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ABSTRACT

This skills inventory for forestry occupations was developed by a technical committee in Montana to assist in the development of model curricula and to address state labor market needs. The committee included employers from the forestry industry, members from trade and professional associations, and educators. The validated task list and defined job clusters are intended to provide information on the type and level of knowledge and skills needed for entry, retention, and advancement in Montana forestry occupations. The guide contains the following: (1) Montana supply and demand occupational information; (2) occupational characteristics of selected jobs in the forestry industry; and (3) task lists and job titles for forest industry occupations in three major categories--natural resources management, forest-related services, and forest product manufacturing. The document includes information on training time for forestry occupations; mathematics and language training time; physical demands; and environmental working conditions. (KC)

FORESTRY

Montana Center for Research, Curriculum and Personnel Development

TECHNICAL COMMITTEE ON OCCUPATIONAL CURRICULUM DEVELOPMENT

FORESTRY TECHNICAL

ADVISORY COMMITTEE

ON CURRICULUM DEVELOPMENT

JOB CLUSTERS, COMPETENCIES AND TASK ANALYSIS

Completed by the Montana
Center for Vocational Education Research,
Curriculum and Personnel Development
Located at Northern Montana College
P.O. Box 7751
Havre, Montana 59501

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  Saint Martin's College, Lacey, Washington

- Research and Analysis Bureau, Montana Department of Labor & Industry, Helena, Montana

- North Dakota State Department of Education, Bismarck, North Dakota

- Florida Department of Education, Division of Vocational, Adult and Community Education, Tallahassee, Florida

- Department of Vocational Education, Colorado State University, Fort Collins, Colorado

INTRODUCTION

The Carl D. Perkins Vocational Education Act (Public Law 98-524) was enacted in 1984 to replace the Vocational Education Act of 1963 and its subsequent amendments. It is the major vehicle for federal support of vocational education to the states.

The Perkins Act heralded a desire by Congress to better target the responsiveness of vocational and technical education and training to the requirements of the marketplace. The Act sets forth guidelines for implementing this desire by mandating significantly greater involvement of business and industry in the curriculum development process through the mechanism of State Technical Committees.

The Montana State Office of the Commissioner of Higher Education, with the assistance of the State Council for Vocational Education designated 14 distinct business and industry areas for future Technical Committee organization. Five Technical Committees were established for 1988-89 to assist in the development of model curricula and to address state labor market needs. The five committees were responsible for developing an inventory of skills that may be used to define state-of-the-art model curricula for Montana. The five designated committees are:

- TOURISM AND TRAVEL
- AGRICULTURE
- FORESTRY AND LUMBERING
- HEALTH CARE
- MINING AND MINERALS

Montana's Technical Committees represented employers from the industry or occupations for which the committee was established; members from trade or professional organizations representing relevant occupations, and members of organized labor (where appropriate).

Committee members met twice during Fall 1988 to validate relevant skills inventory lists for the foundation of curriculum development. Staff from the Center for Vocational Education served as facilitators. This validated task list and defined job clusters should provide the type and level of krowledge and skills needed for entry, retention, and advancement in Montana.

FORESTRY & LUMBERING TECHNICAL COMMITTEE

Mr. Roger Bergmeier
Chief, Forestry Assistance Bureau
Department Of State Lands
2705 Spurgin Road
Missoula, Montana 59801
542-4306

Mr. Robert Krepps
Forest Information Officer
U.S. Forest Service .
Federal Building Drawer 10014
Helena, Montana 59601
449-5201

Mr. Mark Simonich
Stoltze Land & Lumber
Columbia Falls, Montana 59912
892-3252

Mr. Jeff Jahnke
Chief, Forest Management Bureau
2705 Spurgin Road
Missoula, Montana 59801
542-4305

Dr. Sidney Frissell
Dean, School of Forestry
University of Montana
Missoula, Montana 59812
125-5521

MONTANA SUPPLY AND DEMAND INFORMATION

A continuing challenge facing education and training institutions is to identify, design, and offer training programs that serve both the needs of individual participants and the needs of the economy and society as a whole. It is crucial that training programs designed to prepare individuals for specific occupations be realistic in light of anticipated job openings (demand) and the expected number of persons available for and prepared to fill them (supply).

The following projected information can assist in looking into the future job market with some confidence. Through the use of the information individuals and jobs can be matched, thereby decreasing unemployment and increasing job satisfaction. This will also benefit the business community and taxpayers. Through the use of this information, better decisions can be made for the future by having a more realistic knowledge of Montana's employment trends.

The following tables and statistics have been taken from the Montana Supply and Demand Report, Fifth Edition, October 1988, Montana State Occupational Information, Coordinating Committee.

MONTANA FORESTRY OCCUPATIONAL INFORMATION DEMAND REPORT
1986-1995

OCCUPATIONAL TITLE	1986 EMPLOY.	1995 EMPLOY.	EST. ANNUAL OPENINGS
NATURAL RESOURCES MANAGEMENT			
Forester, Conservation Scientist	688	743	13
Forest and Conservation Workers	1087	1079	19
FORESTRY SERVICES AND CONSULTING			
Surveying and Mapping Technicians	334	389	16
All Other Engineering Technicians	441	495	15
LOG MANUFACTURING			
All Other Timber Cutting Workers	3	3	0
Log Graders and Scalers	62	66	1
Fallers and Buckers	733	777	16
Choke Setters	112	118	3
Log Handling Equipment Operators	236	253	5
Logging Tractor Operators	457	484	7
Machinists	738	750	23
Sawing Machine Tool Setters, Operators	6	6	0
Sawing Machine Operators, Tenders	617	664	13
Head Sawyers	115	123	2
Millwrights	354	383	10
Grader, Dozer, Scraper Operators	384	467	50
Industrial Truck and Tractor Operators	716	649	- 1
Mobile Heavy Equipment Mechanics	573	665	28
Welders and Cutters	712	832	25

MONTANA SUMMARY OF JOB CLUSTERS IN DESCENDING ORDER BY DEMAND, (ESTIMATED ANNUAL OPENINGS VS. TRAINING COMPLETERS)

CLUSTER TITLE	DEMAND	SUPPLY
Sales	1482	554
Institutional and Building Service	822	117
Food Production	523	132
Nursing Assistant	262	138
Heavy Equipment Repair and Operation	229	96
Office and Information Services	188	76
Recreation and Tourism	156	205
Other Medical Technology	150	238
Horticulture and Landscaping	113	24
Electrical and Electronic Technology	106	279
Natural Resources Technology	97	217
Forestry and Lumber Production	64	129
Medical Laboratory	59	193
Dental Technology	56	31
Agriculture Business	55	178
Agriculture Production	36	440
Radiologic Technology	31	22
Medical Records	27	47
Environmental Control Technology	25	24
Marketing Management	14	87
Agriculture Mechanics	12	37
Mechanical Technology	10	105
Emergency Medical Technology	9	1
Fish and Wildlife	3	75

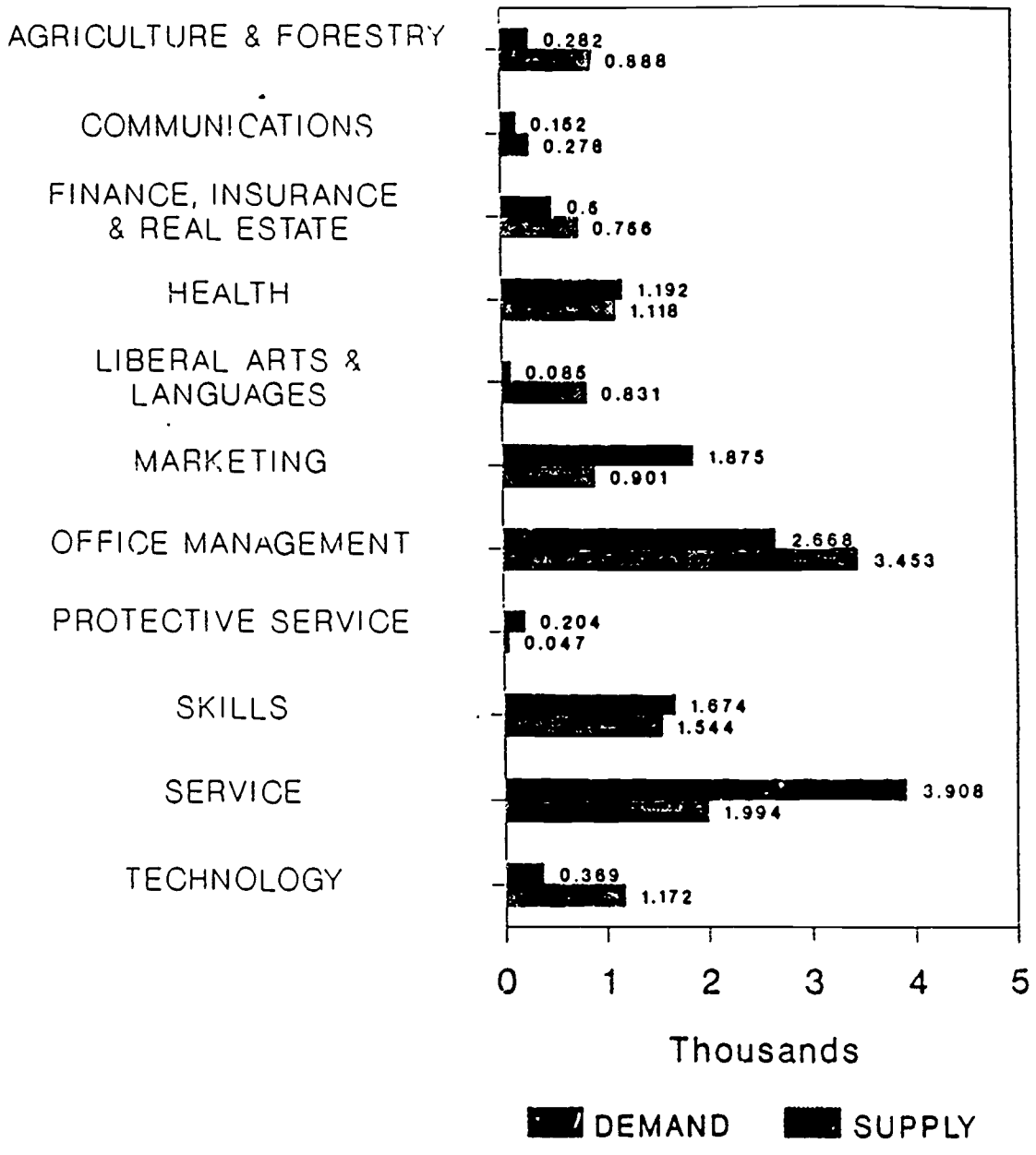
These clusters are representative of clusters found within one or more of the five designated technical advisory committees industry areas: Agriculture, Forestry, Mining and Minerals, Travel and Tourism, and Health Services.

MONTANA OCCUPATIONS RANKED BY ANNUAL OPENINGS TO 1995

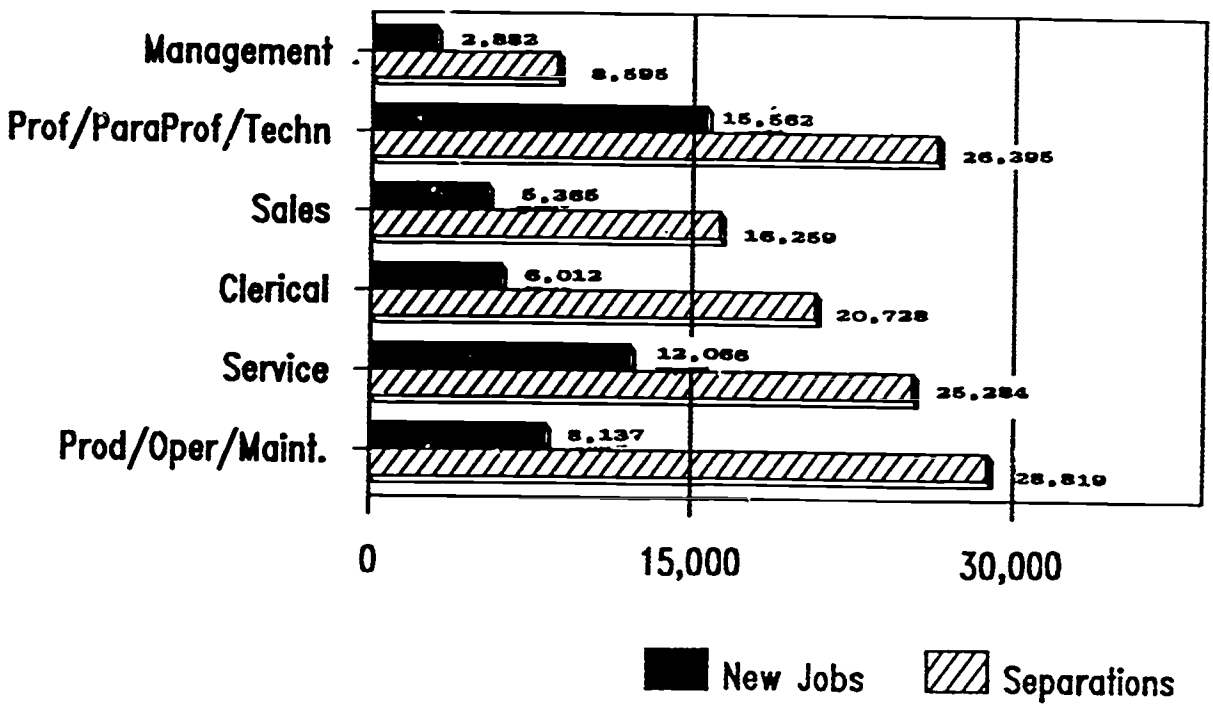
OCCUPATIONAL TITLE	ANNUAL OPENINGS TO 1995
Salespersons, Retail	604
Janitors and Cleaners, excluding Maids	498
Cashiers	324
Waiters and Waitresses	213
Nursing Aides and Orderlies	204
Maids and Housekeeping Cleaners	187
Restaurant Cooks	170
Bartenders	151
Licensed Practical Nurses	108
Gardeners and Groundskeepers	105
Fast Food and Short Order Cooks	105
Combination Food Preparations and Service	97
Institutional or Cafeteria Cooks	88
Food Preparation Workers	88
Receptionists, Information Clerks	75
Institutional Housekeepers	72
Hotel Desk Clerks	65
Food Service and Lodging Managers	65
Guards and Watch Guards	60
Grader, Dozer, Scraper Operators	50
Home Health Aides	44
All Other Foods Service Workers	44
All Other Cleaning, Building Services	43
Bus, Truck, Diesel Eng. Mechanic	40
Bakers, Bread and Pastry	32
Radiologic Technologists and Technicians	30
Butchers and Meat Cutters	29
Dining Room and Bartender Helpers	29
Mobile Heavy Equipment Mechanics	28
Hosts and Hostesses: Restaurant and Lounges	28
Medical Secretaries	27
Amusement and Recreation Attendants	26
All Other Health Service Workers	25
Welders and Cutters	25
All Other Agriculture, Forestry, Fishery Personnel	24
Advertising Sales Agents	23
Travel Agents	23
Machinists	23
Reservation and Transportation Ticket Agent	22
Marketing, Advertising, Public Relations Managers	21
Forest and Conservation Workers	19
Counter and Rental Clerks	19
Excavation Loading Machine Operators	19
Dental Assistants	18
All Other Machinery Mechanics	17
Farm and Home Management Advisors	16
Fallers and Buckers	16
Medical/Clinical Laboratory Technologists	16

Electrical and Electronic Technicians	16
Surveying and Mapping Technicians	16
Medical Assistants	14
Medical Records Technicians and Technologists	13
Sawing Machine Operator, Tender	13
Farm Purchasing Agents and Buyers	11
Machinery Maintenance Workers	11
Millwrights	10
Farm Equipment Mechanics	9
Nursery Workers	8
Logging Tractor Operators	7
Medical/Clinical Laborator Technicians	6
Mining and Related Managers	6
Emergency Medical Technicians	6
Tool Grinders, Filers, Sharpeners	6
Log Handling Equipment Operators	5
Physical Therapy Assistant	5
Recreation Workers	5
Ushers, Lobby Attendants, Ticket Takers	5
Biological, Agriculture Food Technicians	4
First Line Supervisor, Agriculture, Forestry, Fisheries	4
Pharmacy Assistants	4
Choke Setters	3
Crane and Towing Operators	3
Wood Machinists	3
Parking Lot Attendants	3
Well Head Pumpers	3
Curators, Archivists, Museum Technicians	2
Head Sawyers	2
Mine Cutting Machine Operators	2
Agriculture Production Graders and Sorters	1
Log Graders and Scalers	1
Nuclear Medicine Technologists	1
Occupational Therapy Assistants	1

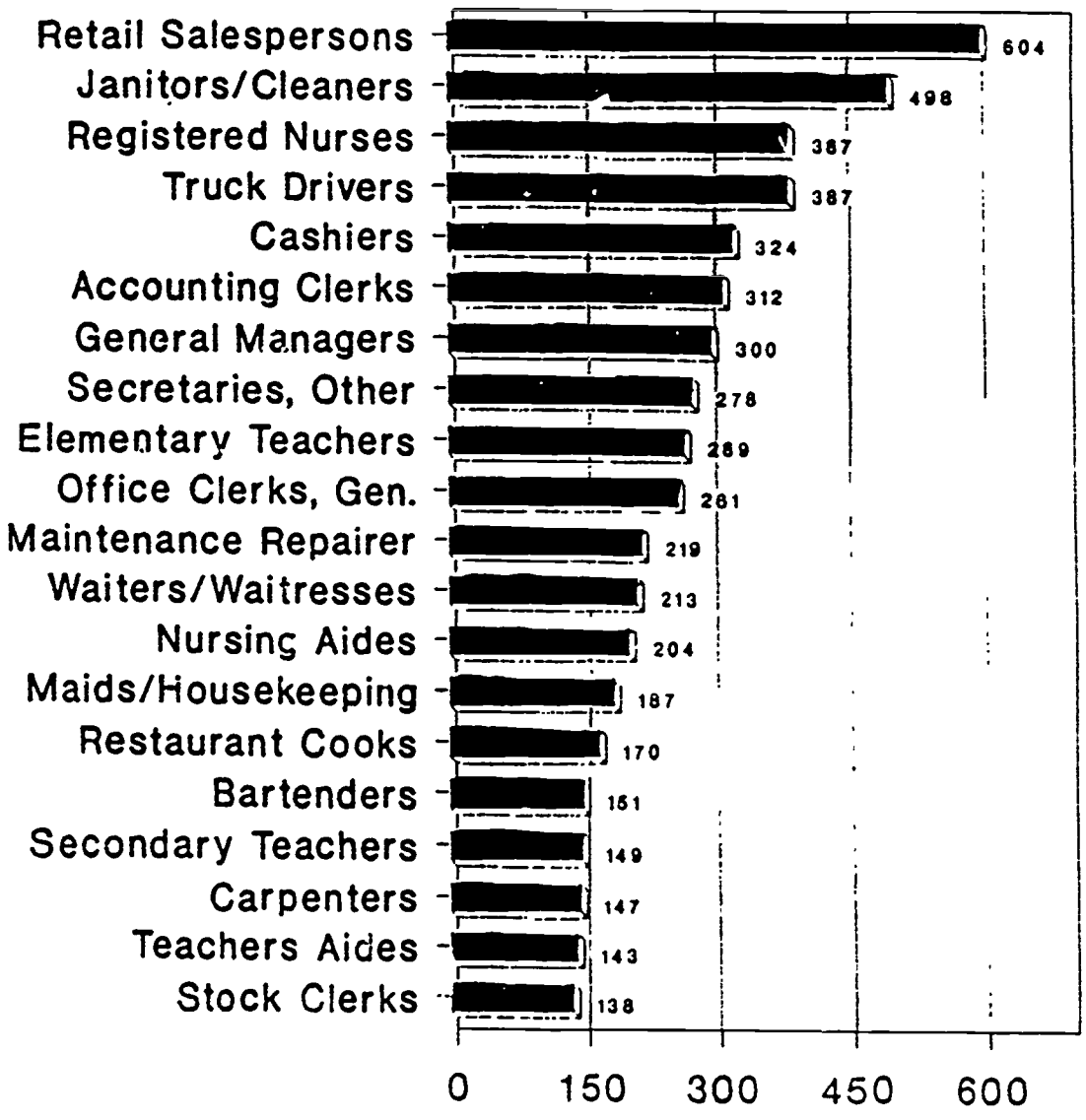
MONTANA CLUSTERS
DEMAND VS. SUPPLY
ESTIMATED ANNUAL OPENINGS VS. TRAINING COMPLETERS



Total Job Openings
Montana Occupations
Growth vs Separations



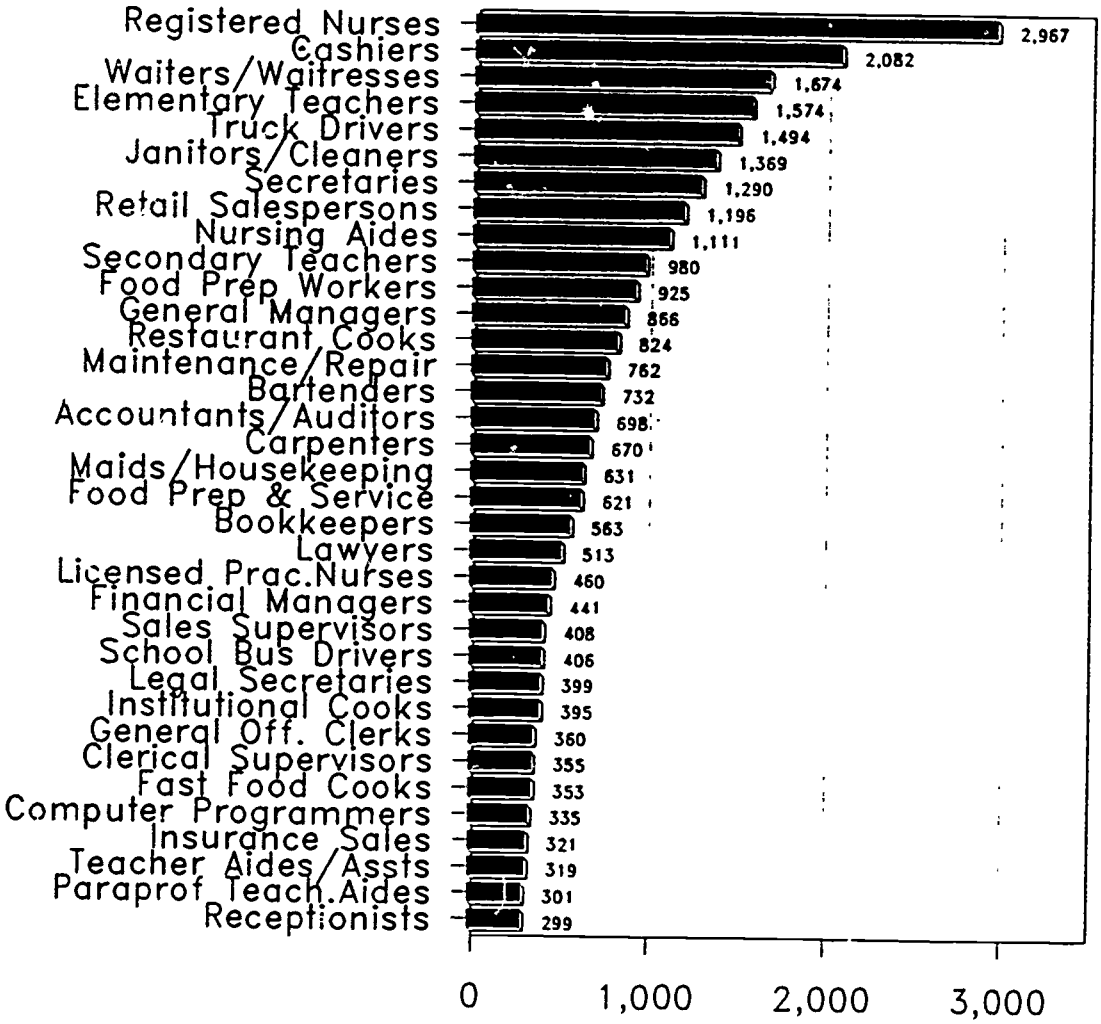
MONTANA
HIGH GROWTH OCCUPATIONS
Estimated Annual Openings to 1995



Montana Job Growth

High Growth Careers

Specific Jobs



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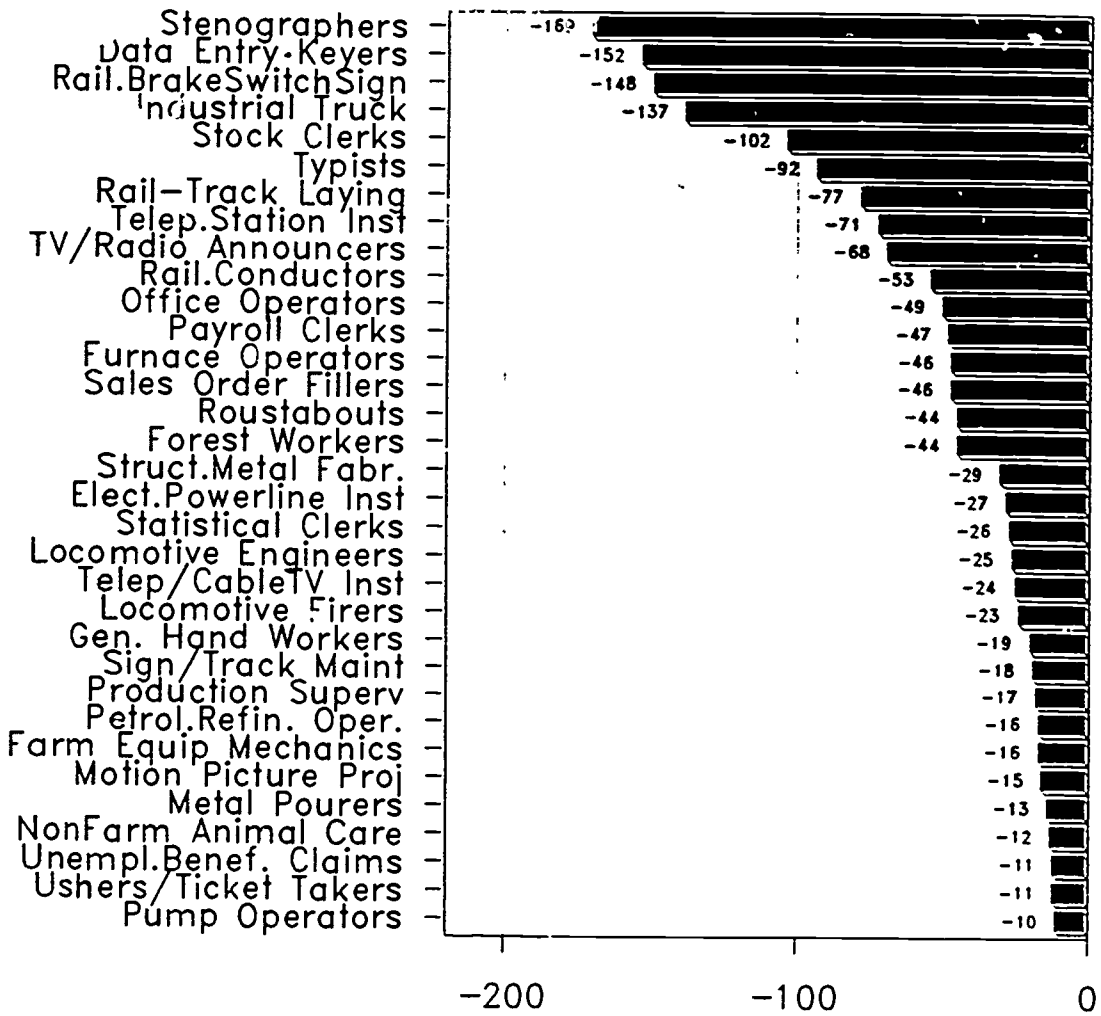
Montana Job Growth

Declining Job Areas

Specific Jobs



Occupational Characteristics of Selected Jobs in the Forestry Industry

The following list of occupations are representive of the Forestry Industry. While not all of them are found in Montana, they do however represent the most common job titles in the industry.

The selected occupational characteristics are taken from the Dictionary of Occupational Titles and the code to the numbers or letters found in each column is given on the pages following this list. The column marked SVP identifies the Specific Vocational Preparation, or the amount of time required to be trained for the job. The GED columns are marked R M L and are coded to describe the reading, mathematical and language development level necessary to meet the job requirements. The physical demands are noted in the next six columns and the environmental working conditions are coded in the last seven columns.

CIP	DICTIONARY OF OCCUPATIONAL TITLES		GED			PHYSICAL	WORKING
CODE	CODE	TITLE	SVP	R	M	L	DEMANDS	CONDITIONS
(15.0201)	018.167-010	CHIEF OF PARTY	7	5	5	4	L2 456	0
(15.0201)	018.167-014	GEODETIC COMPUTER	6	5	5	4	S 4 6	I
(15.0203)	018.167-030	SUPERVISOR, MAPPING	7	4	4	4	S 5	I
(01.0206)	018.167-034	SURVEYOR ASSISTANT, INSTRUMENTS	7	5	5	4	L 456	0
(03.0202)	040.061-030	FOREST ECOLOGIST	8	6	6	6	L 4 6	B
(03.0202)	040.061-034	FORESTER	8	5	5	5	L 56	B
(02.0409)	040.061-046	RANGE MANAGER	8	6	6	6	L 456	B
(03.0202)	040.061-054	SOIL CONSERVATIONIST	8	6	6	6	L 6	B
(00.0000)	040.061-062	WOOD TECHNOLOGIST	8	6	5	5	L 4 6	I
(02.0501)	040.261-010	SOIL-CONSERVATION TECHNICIAN	7	5	4	4	L 456	B
(02.0409)	049.127-010	PARK NATURALIST	7	5	4	5	M 456	B
(03.0405)	454.384-010	FALLER 1	6	3	1	2	H234 6	0 456
(03.0405)	454.684-010	BUCKER	3	2	1	1	H234 6	0 56
(03.0405)	454.684-014	FALLER 2	3	2	1	1	H 34 6	0 56
(03.0405)	454.684-018	LOGGER, ALL-ROUND	4	2	1	1	H234 6	0 56
(03.0405)	454.684-026	TREE CUTTER	3	2	1	1	H234 6	0 5
(03.0405)	454.687-010	CHAINSAW OPERATOR	2	2	1	1	H 34 6	0 56
(03.0405)	S921.664-014	RIGGER	5	3	2	2	V234 6	0 6
(03.0405)	921.687-014	CHOKE SETTER	2	1	1	1	V23456	0 56
(03.0405)	454.683-010	TREE-SHEAR OPERATOR	4	3	1	1	M 4 6	0 5
(03,0405)	929.683-010	LOGGING-TRACTOR OPERATOR	4	3	1	1	M 4 6	0 56
(03.0402)	451.687-010	CHRISTMAS-TREE FARM WORKER	2	1	1	1	H 34	0 45 7
(03.0403)	454.687-018	LOG MARKER	3	3	2	1	M 34 6	0 5
(03.0403)	455.367-010	LOG GRADER	6	3	3	2	L234 6	0 4 6
(03.0403)	455.487-010	LOG SCALER	5	3	3	2	L234 6	B 5

Specific Vocational Preparation (Training Time)

This represents the amount of time required to learn the techniques, acquire information, and develop the facility needed for average performance in a specific job-worker situation. The training may be acquired in a school, work, military, institutional, or a vocational environment. It does not include orientation training required of even every fully qualified worker to become accustomed to the special conditions of any new job. Specific vocational training includes training given in any of the following circumstances:

a. Vocational education (such as high school commercial or shop training, technical school, art school, and that part of college training which is organized around a specific vocational objective);
b. Apprentice training (for apprenticeable jobs only);
c. In-plant training (given by an employer in the form of organized classroom study);
d. On-the-job training (serving as learner or trainee on the job under the instruction of a qualified worker);
e. Essential experience in other jobs (serving in less responsible jobs which lead to the higher grade job or serving in other jobs that qualify).

The following is an explanation of the various levels of specific vocational preparation.

Short demonstration.

Level	Time
1	Short demonstration.
2	Anything beyond short demonstration up to and including 30 days.
3	Over 30 days up to and including 3 months.
4	Over 3 months up to and including 6 months.
5	Over 6 months up to and including 1 year.
6	Over 1 year up to and including 2 years.
7	Over 2 years up to and including 4 years.
8	Over 4 years up to and including 10 years.
9	Over 10 years.

Mathematical Development and Language Development (Training Time)

Commonly referred to as "tool knowledges," these embrace those aspects of education (formal and informal) of a general nature that contribute to the acquisition of such skills but do not have a recognized, fairly specific, occupational objective, ordinarily obtained in elementary, high school, or college environs and augmented by past experiences and self-study. They provide linkage between norms used for interpretation of the Basic Occupational Literacy Test (BOLT) scores and level requisites for DOT occupations. Following are the definitions and scale levels applicable to each:

a. Mathematical Developmental or Arithmetic Computation (M): The acquisition of basic mathematical skills, not specifically vocationally oriented, such as the ability to solve arithmetic, algebraic, and geometric problems ranging from fairly elemental to dealing with abstractions.

b. Language Development or Literacy Training (L): The acquisition of language skills, not specifically vocationally oriented, such as mastery of an extensive vocabulary; use of correct sentence structure, punctuation, and spelling; and an appreciation of literature.

Level	*Mathematical Development*	*Language Development*
6	Advanced calculus: Work with limits, continuity, real number systems, mean value theorems, and implicit function theorems. Modern algebra: Apply fundamental concepts of theories of groups, rings, and fields. Work with differential equations, linear algebra, infinite series, advanced operations methods, and functions of real and complex variables. Statistics: Work with mathematical statistics, mathematical probability, and applications, experimental design, statistical inference, and econometrics.	Reading: Read literature, book and play reviews, scientific and technical journals, abstracts, financial reports, and legal documents. Writing: Write novels, plays, editorials, journals, speeches, manuals, critiques, poetry, and songs. Speaking: Conversant in the theory, principles, and methods of effective and persuasive speeking, voice and diction, phonetics, and discussion and debate.

Level	Mathematical Development	Language Development
5	Algebra: Work with exponents and logarithms, linear equations, quadratric equations, mathematical induction and binomial theorems, and permutations. Calculus: Apply concepts of analytical geometry, differentiations and integration of algebraic functions with applications. Statistics: Apply mathematical operations to frequency distributions, reliability, and validity of tests, normal curve, analysis of variance, correlation techniques, chi-square application and sampling theory, and factor analysis.	Same as level 6
4	Algebra: Deal with system of real numbers; linear, quadratic, rational, exponential; logarithmic, angle, and circular functions, and inverse functions; related algebraic solution of equations and inequalities; limits and continuity, and probability and statistical inference. Geometry: Deductive axiomatic geometry, plane and solid; and rectangular coordinates. Shop Math: Practical application of fractions, percentages, ratio and proportion, mensuration, logarithms, slide rule, practical algebra, geometric construction, and essentials of trigonometry.	Reading: Read novels, poems, newspapers, periodicals, journals, manuals, dictionaries, thesauruses, and encyclopedias. Writing: Prepare business letters, expositions, summaries, and reports, using prescribed format, and conforming to all rules of punctuation, grammar, diction, and style. Speaking: Participate in panel discussions, dramatizations, and debates. Speak extemporaneously on a variety of subjects.
3	Compute discount, interest, profit, and loss; commission, markups, and selling price; ratio and proportion, and percentages. Calculate surfaces, volumes, weights, and measures. Algebra: Calculate variables and formulas, monomials and polynomials; ratio and proportion variables; and square roots and radicals. Geometry: Calculate plane and solid figures, circumference, area, and volume. Understand kinds of angles, and properties of pairs and angles.	Reading: Read a variety of novels, magazines, atlases, and encyclopedias. Read safety rules, instructions in the use and maintenance of shop tools and equipment, and methods and procedures in mechanical drawing and layout work. Writing: Write reports and essays with proper format, punctuation, spelling, and grammar, using all parts of speech. Speaking: Speak before an audience with poise, voice control, and confidence, using correct English and well-modulated voice.

Level	*Mathematical Development*	*Language Development*
2	Add, subtract, multiply, and divide all units of measure. Perform the four operations with like common and decimal fractions. Compute ratio, rate, and percent. Draw and interpret bar graphs. Perform arithmetic operations involving all American monetary units.	Reading: Passive vocabulary of 5,000-6,000 words. Read at rate of 190-215 words per minute. Read adventure stories and comic books, looking up unfamiliar words in dictionary for meaning, spelling, and pronunciation. Read instructions for assembling model cars and airplanes. Writing: Write compound and complex sentences, using cursive style, proper end punctuation, and employing adjectives and adverbs. Speaking: Speak clearly and distinctly with appropriate pauses and emphasis, correct pronunciation, variations in word order, using present, perfect, and future tenses.
1	Add and subtract two digit numbers. Multiply and divide 10's and 100's by 2, 3, 4, 5. Perform the four basic arithmetic operations with coins as part of a dollar. Perform operations with units such as cup, pint, and quart; inch, foot, and yard; and ounce and pound.	Reading: Recognize meaning of 2,500 (two- or three-syllable) words. Read at a rate of 95-120 words per minute. Compare similarities and differences between words and between series of numbers. Writing: Print simple sentences containing subject, verb, and object, and series of numbers, names, and addresses. Speaking: Speak simple sentences, using normal word order, and present and past tenses.

Physical Demands

The physical demands listed in this publication serve as a means of expressing both the physical requirements of the job and the physical capacities (specific physical traits) a worker must have to meet those required by many jobs (perceiving by the sense of vision), and also the name of a specific capacity possessed by many people (having the power of sight). The worker must possess physical capacities at least in an amount equal to the physical demands made by the job.

The Factors

1. Strength: This factor is expressed in terms of *Sedentary, Light, Medium, Heavy,* and *Very Heavy.* It is measured by involvement of the worker with one or more of the following activities:

   a. Worker position(s):

      (1) *Standing:* Remaining on one's feet in an upright position at a workstation without moving about.
      (2) *Walking:* Moving about on foot.
      (3) *Sitting:* Remaining in the normal seated position.

   b. Worker movement of objects (including extremities used);

      (1) *Lifting:* Raising or lowering an object from one level to another (includes upward pulling).
      (2) *Carrying:* Transporting an object, usually holding it in the hands or arms or on the shoulder.
      (3) *Pushing:* Exerting force upon an object so that the object moves away from the force (includes slapping, striking, kicking, and treadle actions).
      (4) *Pulling:* Exerting force upon an object so that the object moves toward the force (includes jerking).

The five degrees of Physical Demands Factor No. 1 (strength), are as follows:

S Sedentary Work

Lifting 10 lbs. maximum and occasionally lifting and/or carrying such articles as dockets, ledgers, and small tools. Although a sedentary job is defined as one which involves sitting, a certain amount of walking and standing is often necessary in carrying out job duties. Jobs are sedentary if walking and standing are required only occasionally and other sedentary criteria are met.

L Light Work

Lifting 20 lbs. maximum with frequent lifting and/or carrying of objects weighing up to 10 lbs. Even though the weight lifted may be only a negligible amount, a job is in this category when it requires walking or standing to a significant degree, or when it involves sitting most of the time with a degree of pushing and pulling of arm and/or leg controls.

M Medium Work

Lifting 50 lbs. maximum with frequent lifting and/or carrying of objects weighing up to 25 lbs.

H Heavy Work

Lifting 100 lbs. maximum with frequent lifting and/or carrying of objects weighing up to 50 lbs.

V Very Heavy Work

Lifting objects in excess of 100 lbs. with frequent lifting and/or carrying of objects weighing 50 lbs. or more.

2. *Climbing and/or Balancing*
   (1) Climbing: Ascending or decending ladders, stairs, scaffolding, ramps, poles, ropes, and the like, using the feet and legs and/or hands and arms.
   (2) Balancing: Maintaining body equilibrium to prevent falling when walking, standing, crouching, or running on narrow, slippery, or erratically moving surfaces; or maintaining body equilibrium when performing gymnastic feats.

3. *Stooping, Kneeling, Crouching, and/or Crawling:*
   (1) Stooping: Bending the body downward and forward by bending the spine at the waist.
   (2) Kneeling: Bending the legs at the knees to come to rest on the knee or knees.
   (3) Crouching: Bending the body downward and forward by bending the legs and spine.
   (4) Crawling: Moving about on the hands and knees or hands and feet.

4. *Reaching, Handling, Fingering, and/or Feeling:*
   (1) Reaching: Extending the hands and arms in any direction.
   (2) Handling: Seizing, holding, grasping, turning, or otherwise working with the hand or hands (fingering not involved).
   (3) Fingering: Picking, pinching, or otherwise working with the fingers primarily (rather than with the whole hand or arm as in handling).
   (4) Feeling: Perceiving such attributes of objects and materials as size, shape, temperature, or texture, by means of receptors in the skin, particularly those of the fingertips.

5. *Talking and/or Hearing:*
   (1) Talking: Expressing or exchanging ideas by means of the spoken word.
   (2) Hearing: Perceiving the nature of sounds by the ear.

6. *Seeing:* Obtaining impressions through the eyes of the shape, size, distance, motion, color or other characteristics of objects. The major visual functions are: (1) acuity, far and near, (2) depth perception, (3) field of vision, (4) accommodation, and (5) color vision. The functions are defined as follows:

   (1) Acuity, far—clarity of vision at 20 feet or more. Acuity, near—clarity of vision at 20 inches or less.
   (2) Depth perception—three-dimensional vision. The ability to judge distance and space relationships so as to see objects where and as they actually are.
   (3) Field of vision—the area that can be seen up and down or to the right or left while the eyes are fixed on a given point.
   (4) Accommodation—adjustment of the lens of the eye to bring an object into sharp focus. This item is especially important when doing near-point work at varying distances from the eye.
   (5) Color vision—the ability to identify and distinguish colors.

Environmental Working Conditions

Environmental conditions are the physical surroundings of a worker in a specific job.

1. *Inside, Outside, or Both:*
   I Inside: Protection from weather conditions but not necessarily from temperature changes.
   O Outside: No effective protection from weather.
   B Both: Inside and outside.

A job is considered "inside" if the worker spends approximately 75 percent or more of the time inside, and "outside" if the worker spends approximately 75 percent or more of the time outside. A job is considered "both" if the activities occur inside or outside in approximately equal amounts.

2. *Extremes of Cold Plus Temperature Changes:*
   (1) Extremes of Cold: Temperature sufficiently low to cause marked bodily discomfort unless the worker is provided with exceptional protection.
   (2) Temperature Changes: Variations in temperature which are sufficiently marked and abrupt to cause noticeable bodily reactions.

3. *Extremes of Heat Plus Temperature Changes:*
   (1) Extremes of Heat: Temperature sufficiently high to cause marked bodily discomfort unless the worker is provided with exceptional protection.
   (2) Temperature Changes: Same as 2(2).

4. *Wet and Humid:*
   (1) Wet: Contact with water or other liquids.
   (2) Humid: Atmospheric condition with moisture content sufficiently high to cause marked bodily discomfort.

5. *Noise and Vibration:* Sufficient noise, either constant or intermittent, to cause marked distraction or possible injury to the sense of hearing, and/or sufficient vibration (production of an oscillating movement or strain on the body or its extremities from repeated motion or shock) to cause bodily harm if endured day after day.

6. *Hazards:* Situations in which the individual is exposed to the definite risk of bodily injury.

7. *Fumes, Odors, Toxic Conditions, Dust, and Poor Ventilation:*
   (1) Fumes: Smoky or vaporous exhalations, usually odorous, thrown off as the result of combustion or chemical reaction.
   (2) Odors: Noxious smells, either toxic or nontoxic.
   (3) Toxic Conditions: Exposure to toxic dust, fumes, gases, vapors, mists, or liquids which cause general or localized disabling conditions as a result of inhalation or action on the skin.
   (4) Dust: Air filled with small particles of any kind, such as textile dust, flour, wood, leather, feathers, etc., and inorganic dust, including silica and asbestos, which make the workplace unpleasant or are the source of occupational diseases.
   (5) Poor Ventilation: Insufficient movement of air causing a feeling of suffocation; or exposure to drafts.

TECHNICAL COMMITTEE ON CURRICULUM PLANNING

F O R E S T R Y

The Forestry and Lumbering Committee divided the forest industry into three major categories:

I. Natural Resources Management
   1. Forest Technologist
   2. Service Forester and Consultant
   3. Nursery Operator

II. Forest-Related Services
   1. Heavy Equipment Operation/Mechanic
   2. Surveyor
   3. Timber Harvester and Marketer

III. Forest Product Manufacturing
   1. Wood Products Manufacturer
   2. Secondary Forest Product Manufacturer/ Residue Re-manufacturer

Under these categories, the committee identified specific job titles and tasks for each title.

I. Natural Resources Management

1. Forest Technologist

a. Assist in managing forest properties
   -measure distance between sample plots
   -record number of trees by species
   -assist in marking timber for thinning
   -use a compass to direct cruising operations
   -measure tree height with instruments
   -recognize and mark insect damaged trees
   -mark undesirable trees to be cut
   -measure growth rate using increment borer
   -measure basal area using prism or other instruments
   -lay out sample plots
   -calculate volume of timber
   -record volume of timber
   -use ground equipment to spray for insect control
   -interpret aerial photographs
   -assist in building and repairing structures
   maintain ditches, culverts and roads
   -analyze a timber sale contract
   -analyze an equipment lease contract

b. Assist in conducting surveys and measurements and marking boundaries
   -mark boundaries and corners using paint or by blazing
   -make linear measurements by pacing
   -make linear measurements by using a surveyor's chain
   -clear brush for surveying team
   -set up surveying instruments
   -calculate land area measured
   -use maps to locate and report position
   -measure acreage
   -use photo scales
   -record measurements on photos or in records
   -make maps
   -interpret a real estate or land description
   -determine locations and other information from maps

c. Perform conservation and reforestation duties
   -keep record of trees planted, area covered and time spent
   -transport and care for seedling from nursery to planting site
   -prepare site for planting trees
   -plant tree seedlings using hand or mechanical planter
   -collect cones and/or seeds from trees

d. Perform forest fire management, prevention, control and use
   -backfire to consume material
   -extinguish spotfires
   -establish fireline by hand
   -use appropriate firefighting tools and equipment
   -describe personal safety procedures for fighting a forest fire
   -apply prescribed firefighting management techniques
   -understand principles of fire behavior
   -follow procedures according to national fire suppression organizational structure (Incident Command System - ICS)

e. Maintain tools and equipment
   -change and maintain oil and oil filters in gasoline and diesel engines
   -maintain hydraulic system fluids
   -maintain tire air pressure on vehicles and equipment
   -maintain battery electrolite level, terminals and cables
   -maintain coolant system on equipment and vehicles
   -service air filters
   -lubricate and grease equipment
   -maintain and service small gasoline engines
   -maintain chainsaw chain and guide
   -replace hoses and lines
   -repair or replace cables and wire rope
   -perform minor welding repairs using arc and oxy-acetylene equipment
   -paint structures and equipment

f. Identify natural plant and animal life
   -identify major plant life in a given area and its relationship to other resources
   -name and identify habitats of endangered plant species in Montana
   -recognize and interpret wildlife game laws, rules and regulations
   -identify species of wildlife common to Montana and classify them as game, non-game, endangered or threatened
   -describe characteristics of wildlife and plant populations
   -evaluate, improve and maintain the habitat and physical condition of selected plants or wildlife species
   -identify commercial trees and their habitats
   -identify the interrelationship between site, flora and fauna

g. Collect samples and specimens
   -collect soil and water samples
   -interpret analysis of soil and water samples
   -collect test pit information for building purposes
   -collect air samples
   -interpret analysis of air samples
   -interpret basic soil differences
   -collect plant and animal specimens

h. Practice safety
   -wear personal safety gear and appropriate clothing
   -study each task to be performed in regard to safety and efficiency
   -operate machinery and equipment according to design specifications
   -keep work area free of clutter, flammable materials and other hazards
   -observe color code warnings on equipment and machinery
   -apply emergency first aid treatment
   -safely handle and store flammable materials and dangerous chemicals

i. Supervise the protection of forests and woodlands
   -identify forest insects
   -describe insect population dynamics
   -describe stress agents of forest trees
   -prevent and control stress agents of forest trees
   -describe elements of chemical control and biological control of forest pests
   -describe symptoms of insect and disease damage to forest trees
   -identify insecticides used to control forest pests
   -identify common forest tree diseases
   -determine the feasibility of controlling forest tree insects and diseases
   -demonstrate knowledge of maladies of tree disorders other than insects and diseases

j. Keep and analyze records
   -keep and maintain equipment service and maintenance records
   -maintain fiscal documents
   -maintain personnel records
   -record and report accidents
   -maintain an historical file on forestry practices
   -base decisions on the analysis of records

k. Supervise employees
   -supervise timber markers, hand planting, fire suppression and other crews
   -train and supervise employees in the use of tools and equipment used in the forest
   -instruct employees in policies and procedures
   -evaluate personnel
   -instruct and monitor employee safety

l. Identify timber sale administration procedures
   -conduct pre-sale tour
   -conduct pre-operations tour
   -inspect road building efforts
   -recognize properly constructed road bed, cut and fill, culvert installation, drain dip, slash filtered window, bridges, etc.
   -inspect logging activity
   -ensure appropriate bonds have been received
   -ensure stumpage payments are up-to-date
   -track truck tickets issued and returned
   -close sale with final inspection
   -recognize when terms of contract have been met
   -maintain adequate communication skills and negotiation skills as well as technical forestry skills

m. Analyze technical information and incorporate into management of operation
   -maintain a current file of technical information
   -improve skills and knowledge through seminars and workshops
   -interpret and apply technical information
   -identify governmental and private agencies providing technical assistance

n. Demonstrate leadership, employability, communication and human relations skills
   -conduct a job search
   -secure information about a job
   -identify documents that may be required when applying for a job
   -complete a job application form correctly
   -demonstrate competence in job interview techniques
   -identify or demonstrate appropriate responses to criticism from employer, supervisor or other persons
   -identify acceptable work habits
   -demonstrate knowledge of how to make job changes appropriately
   -demonstrate acceptable employee health habits

2. Forest Servicer and Consultant

a. Assist in management of forest properties
- -measure distance between sample plots
- -record number of trees by species
- -assist in marking timber for thinning
- -use a compass to direct cruising operations
- -measure tree height with instruments
- -recognize and mark insect damaged trees
- -mark undesirable trees to be cut
- -measure growth rate using increment borer
- -measure basal area using prism or other instruments
- -lay out sample plots
- -calculate volume of timber
- -record volume of timber

b. Conduct surveys and measure and mark boundaries
- -mark boundaries and corners using paint or by blazing
- -make linear measurements by pacing
- -make linear measurements by using a surveyor's chain
- -clear brush for surveying team
- -set up surveying instruments
- -use maps to locate and report position

c. Perform reforestation duties
- -keep record of trees planted, area covered and time spent
- -transport and care for seedling from nursery to planting site
- -prepare site for planting trees
- -plant tree seedlings using hand or mechanical planters
- -collect cones and/or seeds from trees

d. Operate and maintain tools and equipment
- -change and maintain oil and oil filters in gasoline and diesel engines
- -maintain hydraulic system fluids
- -maintain tire air pressure on vehicles and equipment
- -maintain battery electrolyte level, terminals and cables
- -maintain coolant systems on equipment and vehicles
- -service air filters
- -lubricate and grease equipment
- -maintain and service small gasoline engines
- -maintain chainsaw chain and guide
- -replace hoses and lines
- -repair or replace cables and wire rope
- -perform minor welding repairs using arc and oxy-acetylene equipment
- -paint structures and equipment

e. Identify natural plant and animal life
   -identify major plant life in a given area and its relationship to other resources
   -name and identify habitats of endangered plant species in Montana
   -recognize and interpret wildlife game laws, rules and regulations
   -identify species of wildlife common to Montana and classify them as game, non-game, endangered or threatened
   -describe the characteristics of wildlife and plant populations
   -evaluate, improve and maintain the habitat and physical condition of selected plants or wildlife species
   -identify commercial forest trees and their habitats
   -identify the interrelationship between site, flora and fauna

f. Interpret aerial photographs and read maps
   -measure acreage
   -use photo scales
   -record measurements on photos or in records
   -make maps
   -interpret a real estate or land description
   -determine locations and other information from maps

g. Keep and analyze records
   -keep daily record of work accomplished
   -maintain historical records of site plan
   -assist with reports
   -prepare requisitions
   -keep personnel records and information
   -record field data
   -analyze reports and records

h. Observe and apply state, federal and local laws relative to forest and natural resources operations
   -list agencies responsible for administering regulations relative to occupation
   -explain laws and regulations for landowners

i. Collect samples and specimens
   -collect soil samples
   -collect water samples
   -interpret analysis of soil and water samples
   -collect test pit information for building purposes
   -collect air samples
   -interpret analysis of air samples
   -interpret basic soil differences
   -collect plant and animal specimens

j. Practice safety
-wear personal safety gear and appropriate clothing
-study each task to be performed in regard to safety and efficiency
-operate machinery and equipment according to design specifications
-keep work area free of clutter, flammable materials and other hazards
-observe color code warnings on equipment and machinery
-apply emergency first aid treatment
-safely handle and store flammable fuels and dangerous chemicals
-demonstrate safe and effective fire extinguishing techniques

k. Practice soil conservation
-adapt conservation practices
-determine sites best suited for tree planting
-describe importance of drains and water courses
-describe seeding and land preparation conservation practices
-describe soil and water conservation practices
-compare various range use practices
-interpret and explain technical information for landowner

l. Assist in watershed management
-determine significant erosion hazards and other problems related to protection of the environment
-gather drainage area data for watersheds
-record physical and topographical data
-measure stream flow
-measure water level
-determine soil loss

m. Supervise the protection of forests and woodlands
-identify forest insects
-describe insect population dynamics
-describe stress agents of forest trees
-prevent and control stress agents of forest trees
-describe symptoms of insect and disease damage to forest trees
-describe elements of chemical control and biological control to forest pests
-identify insecticides used to control forest insects
-identify common forest tree diseases
-determine the feasibility of controlling forest fire insects and diseases
-demonstrate knowledge of maladies or tree disorders other than insects and diseases

n. Identify timber sale administration procedures
-conduct pre-sale tour
-conduct pre-operations tour
-inspect road building efforts
-recognize properly constructed road bed, cut and fill, culvert installation, drain dip, slash filtered window, bridges, etc.
-inspect logging activity
-ensure appropriate bonds have been received
-ensure stumpage payments are up-to-date
-track truck tickets issued and returned
-close sale with final inspection
-recognize when terms of contract have been met
-maintain adequate communication skills and negotiation skills as well as technical forestry skills

o. Demonstrate leadership, communication, employability and human relations skills
-conduct a job search
-secure information about a job
-identify documents that may be required when applying for a job
-complete a job application form correctly
-demonstrate competence in job interview techniques
-identify or demonstrate appropriate responses to criticism from employer, supervisor, or other persons
-identify acceptable work habits
-demonstrate knowledge of how to make job changes appropriately
-demonstrate acceptable employee health habits

p. Analyze technical information and incorporate into management of the operation
-maintain a current file of technical information
-improve skills and knowledge through seminars and workshops
-interpret and apply technical information
-identify governmental and private agencies providing technical assistance

3. Nursery operator
a. Botanical science
-identify principles of plant growth
-name parts of plant cells and function
-explain reproductive process
-trace photosynthesis process
-identify major characteristics of plants

b. Forest ecology
-determine stages of forest plant succession
-identify role of natural agents of succession vs. manmade processes (logging, etc.)
-identify role of plant quadrant studies
-explain process of forest micro-succession
-explain role of diversity in forest ecosystem

c. Soils and uses
-explain how soil affects human cultures
-identify basic physical properties of soils
-identify basic chemical properties of soils
-identify importance of moisture content
-contrast soil erosion and soil depletion
-identify importance of soil conservation
-identify various types of soils

d. Trees and shrubs
-identify basic taxonomy of trees
-use key to identify tree species by leaf, bark, twig
-make a tree key and associated plant species

e. Commercial stand development
-trace stages of commercial stand development

f. Major commercial hardwood/softwood species
-define terms and principles associated with hardwood/softwood species growth
-identify Montana tree species and current and potential commercial value
-identify major hardwoods/softwoods by sawn woods

g. List types and geographical areas of trees for Montana

II. Forest-Related Services

1. Heavy equipment operation/mechanic
a. Operational skills

Loader
-load trucks
-load scrapers
-stockpile
-clean work area
-keep work area level
-learn short cycle

Graders
-rough blade level areas
-blade road surface
-ditching
-sloping

Backhoe
-trenching
-dig pits
-bury pipe
-dig pipe

Dump trucks
-haul material
-pile and/or spread dump

5th Wheel tractors
-operate fifth-wheel tractor

Track-type tractors
-push material over a distance
-dig pit
-stockpile material
-push load scraper
-pull load wheel scraper

Excavator
-dig trenches
-dig pit

Scrapers
-dig trenches
-haul material
-level material on work pad

b. Heavy equipment mechanics
-maintain safe work environments
-operate machines
-troubleshoot and repair hydraulic systems
-use tools and shop equipment
-keep records
-troubleshoot and repair power train systems
-perform engine repairs
-troubleshoot and repair air and brake systems

2. Surveyor
a. Survey and measure forests
-identify parcels of land based on legal descriptions
-interpret aerial photographs
-survey forest boundaries and acreage
-produce finished map of forest area
-determine forest topography
-operate current tree measuring devices
-estimate timber volumes by product
-select and use tree volume tables
-timber stand growth projection
-demonstrate sampling techniques
-determine forest stocking rate

b. Conduct surveys and measure and mark boundaries
-mark boundaries and corners
-make linear measurements
-clear brush
-set up surveying instruments
-calculate land area measured
-use maps to locate and report position

c. Interpret aerial photographs and read maps
-measure acreage
-use photo scales
-record measurements on photos or in records
-make maps
-interpret real estate and/or legal descriptions
-determine location and other information from maps

3. Timber Harvester and Marketer
a. Recognize the importance of forestry to the economy
-identify job opportunities in the timber harvesting industry
-recognize the value of forests for soil, water, and wildlife conservation, and for recreational activities
-explain the meaning of forestry-related terminology
-identify trees of commercial importance
b. Observe safety precautions
-wear personal safety equipment and clothing appropriate for the task to be performed
-study and understand each task before it is to be performed
-use tools, machinery and materials for their intended purpose
-operate all machinery and equipment according to recommendations of the instructor and operators' manual
-keep the work area free of clutter, flammable materials to the extent possible, and other potential hazards
-practice basic first aid, including that for snake bites
identify correct color coding for machinery and equipment
-properly use and store flammable materials
-use safety equipment and devices in shop and on timber harvesting equipment
-extinguish fires in shop and forest

c. Procure timber for harvesting
-locate a tract of timber by correctly interpreting legal land descriptions, maps and aerial photography
-mark boundaries of a tract of timber using current equipment and practices
-determine volume of commercial standing timber in cords, board feet and weight using accepted methods
-determine value of a tract of timber based on ease of logging, volume of timber, hauling distance, cutting method, current prices and other criteria
-determine legal ownership of a piece of property and the timber growing on it
-list and explain the major consideration in legal agreements used in timber purchase contracts
-complete a timber purchase agreement
-complete a contract for cutting and hauling for a broker
-determine a volume of felled wood
-determine market for different timber products

d. Organize timber harvesting systems
   -explain advantages and disadvantages of each of the following systems: partially mechanized shortwood, mechanized shortwood, partially mechanized longwood, mechanized longwood, chipping
   -list crew members' tasks for each system above
   -determine relative investment cost of each system listed above
   -layout and determine construction methods needed to build logging roads for a given tract of timber
   -plan and organize logging activities
   -select appropriate machinery, equipment, and materials for harvesting a given tract
   -construct a log landing, if appropriate to system used

e. Finance the timber harvesting system
   -identify major sources of credit for timber harvesting operations
   -determine financing required for beginning a small logging enterprise
   -list types of loans
   -determine interest rates and total interest charged on a given loan
   -explain the necessity of a good credit rating
   -determine cost of a loan other than interest rates
   -select adequate and economical insurance coverage for liability, life, health, vehicles, etc.
   -complete loan and insurance applications

f. Demonstrate skills in business management procedures
   -demonstrate basic bookkeeping skills
   -keep the following records: income and expenses, employee time, maintenance, repair, equipment, timber harvest volume, income tax and social security, workman's compensation, insurance
   -from records and observations, determine equipment replacement requirements
   -determine procedures for purchase and assembling on site all machinery, materials and supplies needed for this operation
   -identify and follow all laws and regulations affecting a timber harvesting operation

g. Market timber products
   -correctly complete different timber sale contracts
   -locate profitable markets for forest products: sawmills, paper mills (pulpwood and chips), veneer mills, plywood mills, furniture manufacturers, brokers, others.
   -identify up-to-date marketing information
   -identify characteristics of timber harvesting systems
   -conduct a timber sale
   -identify equipment used in the processing of wood products

-grade logs and lumber
-identify methods of processing wood and wood products
-scale pulpwood and saw log
-safely deliver products to manufacturing sites

h. Select and use fuels, lubricants and other supplies
-determine the proper fuel for each engine used
-purchase, store and use fuel and lubricant correctly
-list the different types and octane ratings of gasolines and types of diesel fuels
-transfer fuels from storage to machine tank safely
-explain the types of lubricating oils and uses of each common type
-explain the types of lubricating grease and uses of each common type
-drain, flush and replace oils used in timber harvesting machinery
-lubricate all points on machinery as recommended by manufacturer
-mix fuel and oil for two-cycle engines as recommended in operators manual
-select and use hydraulic fluids as recommended by manufacturer

i. Operate and maintain shop machinery, equipment and tools
-identify and describe the use of hand tools used in maintenance and basic repair of timber harvesting machinery and equipment
-demonstrate the safe use of each tool used in maintenance and repair
-maintain tools used in list above in safe, efficient working conditions
-identify and describe the use of the following power tools: drill press, grinder, portable drill, portable grinder, metal cutting bandsaw, arc welder, oxy-acetylene welder, impact wrench, air compressor, steam cleaner, others as identified by supervisor
-demonstrate safe use of each power tool listed above, and that of commonly used accessories
-maintain power tools listed above in an efficient, safe operating condition
-select the recommended amperage and electrode for welding a given thickness and type of metal
-strike and maintain an arc
-prepare metal and lay a bead
-prepare metal and make a: butt weld, fillet weld, vertical up and down weld, horizontal weld
-demonstrate recommended maintenance and storage procedures for arc and oxy-acetylene welding equipment and supplies
-identify and describe the purposes of different items of oxy-acetylene equipment

-set up, adjust and operate oxy-acetylene welding and cutting equipment
-cut and pierce metal using the torch
-weld and braze with oxy-acetylene equipment
-demonstrate recommended maintenance, cleaning and shut-down procedures for oxy-acetylene equipment

j. Operate and maintain chainsaws
-identify and explain the basic functions of the major parts of chainsaw
-select the appropriate chainsaw for a given job
-use proper procedure for refueling and starting a chainsaw
-safely operate and stop a chainsaw
-clean and adjust a chainsaw for efficient use
-service/replace air cleaners, spark plugs, mufflers and carburetors for efficient operations
-replace saw chains
-sharpen saw chains
-troubleshoot chainsaw problems and replace or repair according to manufacturer's recommendations
-replace a starter rope
-replace ignition parts

k. Operate and maintain timber harvesting machinery and equipment
-read and follow operating procedures listed in operators manual for each item of equipment
-inspect, clean, service and adjust: cooling systems, fuel delivery system, electrical systems, lubrications systems, hydraulic systems, transmission systems, intake and exhaust systems and final-drive systems
-clean engines using the steam cleaner
-identify types, parts and accessories of major items of timber harvesting machinery and equipment used in the local area
-correctly operate a shear mounted in a skidder or other tractor for felling trees
-correctly operate a skidder for skidding logs to the loading ramp
-correctly operate a loader for loading logs on a truck
-correctly operate a log truck for hauling logs
-correctly operate a chainsaw for felling, limbing and topping trees
-correctly operate any other major items of timber harvesting

l. Operate and maintain tree harvesting and forest equipment
-operate selected mechanized timber harvesting equipment
-demonstrate felling techniques with a chainsaw
-demonstrate loading and hauling timber
-prepare and interpret technical drawings
-tune-up engine to manufacturers specifications

-overhaul engine and engine components
-maintain fuel injection system
-troubleshoot equipment failure
-identify and maintain hand and power shop tools
-demonstrate arc and oxy-acetylene welding techniques
-set up and maintain a shop
-follow OSHA shop safety guidelines
-train and monitor employees in the safe use of tools and equipment
-supervise the forest harvesting operation
-order parts and supplies

m. Practice soil, water and wildlife conservation
-plan the operation for minimum disturbance of soil, water and wildlife
-explain methods of preventing wildfires and methods of extinguishing them if started
-carry out recommendations of agencies involved in soil, water and wildlife conservation

n. Demonstrate leadership, employability, communication and human relations skills
-conduct a job search
-secure information about a job
-identify documents that may be required when applying for a job
-complete a job application form correctly
-demonstrate competence in job interview techniques
-identify or demonstrate appropriate responses to criticism from employer, supervisor or other persons
-identify acceptable work habits
-demonstrate knowledge of how to make job changes appropriately
-demonstrate acceptable employee health habits

III. Forest Product Manufacturing

1. Log Manufacturer
a. Falling
-define terms associated with falling timber
-know safety rules associated with falling timber
-determine how to open a strip of timber
-determine where to start in a felling operation
-determine the lean of a tree
-determine the lay of a tree
-determine various felling techniques

b. Bucking
-define terms associated with bucking timber
-know safety rules associated with bucking timber
-determine how to measure for bucking
-know log grader terminology and applications
-determine trim allowance
-know how to buck for volume versus bucking for grade
-determine different bucking techniques

c. Yarding and hauling
   -select logs to be yarded from central point with maximum efficiency and least difficulty
   -locate site selection so majority of logs are loaded uphill
   -develop landing to be large enough to handle log sorts
   -know yarding (skidding) terminology
   -position skidder for maximum yarding and loading efficiency
   -select landing for easy truck access
   -file logging plan

d. Loading and hauling
   -determine types of loading and hauling
   -determine efficient loading area and equipment
   -determine log sorting according to grade, species, length, diameter, second growth and old growth
   -determine proper placement and choice of logs for maximum loads

e. Chainsaw operations
   -know characteristics, limitations of electric, gas driven, indirect and direct drive chainsaws
   -break down, clean and reassemble saws
   -develop starting and operating techniques
   -file a chain and adjust proper tensions
   -maintain safety in field operations

f. Rigging operations
   -determine names and functions of logging cable
   -determine names and functions of logging blocks
   -determine names and functions of hand tools

g. Choker setting operations
   -learn whistle signals
   -know terminology of cable lines, butt rigging and blocks
   -set chokes
   -hook logs
   -avoid hangups
   -select turn of logs
   -know functions of types of yarding equipment

h. Landing operations
   -develop use of hand signals
   -determine proper limbing and bucking techniques
   -determine log branding procedures
   -unload truck trailers
   -determine proper safety procedures for landing
   -release chokers

2. Secondary Forest Product Manufacturer/Residue Re-manufacturer

a. Sawyer
-identify different species of logs
-identify different grades of lumber according to WWPA grade rules
-identify correct procedure in jawing logs concerning the heart check, sweep and crook
-maintain excellent physical coordination and control of extremities
-maintain exceptional physical reaction ability to given circumstances
-maintain physical and mental alertness at all times

b. Filer
-demonstrate knowledge of working with steel, including stretching and shrinking steel in jaws
-work with bandmills and grinders
-maintain bandmills and grinders

c. Kiln Operator
-identify functions and inner workings of dry kilns
-identify species of wood and grades according to WWPA standards
-identify procedures and principles of extracting moisture from wood
-operate moisture meters and identify their functions

d. Lumber Grader
-identify knowledge of WWPA grade rules
-identify all species of lumber
-apply grade rules to visual contact of lumber
-maintain quick decision-making ability

e. Electrician
-apply s[illegible] practices
-perform [illegible]ervisory functions
-perform housekeeping and recordkeeping activities
-conduct shop operations
-compute service loads
-install electrical environmental control components
-install lighting fixtures
-install service equipment
-install switch boxes and outlet boxes
-maintain existent wiring
-rough in feeders, branch circuit cables and circuits
-trim out electrical devices
-install and maintain motors

f. Machinist
   -apply safety practices
   -perform benchwork operations
   -perform precision measurements
   -perform layouts
   -operate saws
   -operate drilling machines
   -operate bench grinders
   -operate lathes
   -operate vertical milling machines
   -operate horizontal milling machines
   -operate boring machines
   -operate surface grinders
   -operate inside and outside diameter grinders
   -operate centerless grinders
   -operate tool and cutter grinders
   -operate electrical discharge machines
   -select materials
   -perform neat treatment of metals
   -perform housekeeping and recordkeeping activities
   -perform supervisory functions
   -set up numerical control/computer material control
    machines

SUMMARY

Because the forestry and lumbering industry's future progress is linked directly to global economics, the Forestry Technical Committee stressed the need for increased awareness of the diversity of jobs and employment oportunities in Montana.

The need for highly skilled workers both in the forests and in production plants, is a first priority. Workers with excellent communication skills, and positive work habits are sorely needed.

While the industry cannot predict increasingly large employment figures, the committee noted that skilled workers for select jobs will always be in demand..