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Criterion 6, Indicator 37: Average Wage Rates, Annual Average Income, and Annual Injury Rates in Major Forest Employment Categories

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Abstract

Average annual incomes for forest management and protection includes salaries for full-time permanent employees of the U.S. Department of Agriculture, Forest Service, which have increased from a median of \$41,300 in 1992 to \$48,200 in 2000, to \$50,500 in 2006 (all in 2005\$). Salary of full-time permanent employees in state forestry agencies in 1998, for entry level foresters, ranged from \$48,000 for the Pacific Coast, \$39,000 in the North, \$35,000 for the Rocky Mountains, and \$28,000 for the South (all in 2005\$). Trends in wages for the pulp and paper industry have been increasing at the same pace as wages for all manufacturing while the trend in wages for solidwood industries has not kept pace. Injury rates in forest products industries have been declining at the same pace as for all manufacturing. Businesses in the nontimber forest products (NTFP) industry are generally small, exceptions exist, but most employ less than 10 people. Many workers receive fewer benefits or lower wages, or experience worse working conditions than they would in the formal economy. Injury rates for the non-timber forest products sectors have not been assessed. Gathering products in the forest can be dangerous, and there are reports in the media of people becoming lost or injured every year. In the 2006 average income for a person employed in the forest recreation and tourism private sector is estimated to be \$23,517, approximately 9% less than the average American.

Keywords: production, sustainability, consumption

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Criterion 6, Indicator 37: Average Wage Rates, Annual Average Income, and Annual Injury Rates in Major Forest Employment Categories

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Indicator Background

The purpose of this report is to provide information on the rationale and data provided for Indicator 37 for the *U.S. National Report on Sustainable Forests—2010*. Information on the rationale for the Indicator and recommended data to be developed are taken from the report of the Technical Advisory Committee (TAC) of the Montreal Process (MP).

Verbatim Montreal Process Technical Advisory Committee Notes

Rationale—Wages, income, and injury rates are measures of the quality of employment. Wages and income are indicators of the economic returns to workers in forest-based and forest-related enterprises. Decreasing injury rates may reflect improved occupational health and safety and employment quality, which provide both personal and community social benefits.

Measurement—The measures desired are the following:

- Average wage and/or income rates for the forest sector and related sectors. Attempts should be made to report average wages and/or income rates on an annual per-worker basis for the major components of the forest and related economic sectors for which production and investment data were reported in sub-sections Indicators 25–35.
- Injury rates for the forest sector and related sectors, normalized to an appropriate basis (e.g., injuries per 100,000 employees or per million working hours).

Attempts should be made to report injury rates by major employment categories that provide representative coverage of wood-based and non-wood forest industries and forest-based services (e.g., selected forest management activities such as logging/harvesting, and selected primary and secondary processing categories). For instance, perhaps fire-fighting should be distinguished from other resource management activities.

Official government reports are likely to be the best source of comprehensive data on employment in many countries. Other sources of information may include labor unions, industry associations, and other nongovernmental organizations focused on employment issues. Presenting employment information in a spatial display that highlights where the various types of jobs are concentrated may provide more compelling and useful information to key audiences for the country report.

Income and injury rates in the forest sector give an indication of the economic viability of the sector and potential for income security in dependent communities.

Comments and Clarifications

Additions and Clarifications to Rationale (Opportunity to Provide Comment on Relevance and Nature of Indicator)

Additions and Clarifications to Measurement (Opportunity to Provide Comment on Feasibility and Applicability of TAC Recommendations)

Table 1—U.S. Department of Agriculture, Forest Service full-time permanent employees by annual base salary, 1992–2006^a

Year	\$10,000– 20,000	\$20,000– 30,000	\$30,000– 40,000	\$40,000– 50,000	\$50,000– 60,000	\$60,000– 70,000	\$70,000– 80,000	\$80,000– 90,000	\$90,000+	Total employees	Range for median base salary	Median salary
											(thousand 2005\$)	(thousand 2005\$)
1992	4,451	12,996	8,928	4,464	1,975	809	271	59	65	34,018	28–42	41.3
1993	2,983	12,706	9,129	5,469	2,316	956	346	120	68	34,093	41–54	42.6
1994	1,709	10,947	9,385	5,104	2,302	1,029	375	152	69	31,072	40–53	43.6
1995	948	9,611	9,345	5,497	2,514	1,128	374	154	97	29,668	38–51	44.3
1996	759	8,661	9,385	5,966	2,876	1,332	451	192	115	29,737	37–50	44.6
1997	324	7,859	9,003	6,392	2,897	1,619	557	247	161	29,059	37–49	45.1
1998	188	6,734	8,836	5,784	3,224	1,875	755	278	212	27,886	36–48	45.5
1999	126	5,718	8,439	6,107	3,525	2,034	962	418	266	27,595	35–47	46.2
2000	42	4,572	7,491	6,496	4,274	2,427	1,297	460	452	27,511	45–57	48.2
2001	119	5,118	7,473	6,709	4,560	2,685	1,308	769	570	29,311	44–55	47.3
2002	44	4,334	8,039	7,005	5,014	2,391	1,906	907	818	30,458	43–54	47.8
2003	4	3,904	6,942	6,941	5,464	3,513	1,895	1,364	1,010	31,037	42–53	49.6
2004	3	2,758	6,541	7,228	5,206	3,786	2,398	1,250	1,558	30,728	41–52	50.0
2005	0	1,660	6,406	6,161	5,638	3,801	2,426	1,304	1,792	29,188	50–60	50.7
2006	1	1,114	5,876	6,104	5,615	3,852	2,276	1,633	2,151	28,622	48–58	50.5

^aUSDA FS HCM 2008a,b. Note: Count categories are in current year dollars for each given year. Range for median salary and median salary are in dollars deflated by the consumer price index.

The TAC guidance for this indicator requests wage and income data for “which production and investment data were reported in sub-sections 6.1 and 6.2.” Sections 6.1 and 6.2 (Indicators 25–35) requested production and investment data for activities including the following:

1. Forest management (we provided information for Federal and state agencies)
2. Forest industries (we provided information for forestry, wood products, paper products, and furniture)
3. Recycling
4. Recreation and tourism (we provided information for selected Federal agencies and private businesses but not state agencies)
5. Non-wood forest products
6. Environmental services
7. Research and education

In this indicator, we present wage and income information for items 1, 2, 4, and 5 above. We present injury information for items 2 and 5 above.

Indicator Development

Data Used to Address Indicator

General Description—data on forest management, including wage and income data were obtained from Federal agencies and the Association of State Foresters. Wage and income data for forest industries were obtained from the U.S. Department of Commerce, Bureau of the Census and the Bureau of Economic Analysis. Injury rates for forest sector industries were obtained from the Department of Labor,

Bureau of Labor Statistics. Wage and income data for recreation and tourism were developed using data from Federal and private databases. Wage and income data for non-wood forest products were obtained for a number of local studies.

Trend information has been sought covering at least the last 10 years and data are presented by Resources Planning Act (RPA) Region where available.

Specific Data Sources

Wages and Salaries—Category 1—Forest management and protection

- U.S. Department of Agriculture, Forest Service full-time permanent employees by annual base salary, 1992–2006 (Table 1)
- Average and range for salaries of employees in state forestry agencies by RPA region, 1998 (Table 2)

Category 2—Wood and paper products industries

- Wage and salary accruals per full-time equivalent employee for all domestic employment, for all manufacturing, and for Standard Industrial Classification (SIC) industries 24 and 26, 1929–2006 (Table 3)
- Production worker wages per hour for North American Industry Classification System (NAICS) industries 321, and wood part of 322 by RPA region, 1997, 2002–2006 (Tables 4 and 5)

Category 3—Non-wood forest products industries

- See discussion of wages and injuries in the non-wood forest products sectors (Appendix)

Table 2—Average and range for salaries of employees in state forestry agencies by Resources Planning Act (RPA) region, 1998

	North			South			Rocky Mountain			Pacific Coast		
	Average	High	Low	Average	High	Low	Average	High	Low	Average	High	Low
State Forester	74,650	103,700	45,600	68,564	91,000	46,128	82,595	115,000	50,190	97,270	107,940	86,600
Regional Forester	64,000	88,000	40,000	54,491	74,295	34,686	46,494	59,335	33,653	66,354	68,280	64,428
District Forester	52,200	69,000	35,400	41,615	52,700	30,530	35,726	43,583	27,868	52,019	58,208	45,830
Service Forester	43,400	58,800	28,000	34,255	44,200	24,310	32,095	40,894	23,295	49,470	64,164	34,776
Entry Level Forester	32,450	43,700	21,200	23,146	27,000	19,291	28,973	37,445	20,500	40,278	54,324	26,232
Forestry Technician	35,450	48,000	22,900	27,435	35,000	19,870	25,695	32,717	18,672	28,464	34,152	22,776

Source: NASF 2002.

Category 4—Forest sector research and education

Category 5—Recreation and tourism

Injury Rates—Category 1—Forest management and protection

Category 2—Wood and paper products industries

- Rate of injury and illness cases per 100 full-time workers for lumber and wood products, paper and allied products, and all manufacturing industries, 1976–2006 (Table 6)

Category 3—Non-wood forest products industries

- See discussion of wages and injuries in the non-wood forest products sectors (Appendix)

Category 4—Forest sector research and education

Category 5—Recreation and tourism

Analysis Techniques

General Description

Most data on wages and salaries and injuries were obtained directly from Federal government survey databases, publications, or the Association of State Foresters. Estimates of income and wages for forest-based recreation sector are estimated indirectly using data from Federal government survey databases and private data sources.

Specific Steps Taken

Estimating Wages and Income in the Forest-Based Recreation and Tourism Sectors—Specific data reflecting wages and incomes in the forest-based recreation and tourism sector were not available; therefore, rough approximations were estimated. First, total income and total number of employees for 2006 were obtained by state for NAICS codes that included outdoor recreation industries from the Bureau of Economic Analysis (US DOC BEA 2006). These included all sub-industries under NAICS code 71 except for

performing arts and spectator sports. The average income for an employee in these industries was calculated by state by dividing total income by total number of employees. The hourly wage was calculated by dividing an estimated 2,000 hours of work per year, assuming 150 weeks of work at 40 hours a week, with 10 holidays (Table 7).

We assumed that employees in forest-based recreation industries in a given state have the same hourly wage as for all employees in the industries that include outdoor recreation. An average regional wage for employees in forest-based recreation was calculated by taking a weighted average of wages across states by weighting by the number of employees in forest-based recreation in each state. The number of employees engaged in forest-based recreation in each state was estimated in the following way. Because the NAICS groups containing outdoor recreation industries included many industries unrelated to outdoor recreation, an estimate of the proportion of outdoor recreation industries was needed. This estimate was calculated by summing the number of mailing lists for each sub-industry within the NAICS codes from a private, direct marketing firm (Mari-gold Technologies 2008) and used to estimate the relative size of each industry. The proportion of outdoor recreation related mailing lists to all mailing lists was approximately 24%. So we assumed that in each state 24% of the total employees in the NAICS groups were in outdoor recreation. However, not all outdoor recreation activities are necessarily forest-based recreation activities. We assumed that the proportion of outdoor recreation employees in a state that were in forest-based recreation was equal to the percentage of land in the state that is forest land. So, to obtain the number of forest-based recreation workers in a state, we multiplied by 24%, then by the percentage of forest land in the state. This count of employees was used to weight the average wage values in a region to obtain a region wide average wage for forest-based recreation employees.

Table 3—Wage and salary accruals per full-time equivalent employee for all domestic employment, for all manufacturing, and for SIC industries 24 and 26, 1929–2006

Year	Actual dollars (\$)					2005 dollars (\$)					Personal consumption expenditures implicit price deflator 1996 = 100
	All domestic employment	All manufacturing	Lumber and wood products SIC 24	Paper and allied products SIC 26	Average	All domestic employment	All manufacturing	Lumber and wood products SIC 24	Paper and allied products SIC 26	Average for wood and paper products	
1929	1,430	1,543	1,172	1,514	1,343	13,908	15,007	11,398	14,724	13,061	12.38
1930	1,392	1,488	1,156	1,487	1,322	14,143	15,119	11,746	15,109	13,432	11.85
1931	1,299	1,369	1,010	1,404	1,207	14,797	15,594	11,505	15,993	13,749	10.57
1932	1,143	1,150	787	1,208	998	14,766	14,857	10,167	15,606	12,893	9.32
1933	1,069	1,086	737	1,143	940	14,317	14,545	9,871	15,308	12,589	8.99
1934	1,110	1,153	791	1,186	989	14,203	14,753	10,121	15,175	12,654	9.41
1935	1,157	1,216	833	1,235	1,034	14,466	15,203	10,415	15,441	12,928	9.63
1936	1,203	1,287	911	1,313	1,112	14,902	15,942	11,285	16,264	13,774	9.72
1937	1,277	1,376	963	1,403	1,183	15,268	16,452	11,514	16,775	14,145	10.07
1938	1,249	1,296	940	1,359	1,150	15,283	15,858	11,502	16,629	14,071	9.84
1939	1,282	1,363	956	1,414	1,185	15,831	16,832	11,806	17,461	14,634	9.75
1940	1,317	1,432	934	1,458	1,196	16,131	17,540	11,440	17,858	14,649	9.83
1941	1,460	1,653	1,026	1,646	1,336	16,854	19,082	11,844	19,001	15,423	10.43
1942	1,729	2,023	1,205	1,850	1,528	17,762	20,783	12,379	19,005	15,698	11.72
1943	1,973	2,349	1,446	2,076	1,761	18,559	22,096	13,602	19,528	16,565	12.8
1944	2,126	2,517	1,564	2,254	1,909	18,919	22,399	13,918	20,058	16,988	13.53
1945	2,208	2,517	1,618	2,365	1,992	18,895	21,539	13,846	20,238	17,046	14.07
1946	2,383	2,517	1,813	2,535	2,174	19,039	20,110	14,485	20,253	17,369	15.07
1947	2,616	2,793	2,046	2,901	2,474	18,951	20,234	14,822	21,016	17,923	16.62
1948	2,822	3,037	2,256	3,194	2,725	19,338	20,812	15,460	21,888	18,674	17.57
1949	2,881	3,107	2,305	3,248	2,777	19,890	21,450	15,913	22,424	19,172	17.44
1950	3,034	3,330	2,517	3,498	3,008	20,685	22,703	17,160	23,849	20,508	17.66
1951	3,266	3,652	2,723	3,815	3,269	20,861	23,327	17,393	24,368	20,880	18.85
1952	3,458	3,894	2,928	4,032	3,480	21,651	24,381	18,333	25,245	21,789	19.23
1953	3,643	4,133	3,046	4,252	3,649	22,494	25,519	18,807	26,254	22,531	19.5
1954	3,737	4,224	3,163	4,391	3,777	22,863	25,842	19,351	26,864	23,108	19.68
1955	3,929	4,481	3,352	4,654	4,003	23,940	27,304	20,425	28,358	24,391	19.76
1956	4,141	4,739	3,522	4,895	4,209	24,731	28,303	21,035	29,235	25,138	20.16
1957	4,306	4,928	3,583	5,067	4,325	24,962	28,567	20,770	29,373	25,072	20.77
1958	4,475	5,148	3,759	5,292	4,526	25,308	29,114	21,258	29,928	25,596	21.29
1959	4,675	5,413	3,973	5,559	4,766	26,023	30,131	22,116	30,944	26,530	21.63
1960	4,822	5,545	3,985	5,708	4,847	26,390	30,347	21,809	31,239	26,527	22
1961	4,966	5,701	4,098	5,952	5,025	26,897	30,878	22,196	32,237	27,216	22.23
1962	5,158	5,916	4,281	6,151	5,216	27,614	31,672	22,919	32,930	27,924	22.49
1963	5,344	6,111	4,470	6,327	5,399	28,283	32,342	23,657	33,485	28,574	22.75
1964	5,610	6,417	4,747	6,636	5,692	29,279	33,490	24,775	34,633	29,707	23.07
1965	5,807	6,564	4,877	6,768	5,823	29,867	33,760	25,083	34,809	29,949	23.41
1967	6,309	7,044	5,335	7,256	6,296	30,854	34,448	26,090	35,485	30,790	24.62
1968	6,755	7,534	5,877	7,734	6,806	31,795	35,462	27,662	36,403	32,035	25.58
1969	7,226	7,970	6,290	8,182	7,236	32,537	35,887	28,322	36,841	32,582	26.74
1970	7,743	8,378	6,662	8,637	7,650	33,296	36,026	28,647	37,140	32,896	28
1971	8,250	8,883	7,153	9,226	8,190	34,018	36,628	29,494	38,042	33,770	29.2
1972	8,788	9,450	7,606	9,947	8,777	35,013	37,651	30,304	39,631	34,969	30.22
1973	9,320	10,027	8,216	10,581	9,399	35,221	37,893	31,049	39,987	35,520	31.86
1974	10,009	10,843	8,850	11,461	10,156	34,304	37,163	30,332	39,281	34,808	35.13
1975	10,808	11,899	9,744	12,613	11,179	34,236	37,692	30,866	39,954	35,411	38.01
1976	11,576	12,835	10,554	13,847	12,201	34,775	38,557	31,705	41,597	36,652	40.08
1977	12,360	13,859	11,472	14,996	13,234	34,827	39,051	32,325	42,255	37,290	42.73
1978	13,263	14,936	12,436	16,259	14,348	34,882	39,282	32,707	42,761	37,736	45.78
1979	14,381	16,263	13,476	17,776	15,626	34,748	39,296	32,562	42,951	37,756	49.83
1980	15,790	17,978	14,701	19,678	17,190	34,435	39,207	32,060	42,914	37,488	55.21

Table 3 con.—Wage and salary accruals per full-time equivalent employee for all domestic employment, for all manufacturing, and for SIC industries 24 and 26, 1929–2006

Year	Actual dollars (\$)					2005 dollars (\$)					Personal consumption expenditures implicit price deflator 1996 = 100
	All domestic employment	All manufacturing	Lumber and wood products SIC 24	Paper and allied products SIC 26	Average	All domestic employment	All manufacturing	Lumber and wood products SIC 24	Paper and allied products SIC 26	Average for wood and paper products	
1981	17,243	19,628	15,781	21,429	18,605	34,556	39,335	31,626	42,944	37,285	60.08
1982	18,482	21,117	16,517	23,148	19,833	35,055	40,053	31,328	43,905	37,617	63.48
1983	19,410	22,307	17,330	24,710	21,020	35,308	40,577	31,524	44,948	38,236	66.19
1984	20,337	23,543	17,756	26,438	22,097	35,679	41,303	31,151	46,382	38,766	68.63
1985	21,293	24,945	18,473	27,746	23,110	36,114	42,308	31,331	47,058	39,196	70.99
1986	22,160	26,003	19,225	29,202	24,214	36,690	43,053	31,831	48,350	40,091	72.72
1987	23,123	26,732	19,764	30,067	24,916	36,880	42,636	31,522	47,955	39,740	75.49
1988	24,273	27,984	20,721	31,382	26,052	37,263	42,960	31,810	48,176	39,994	78.43
1989	25,029	28,855	21,109	32,282	26,696	36,813	42,441	31,048	47,481	39,265	81.86
1990	26,257	30,054	21,712	33,514	27,613	36,919	42,258	30,529	47,123	38,826	85.63
1991	27,325	31,240	22,176	34,456	28,316	37,004	42,305	30,031	46,660	38,346	88.91
1992	28,654	32,815	23,339	36,173	29,756	37,656	43,124	30,671	47,537	39,104	91.62
1993	29,417	33,665	23,872	36,968	30,420	37,756	43,208	30,639	47,447	39,043	93.81
1994	30,139	34,704	24,391	38,260	31,326	37,919	43,662	30,687	48,136	39,412	95.7
1995	30,996	35,779	25,110	39,458	32,284	38,120	44,003	30,882	48,527	39,704	97.9
1996	32,040	37,158	26,148	40,718	33,433	38,577	44,739	31,483	49,025	40,254	100
1997	33,429	38,941	27,382	42,129	34,756	39,874	46,449	32,662	50,252	41,457	100.94
1998	35,109	40,831	28,258	43,197	35,728	41,029	47,716	33,023	50,481	41,752	103.03
1999	36,677	42,832	29,009	44,900	36,955	42,170	49,246	33,353	51,624	42,489	104.72
2000	38,759	45,704	30,018	46,519	38,269	43,403	51,180	33,615	52,093	42,854	107.52
2001	39,538	43,778	30,644	46,911	38,778	43,631	48,310	33,816	51,768	42,793	109.10
2002	40,263	44,864	31,058	48,497	39,778	43,669	48,659	33,685	52,599	43,143	111.01
2003	41,628	46,753	32,124	50,192	41,158	44,209	49,651	34,115	53,303	43,709	113.37
2004	43,280	48,659	33,866	51,338	42,602	44,679	50,232	34,961	52,997	43,979	116.63
2005	44,764	50,137	35,132	52,937	44,035	44,764	50,137	35,132	52,937	44,035	120.40
2006	46,758	52,307	35,376	54,232	44,804	45,327	50,706	34,293	52,572	43,433	124.20

Source: US DOC BEA 2008a,b.

Table 4—Wage per hour for production workers in wood products industries (NAICS 321) by region (million 2005\$)

Year	Pacific		Rocky	Not	Total	
	North	South	Coast	Mountains specified		
1997	13.68	12.68	15.21	13.99	—	13.56
1998	—	—	—	—	—	0.00
1999	—	—	—	—	—	0.00
2000	—	—	—	—	—	0.00
2001	—	—	—	—	—	0.00
2002	14.79	13.42	13.94	15.54	—	14.31
2003	14.43	14.43	14.43	14.43	—	14.26
2004	14.06	13.04	15.43	14.04	—	13.89
2005	14.13	12.97	15.07	14.43	—	13.85
2006	14.30	13.10	15.15	14.39	—	13.97

Source: US DOC BOC 1999, 2008a.

Table 5—Wage per hour for production workers in paper products industries (NAICS 322) by region (million 2005\$)

Year	Pacific		Rocky	Not	Total	
	North	South	Coast	Mountains specified		
1997	19.19	20.28	21.33	17.46	—	19.73
1998	—	—	—	—	—	0.00
1999	—	—	—	—	—	0.00
2000	—	—	—	—	—	0.00
2001	—	—	—	—	—	0.00
2002	19.61	21.24	18.68	21.46	—	20.34
2003	19.57	20.60	21.28	18.64	—	20.08
2004	19.19	20.81	20.50	18.87	—	19.91
2005	19.11	20.89	20.17	18.10	—	19.72
2006	19.25	21.35	21.02	18.53	—	20.07

Source: US DOC BOC 1999, 2008a.

Table 6—Rate of injury and illness cases per 100 full-time workers for lumber and wood products, paper and allied products, and all manufacturing industries, 1976–2006

Year	Lumber and wood products (SIC 24)	Paper and allied products (SIC 26)	Wood furniture (parts of SIC 25)	All manufacturing industries
1976	22.1	13.7	17.0	13.2
1977	22.3	13.6	16.6	13.1
1978	22.6	13.5	17.7	13.2
1979	20.7	13.5	17.6	13.3
1980	18.6	12.7	16.0	12.2
1981	17.6	11.6	14.9	11.5
1982	16.9	10.6	14.1	10.2
1983	18.3	10	13.5	10
1984	19.6	10.4	14.7	10.6
1985	18.5	10.2	13.8	10.4
1986	18.9	10.5	15.6	10.6
1987	18.9	12.8	15.4	11.9
1988	19.5	13.1	15.8	13.1
1989	18.4	12.7	14.9	13.1
1990	18.1	12.1	16.1	13.2
1991	16.8	11.2	15.4	12.7
1992	16.3	11	14.5	12.5
1993	15.9	9.9	12.6	12.1
1994	15.7	9.6	15.1	12.2
1995	14.9	8.5	12.7	11.6
1996	14.2	7.9	11.9	10.6
1997	13.5	7.3	12.7	10.3
1998	13.2	7.1	11.0	9.7
1999	13	7	10.6	9.2
2000	12.1	6.5	9.8	9
2001	10.6	6.0	10.0	8.1
2002	10.1	5.6	9.2	7.2
2003	10.0	4.8	6.8	6.8
2004	10.0	4.9	5.4	6.6
2005	9.4	4.4	NA	6.3
2006	8.5	4.3	7.1	6.0

Source: US DOL BLS 2008; US DOL BLS 2002. Wood furniture figure is simple average of rates for SIC 2511, 2517, 2521, 2541. Definition: Recordable injuries and illnesses are (1) occupational deaths; (2) nonfatal occupational illnesses; or (3) nonfatal occupational injuries involving one or more of the following: loss of consciousness, restriction of work or motion, transfer to another job, or medical treatment other than first aid.

The percentage of forest covering state land was obtained from U.S. Department of Agriculture, National Agricultural Statistics Service (NASS) data sets, provided by the U.S. Department of Agriculture, Economic Research Service (USDA ERS 2002). These values were kept constant for all three years to help ensure that changes in income from forest recreation and tourism were not a function of lost forest cover.

Income estimates across U.S. Forest Service regions were roughly calculated, as these regions do not perfectly overlay with states in Regions 1, 2, and 4. However, because this only occurs in three states—Idaho, Wyoming, and South Dakota—these overlaps were ignored and the region that

appeared to encompass the majority of each of these states was assumed to be the region for the entire state (Table 8). This limitation could easily be improved upon with access to a geographic information system (GIS) boundary file for National Forest Service regions.

Data Issues (Replicability, Availability, Precision, and Potential Bias)

Wage or salary data are expected to be available and accurate routinely in the future for only forest products industries and employees in the U.S. Department of Agriculture, Forest Service. No direct estimate of wages for employees in forest-based recreation is available, and estimates with current methods are rough. Continuing estimates of wages in state forestry agencies are not available. Wage data for non-wood products industries are not available. Injury data are available for forest products industries but not other industries.

Indicator Interpretation and Discussion

Indicator Results (Reiteration of Indicator Briefs)

What Does the Indicator Show?

U.S. Department of Agriculture, Forest Service—

Salaries—Average annual incomes related to forest management and protection employment includes the salaries of full-time permanent employees of the U.S. Department of Agriculture, Forest Service, which have increased from a median of \$41,300 in 1992 to \$48,200 in 2000, to \$50,500 in 2006 (all in 2005\$, Fig. 1).

State Forestry Agencies—Salaries—Salary of full-time permanent employees in state forestry agencies in 1998, for entry level foresters, ranged from a high of \$48,000 for the Pacific Coast, \$39,000 in the North, \$35,000 for the Rocky Mountains, and \$28,000 for the South (all in 2005\$). Values for district foresters for the same regions were \$62,000; \$63,000; \$43,000, and \$50,000 (in 2005\$, Fig. 2). Salary data are not available for more recent years.

Forest Products Industry—Annual Income and Wages

In the forest products industries, annual income per full-time equivalent employee is higher and has increased more for paper products industries than for wood products industries. For paper products, annual income increased from \$39,954 to \$52,572 between 1975 and 2006, while wood products annual income increased from \$30,866 to \$34,239 (all in 2005\$) (Fig. 3). Annual income for paper products continues to be above the average for all manufacturing and the wood products average is below the average for wood products. Production worker wages for forestry and logging, including timber tract operations, nurseries, and logging, ranged from \$33,000 to \$34,620 in 2008.

Average annual income for persons working in the forest recreation and tourism sector during 2006 was estimated to

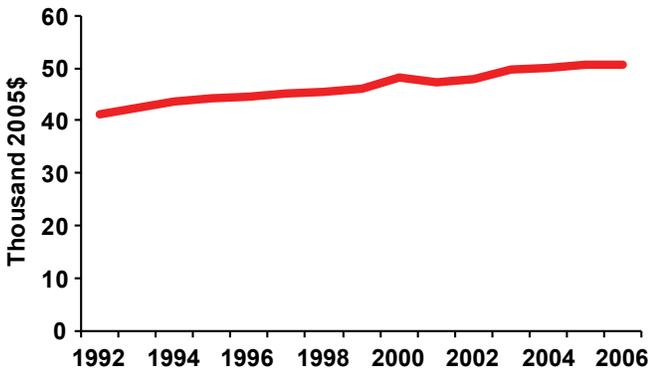


Figure 1. Estimated median salary for full-time permanent U.S. Department of Agriculture, Forest Service employees, 1992–2006 (thousand 2005\$). Source: Table 1.

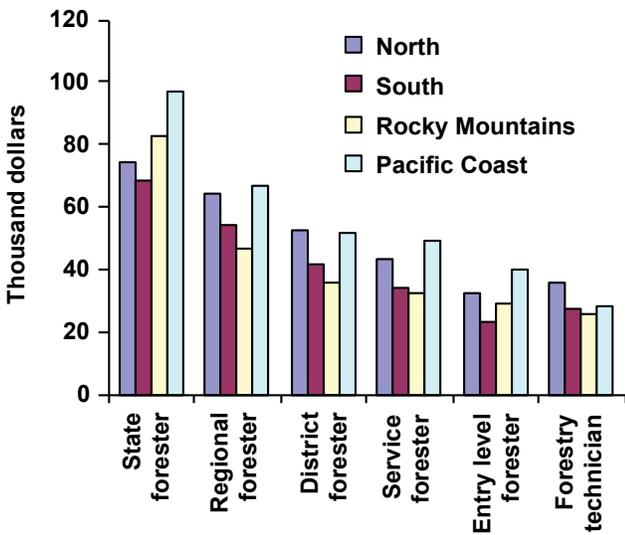


Figure 2. Average salaries for employees of state forestry agencies by RPA region, 1998. Source: Table 2.

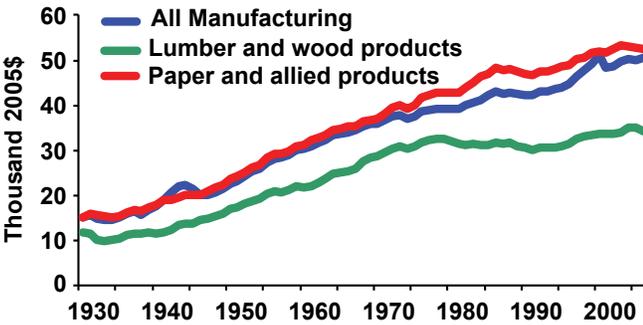


Figure 3. Wage and salary accruals per full-time equivalent employee for all manufacturing, lumber and wood products industries and paper and allied product industries, 1930–2006 (thousand 2005\$). Source: Table 3.

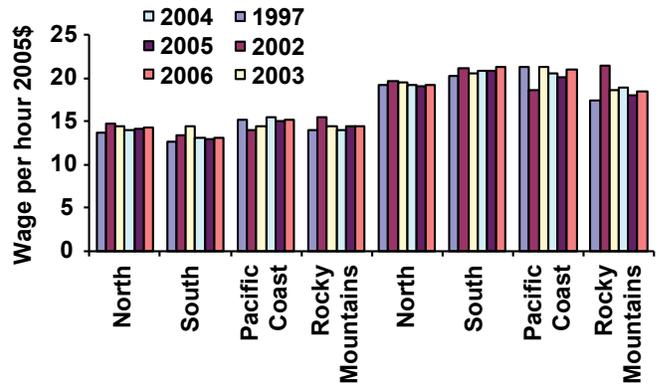


Figure 4. Wage per hour for production workers in wood products industries (left side) and paper products industries (right side) by region, 1997, 2002–2006. Sources: Tables 4 and 5.

be \$22,782, which is only a slight increase from the \$21,939 figure estimated for 2003. This is about 37% less than the 2006 national average per capita annual income of \$36,276. One likely reason for the lower income is that jobs offered in this sector tend to be lower wage and seasonal jobs.

Hourly wages for wood products industries production workers are slightly higher than the national average for the Pacific Coast and slightly lower for the South (Fig. 4). Wages for paper products industries are slightly higher in the South, Pacific Coast, and North than in the Rocky Mountains.

Forest-Based Recreation and Tourism—Annual Income— Average income in forest-based recreation and tourism in 2006 was highest for the Pacific Coast at \$24,566 and lowest for the Rocky Mountains at \$17,620 (both in 2005\$) (Fig. 5). Although these differences could be a function of forest-based recreation and tourism demand driving labor markets, fluctuations in regional economies are likely to be the major drivers of these rankings.

In the United States, the 2006 average income for a person employed in the forest recreation and tourism private sector is estimated to be \$23,517. Although data on wage rates were unavailable, it can be inferred from this annual income estimate that the average wage rate is approximately \$11.80 an hour, assuming a person works 250 days a year, 8 hours a day, totaling 2,000 hours annually. The U.S. Census Bureau reported that in 2005, the average income per household member was \$36,276 (US DOC BEA 2008b, table 659). This indicates that persons employed in the forest recreation sector make approximately 9% less than the average American. One likely reason for this is that the types of jobs that are offered in this sector tend to be low wage, seasonal jobs (Marcouiller and Deller 1996).

Leisure industries are defined as all industries under NAICS code title 71, as well as scenic and sightseeing

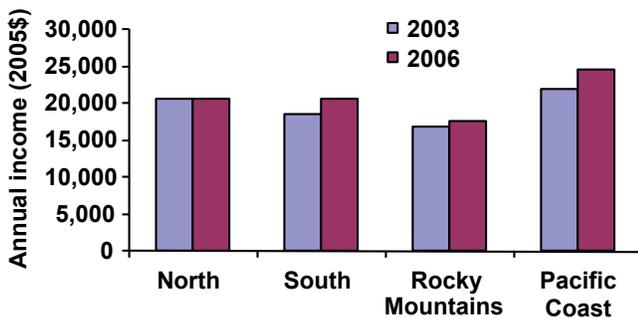


Figure 5. Annual average income for persons employed in the forest recreation and tourism sector by RPA region, 2003 and 2006.

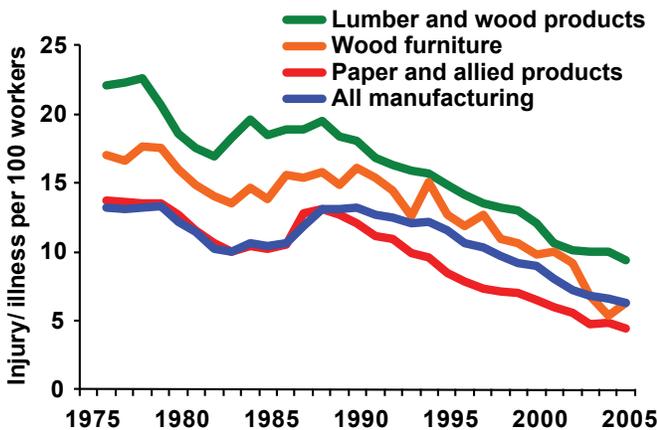


Figure 6. Rate of injury and illness cases per 100 full-time workers for lumber and wood products, paper and allied products, and all manufacturing industries, 1976–2006. Source: Table 6.

transportation (2002 NAICS code 487, under Transportation and Warehousing). Total income for all leisure industries was \$113,877,374,000. The total contribution of forest-based recreation to income in the U.S. in 2006 was approximately \$13,273,297,804, which is approximately 11.65% of the total annual income derived from leisure activities. This is a slight decrease in comparison with 2005, in which 11.95% of income from leisure activities was derived from forest recreation. In 2005, income from forest recreation totaled \$12,548,247,940, in comparison with \$104,987,892,000 for the entire leisure industry.

Forest Products Industry—Injury and Illness—Injury and illness rates for forest products industries have steadily declined since the early 1990s, with rates for wood products and furniture industries being somewhat higher than for all manufacturing, and paper products industries being somewhat lower (Fig. 6). In 2006, injuries and illness per 100 employees was 8.5 for wood products, 7.1 for wood furniture, 4.3 for paper products, and 6.0 for all manufacturing.

How Has It Changed Since 2003?

Trends in wages apparent in 2003 are the same for this report—increasing for pulp and paper industries, stable for wood products industries, increasing for the U.S. Department of Agriculture, Forest Service. Injury levels in forest products industries continue to decline. Data are still missing from a number of categories of employment, so it is not possible to indicate changes in trends.

Regional Variation and Associated Issues

Hourly wages for wood products industries production workers are slightly higher than the national average for the Pacific Coast and slightly lower for the South (Table 4, Fig. 4). Wages for paper products industries are slightly higher in the South, Pacific Coast, and North than in the Rocky Mountains (Table 5, Fig. 4).

Estimated average income in forest-based recreation and tourism in 2006 was highest for the Pacific Coast at \$24,566 and lowest for the Rocky Mountains at \$17,620 (both in 2005\$) (Table 7, Fig. 5). Although these differences could be a function of forest-based recreation and tourism demand driving labor markets, fluctuations in regional economies are likely to be the major drivers of these rankings.

Assessment of Ability to Measure Underlying Concern (How Successful was Indicator?)

General Assessment

Data that are provided on wages and income and injuries match the data requested by the TAC recommendations for a limited number of categories of employment, but data are not available for many categories of workers.

Suggested Steps for Improvement

Special surveys and studies would be needed to provide data on employment for a number of categories of forest management, non-wood products production, education, research, and environmental services.

Cross-Cutting Issues and Relation to Other Indicators

The level of wages and income and level of injuries are a factor in the resilience of forest-based communities (Indicator 38) and a factor in the importance of forests to people (Indicator 44). The level of wages is influenced by the levels of capital investment (Indicator 34) and by the levels of education and research (Indicator 35). The level of wages in forest products industries may also be influenced by competition with other countries to provide products for the United States, as indicated by trends in imports as a proportion of U.S. consumption (Indicator 32).

Concluding Remarks

What does the information on wages, income, and injuries suggest about sustainable forestry and the sustainable

Table 7—Forest recreation and tourism in the United States: Average income per worker, total aggregated income, and income as a percentage of all income from all leisure activity industries, 2003, 2005, 2006

Year	Average income per worker (\$)	Annual income per worker (2005\$)	Total income (million\$)	Total income (million 2005\$)	Income for all leisure activity industries (%)
2003	20,670	21,939	11,806	12,532	18.66
2005	22,985	22,985	12,548	12,548	18.55
2006	23,517	22,782	13,273	12,859	18.38

Table 8—Annual average income for persons employed in the forest recreation and tourism sector by region, 2003 and 2006

Forest Service Region	RPA region	By Forest Service region					By RPA region				
		2003 actual dollars (\$)	2006 actual dollars (\$)	2003 (2005\$)	2006 (2005\$)	Change (based on 2005\$) (%)	RPA region	2003 (2005\$)	2006 (2005\$)	Change (based on 2005\$) (%)	
1	Rocky Mountain	13,243	13,444	14,056	13,024	-7.34	North	20,603	20,710	0.52	
2	Rocky Mountain	16,804	17,401	17,836	16,857	-5.49	South	18,628	20,606	10.62	
3	Rocky Mountain	16,645	19,311	17,667	18,708	5.89	Rocky Mountains	16,952	17,620	3.94	
4	Rocky Mountain	17,193	22,597	18,249	21,891	19.96	Pacific Coast	21,997	24,566	11.68	
5	Pacific Coast	26,232	32,007	27,843	31,007	11.36	—	—	—	—	
6	Pacific Coast	15,217	18,710	16,152	18,125	12.22	—	—	—	—	
8	South	18,628	20,606	19,772	19,962	0.96	—	—	—	—	
9	North	19,411	21,378	20,603	20,710	0.52	—	—	—	—	
U.S. average	—	20,670	23,517	21,939	22,782	3.84	—	20,670	23,517	—	

benefits of employment? The lack of data about wages and injuries within a number of categories indicates we do not have full understanding of employment quality associated with forestry. Trends in wages for the pulp and paper industry have been increasing at the pace of increase in wages for all manufacturing while the trend in wages for solidwood industries has not kept pace. Injury rates in forest products industries have been declining at the same pace as for all manufacturing.

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Appendix—Discussion of Wages and Injuries in the Non-wood Forest Products Sectors

Businesses in the nontimber forest products (NTFP) industry are generally small, employing few people. Exceptions exist, but most businesses are what are referred to as very small enterprises, employing less than 10 people. Very small enterprises are relevant to informality for two important reasons. First, because of their low visibility, ease of displacement, and other small business/low capital investment characteristics, they provide the most appropriate setting for casual hiring, non-reported income, and other informal practices. The second point is that it is easier to operate a very small enterprise as a totally underground business. Fully informal small enterprises escape government recordkeeping. It is important to note that not all very small enterprises engage in informal practices (Alexander and others 2002b).

A few studies have attempted to estimate gross wages for wild edible mushroom harvesters. Acker (1986) said that an average wage for a mushroom picker in the mid-80s was \$830 seasonally, with a few people earning a maximum of \$4,000. In an assessment of American matsutake in the Nass Valley in British Columbia, Meyer Resources (1995) found that matsutake pickers earned an estimated \$4,500 per season in the early 1990s. Love and others (1998) estimated wages for commercial mushroom harvesters in the Olympic Peninsula in Washington at about \$30 per day. Obst and Brown (2000) reported an average wage of U.S. \$15 per hour for morel harvesters in the Northwest Territories of Canada. Other authors have found that while such wages may be standard for experienced pickers, the majority of mushroom harvesters earn far less, and many, particularly those with little or no experience, lose money. Pickers are paid immediately in cash by mushroom buyers, who often handle tens of thousands of dollars each day in high-value, high-volume areas. Mushroom buying may represent the largest legal cash-based commerce in our society.

Alexander and others (2002a) attempted to explain how harvester wages for mushroom picking could be determined. It is known locally, in many cases, what harvesters are paid for products they harvest from the forest. However, assessing a wage from those data can be problematic. Harvester costs are generally unknown, and the harvesters' personal minimum wage may vary from one market to another, may vary from one season to another, and will vary as economic conditions change.

There is also little published information about wages paid to harvesters of Christmas greens and floral products. Heckman (1951) reported daily wages of \$18 to \$40 for people who harvested floral greens in the Pacific Northwest in 1950, with a weekly maximum of \$400. It has been estimated that about 80% of boughs are used during the Christmas

holidays. The remaining 20% are used year-round by the floral market.

Injury rates for the non-timber forest products sectors have not been assessed. Because many of the primary production level workers operate in the informal economy, no data on injury rates at that level would be available without surveys. Gathering products in the forest can be dangerous, and there are reports in the media of people becoming lost or injured every year.

Workers in the informal economy tend to have very specific characteristics that can be referred to as downgraded labor. Many receive fewer benefits or lower wages, or experience worse working conditions than they would in the formal economy. Many work in the informal economy because they must.