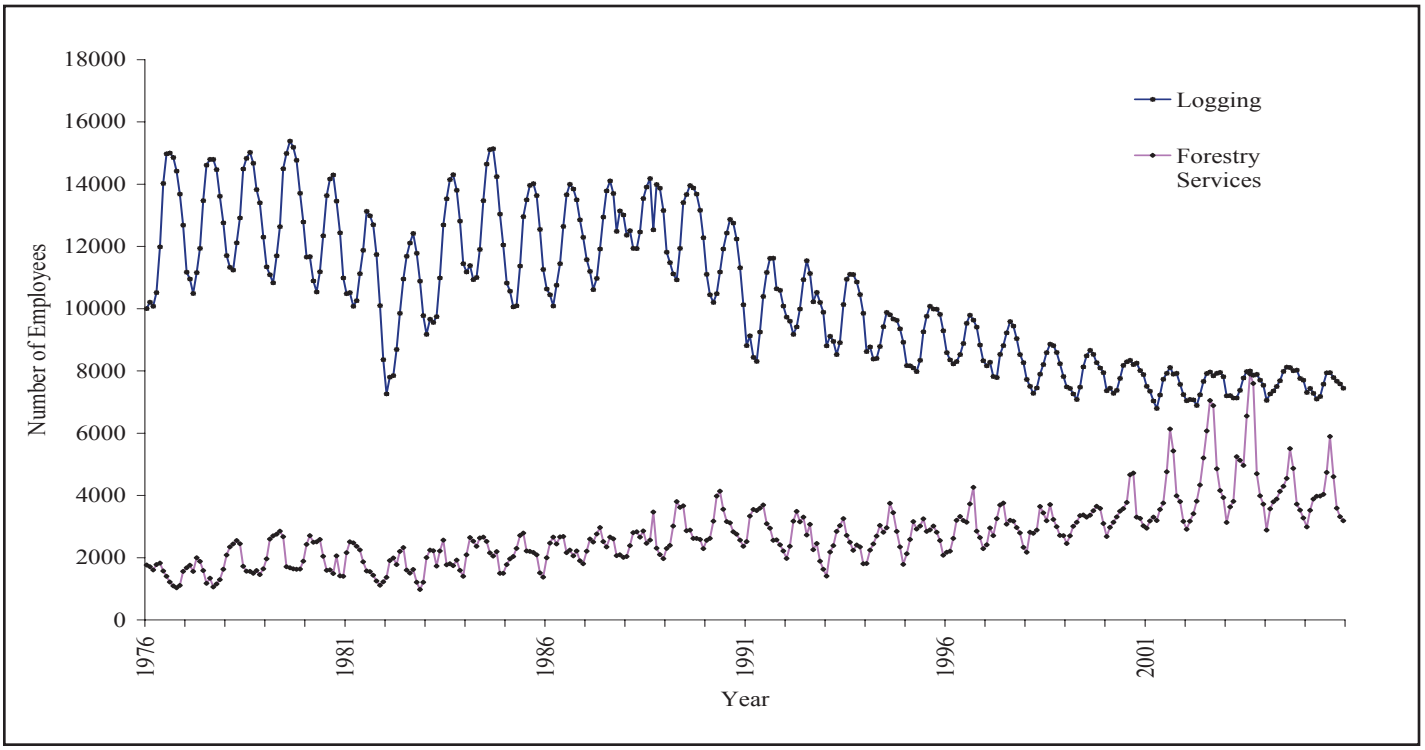

Figure 9 - Monthly Employment in Forestry Services and Logging, 1976-2005

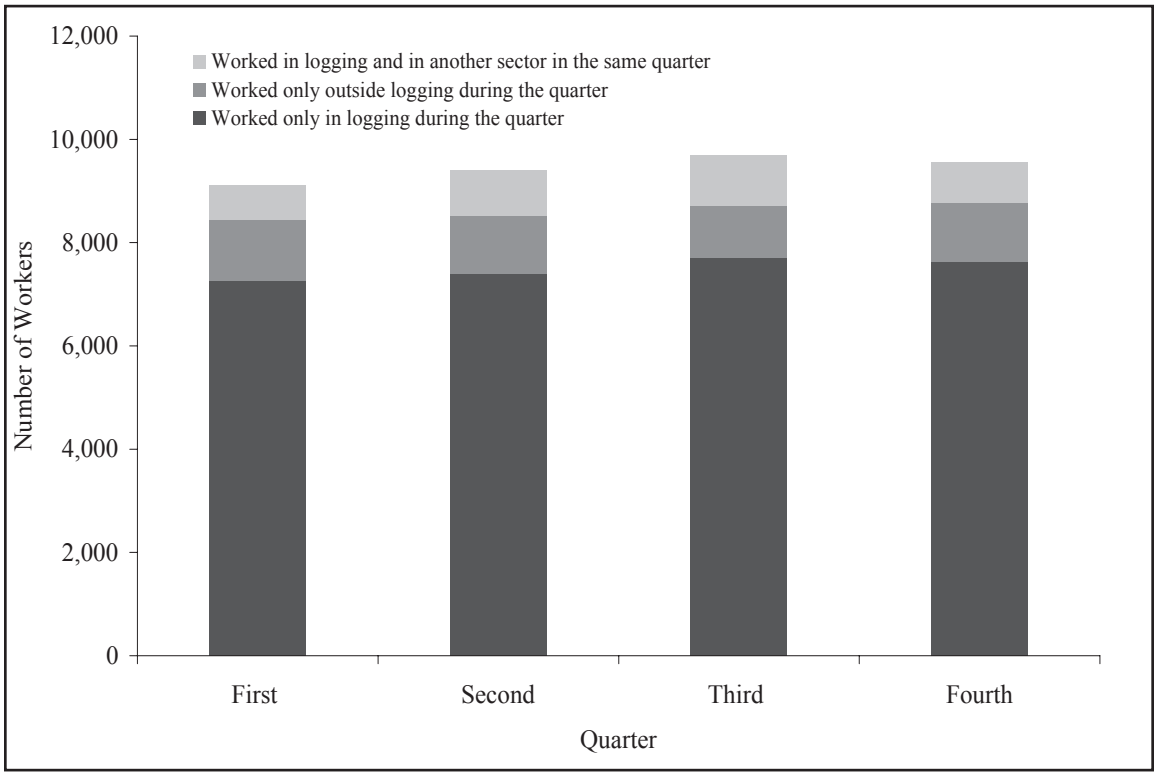

Figure 10 - Quarterly Employment for Loggers, 2003

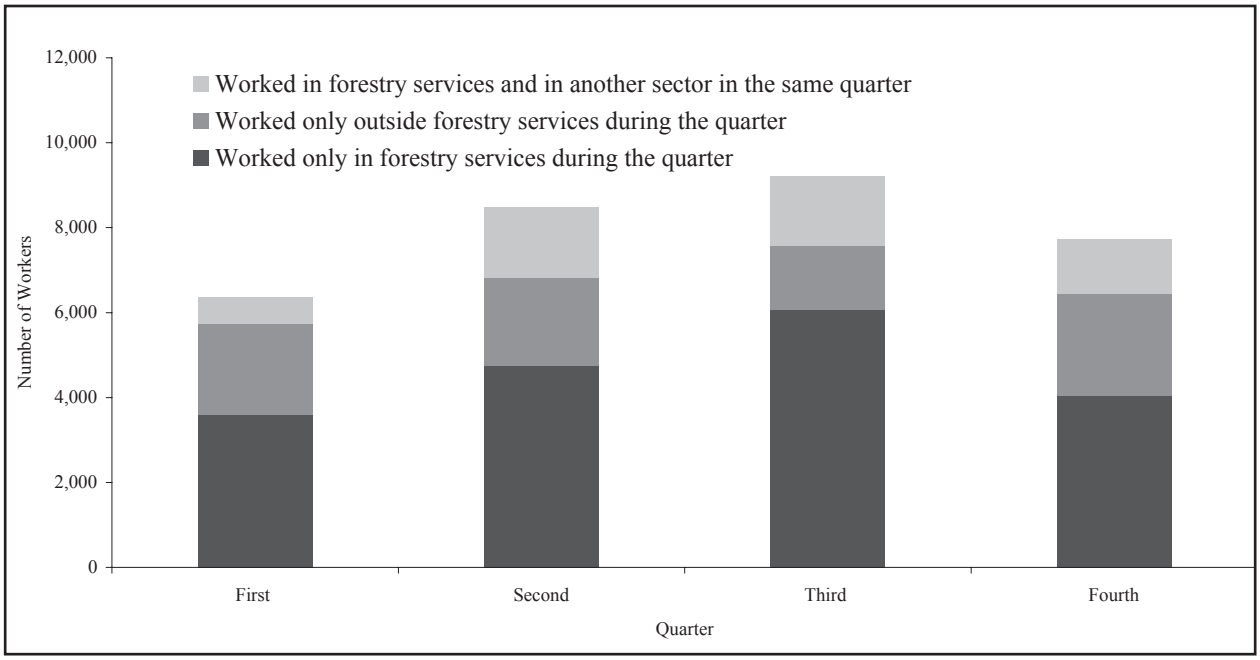

Figure 11- Quarterly Employment for Forestry Services Workers, 2003

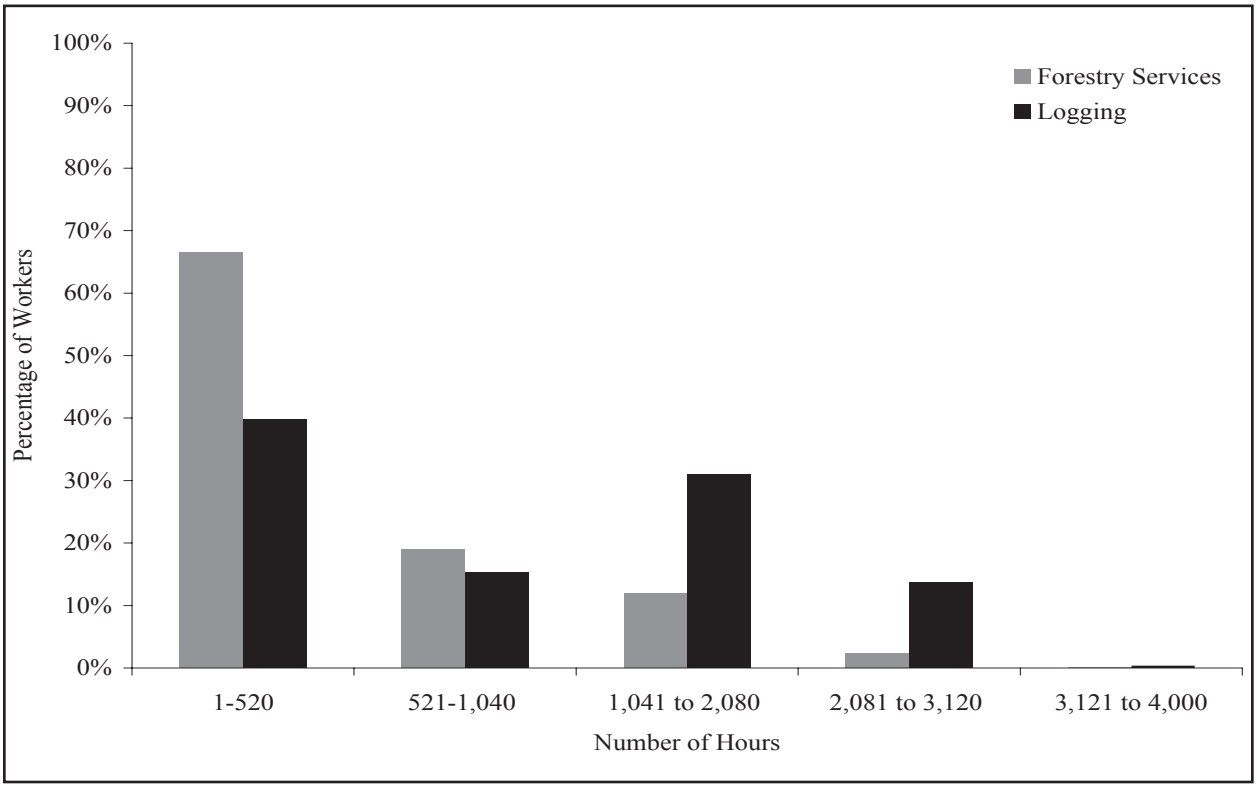

Figure 12- Distribution of Annual Hours Worked, 2003

In forestry services, the median hours worked per quarter were nearly the same as the median hours worked annually. For forestry service workers, this means that a large number of employees in this sector might be working only one or two quarters in this sector per year, which suggests low durability and high seasonality. In contrast, for loggers, the median hours worked annually were greater than those worked per quarter, suggesting that loggers worked consistently more quarters during the year.

Retention

The last measure of job duration is retention - the extent to which loggers and forestry services workers remain working in their respective sectors over time. The retention rate was lower in forestry services than in logging. In forestry services, 29 percent of people who were working in the industry in 1997 were still working in the industry in 2003. Another 29 percent remained in the Oregon wage record but were working in other sectors. The remaining 44 percent were no longer in the wage record. In logging, about 44 percent of employees working in 1997 were still in the industry in 2003, and an additional 27 percent worked in Oregon but not in logging (Table 8). People who are no longer in the wage record could have done a variety of things, including retiring, dieing, leaving the state to work elsewhere, becoming self-employed, or working in the informal economy.

For comparison, in highway and street construction, 30 percent of employees in 1997 were still working in road construction in 2003, with another 37 percent still in the wage record. Further, only 21 percent of 1997 heavy construction workers were still working in the same industry in 2003, and another 33 percent were in the Oregon wage record in 2003.

Compared to these industries, logging had a higher retention rate, both for employees remaining in the same industry and for employees remaining in the Oregon wage record. Employees in forestry services departed from the sector and the Oregon wage record as a whole more frequently, compared with logging, highway and street construction, and heavy construction (Table 8).

Discussion

Although employment in forestry services was expanding, in logging and contracting it was decreasing. Working conditions were consistently poorer for forestry services. By every measure, the typical forestry worker earned less money and faced less stable employment than loggers.

Oregon's loggers work seasonally, but their season is relatively long—with half of loggers working at least some during four quarters of the year. Loggers have relatively secure day-to-day employment and are likely to continue to work in the industry for several years. Even if they leave the industry, they are more likely than forestry services workers to continue to work in Oregon. Loggers are fairly tied to the forest products industry. Many of those who do not work for logging firms exclusively work for a mill or as a short-haul truck driver (perhaps as a log-truck driver). Although wages in logging are not high compared to state or national income standards, both hourly and annual wages are high compared to forestry services.

Forestry services offers low wage and erratic employment opportunities. Compared to logging, forestry services work is highly seasonal, part time, or temporary. Workers may be employed only a few weeks or

Table 8 - Retention of Workers from 1997 to 2003 in Oregon

Standard Industrial Code (SIC)	Total Employees 1997	Number of Workers Still Employed in the Same SIC in 2003	Number of Workers Still in wage record in 2003	Number of Workers Still Employed in the Same SIC in 2003	Number of Workers Still in wage record in 2003
Forestry Services	3,398	952	1,921	28%	57%
Logging	9,319	4,095	6,591	44%	71%
Highway and Street Construction	4,373	1,291	2,919	30%	67%
Heavy Construction	2,544	541	1,382	21%	54%

Note: Attachment to a 2-digit SIC for each year is defined as having at least 2 quarters in a specific forestry-related SIC, earning at least $1,000 in a specific forestry-related, or earning greater than half of total wages in the specific forestry-related SIC.

months of the year in this industry. Compared to loggers, forestry services workers do not stay in forestry services very long. When no longer working in forestry services, they are more likely to leave the Oregon wage file entirely, suggesting movement out of state or into the informal economy. When they are not working in forestry services, they frequently appear to take jobs in agriculture, restaurants, and temporary help services, rather than jobs in the forest products sector. Nevertheless, forestry services workers also do not appear to be casual laborers. That is, workers do not appear to change employers, as they might if they were being picked up on the street corner each morning, as is the practice in some sectors. Instead, they seem to sign up with a single employer for the season or year. Then, they may work only sporadically, part time, or seasonally for that employer.

Annual wages in forestry services are low compared to logging; most workers earn less than the federal poverty level. However, wages in the sector are typically higher for forestry services workers who work outside of the sector than wages for work they participate in outside of the sector.

Although the work is highly seasonal, evidence suggests that these are the jobs of immigrants rather than the summer jobs of college students. The other sectors where forestry services workers are frequently employed—agriculture and restaurants—are dominated by immigrants rather than college students. This confirms what previous studies have suggested–forestry services workers in the Pacific Northwest are increasingly Hispanic immigrants (Brown 2001; Mann 2001).

Implications

These differences in working conditions have significant implications for restoration-based economic development efforts. Many rural communities in the Pacific Northwest and elsewhere have seen a decline in well-paying manufacturing jobs and the rise of lower-wage, service sector employment opportunities. Although restoration-based businesses may still offer economic opportunities for rural communities, this study makes clear that great care needs to be taken to ensure that the restoration businesses and employment opportunities in rural communities are structured to create high quality jobs. A straightforward shift from logging to forestry services—from logging to thinning, tree planting, and fire fighting—is unlikely to provide rural communities with jobs of equal quality.

However, there are small segments of the forestry services sector that provide reasonable wages and year-around employment. Businesses, agencies, and nonprofits should explore ways to structure the work year in ways that provide more consistent employment and relatively long work seasons. There may be niches within the forestry services sector where one can find high quality jobs. In addition, there are other types of restoration activities that are not included in forestry services, such as road and stream restoration involving heavy equipment. Although these heavy-equipment businesses require considerable start-up capital, they may offer higher quality jobs and be worth investing in if market research indicates that there is demand for such businesses locally. Understanding the quality of this sort of job cannot be done through the method pursued in this project, but it may be worthy of further investigation to gain a better understanding of the job quality and employment opportunities of equipment-based restoration.

Notes

[1] There were two employers with locations in both eastern and western Oregon. For the regional analysis, they were categorized in a "multiple" category.

[2] The average wage is calculated by summing the total wages earned, divided by the number of workers. In contrast, the median is the number in the "middle." That is, half of the workers earn less than the median and the other half earns more. Average wages are typically larger than median wages, and a few large wage earners can skew the average wage upward from the more typical wage for most workers.

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