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Fit to Work?



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Fit To Work?

United States
Department of
Agriculture

Forest Service

Equipment
Development
Center

Missoula, MT



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One of a series of publications on health, fitness, and work capacity developed by the Missoula Equipment Development Center.

Fitness—Who Needs It?

Good question. The answer is you do. Fitness is a prime consideration for most Forest Service field jobs—particularly firefighting. This booklet was prepared to help you find out how fit you are and how to physically condition yourself for that field job you want.

Why does the Forest Service link fitness and fieldwork, especially firefighting, so closely? The Forest Service has been studying the relationship of fitness to the job for many years. One thing shows up again and again in our studies: Employee fitness goes hand in hand with productivity and safety. For arduous physical tasks, *fitness is the most important factor in predicting work capacity.*

Work capacity is your ability to accomplish production goals without undue fatigue, and without becoming a safety hazard to yourself or coworkers.

Work capacity is a composite of fitness, intelligence, motivation, skill and experience, acclimatization, and nutrition. *But fitness is the number one factor.*

Fitness has two aspects: aerobic and muscular.

Aerobic fitness is a measure of the maximum amount of oxygen that you can take into your body and transport to the muscles. Oxygen intake is the most basic factor limiting work capacity, because working muscles need a continuous supply of oxygen to perform vigorous, day-long work. The more efficient your oxygen delivery system, the better you can do the tough jobs.

Muscular fitness includes both *strength* and *muscular endurance*. Aerobic fitness and muscular fitness together are essential components of work capacity.

Field studies of firefighting tasks and other forest work confirm the link between fitness and work performance.

Fit workers perform better in the heat. They acclimate faster, work with a lower heart rate and body temperature, lose acclimatization slower, and regain it faster.

Muscularly fit workers perform lifting tasks better and are less likely to suffer back injuries.

The physically fit miss fewer days of work because of illness or injury. And studies show that fitness boosts morale.

For all these reasons, the Forest Service is interested in hiring physically fit workers—people who report fit and conditioned to tackle the tough field assignments.

You can't wait until you get the job to get fit. Fitness can't be rushed—it's a gradual process. Depending on your present fitness, *it may take 6 weeks or more of exercise to shape up.* A seasonal job doesn't give you the time to get fit on the job. Furthermore, some jobs, like firefighting, require you to be fit to qualify for the job.

Make sure to include some work-hardening activities in your exercise program. Hiking, backpacking, cross-country skiing, chopping firewood, and gardening will help toughen you up.

So how can you tell if you're fit enough for the job? First, refer to table 1 on page 4. It shows the aerobic and muscular fitness levels needed for arduous jobs. Some of these levels are simply recommendations, but others are required by Forest Service regulations.

The required fitness levels are based on field studies of fire crews performing firefighting tasks. The recommended fitness level for forestry fieldwork is based on the physical demands common to jobs like trail building and brush disposal. The levels represent the fitness needed to perform tasks safely for extended periods, with the added ability to respond to emergencies.

Now that you know the required and recommended fitness levels for each job, the next step is to see how you measure up. You can do this easily by self-testing.

Self-Testing

The object of self-testing is to find out how fit you are. Once you know your fitness level, you can then develop a personal fitness prescription designed to achieve your fitness goal.

Begin by answering the questions below. Your answers will reveal whether you're ready for an exercise test or exercise program.

For most of us, physical activity poses no problem or hazard. But these questions will tell you if you should seek medical advice before testing or exercise:

Yes No

- Has your doctor ever said you have heart trouble?
- Do you frequently have pains in your heart and chest?
- Do you often feel faint or have spells of severe dizziness?
- Has a doctor ever said your blood pressure was too high?
- Has your doctor ever told you that you have a bone or joint problem that has been aggravated by exercise, or might be made worse with exercise?
- Is there a good physical reason (such as overweight) why you should not follow an exercise program even if you wanted to?
- Are you taking any drugs or medications that might alter your usual response to exercise?

If you answered yes to one or more questions, see a doctor *before* taking any fitness test or increasing your physical activity.

If you answered no to all questions, you have reasonable assurance of your suitability for fitness self-testing. Go on to the aerobic and muscular fitness self-tests. Table 1 lists required or recommended fitness for various jobs.

Table 1.—Required and recommended fitness levels

Job Classification	Aerobic Fitness		Chinups	
	Time for 1½-Mile Run ¹		Required	Recommended
	Required (minute)	Recommended (minute)		
Smokejumper ²	11:00 (48)	9:30 (55)	7	
Interagency Hotshot Crew	11:40 (45)	10:35 (50)	—	Weight > 170 = 4 135-170 = 5 110-135 = 6 < 110 = 7
Firefighter	11:40 (45)	11:40 (45)	—	
Forestry Fieldworker	—	12:45 (40)	—	3

¹Or equivalent Forest Service step test scores in parentheses.

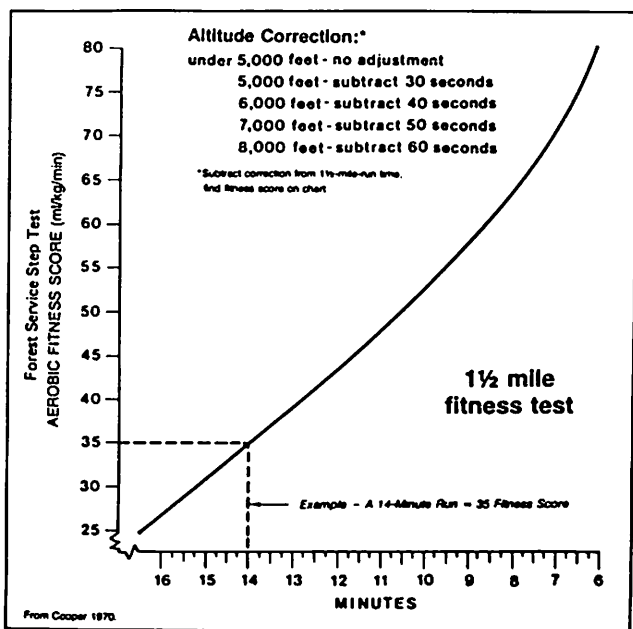
²In addition to the required job qualification tests, smokejumpers must pass a work performance standard for backpacking a 110-pound load 3 miles in less than 90 minutes. Train for this requirement by backpacking 50-pound and progressively heavier loads until you feel you can pass this test.

Aerobic Fitness Test—1½-Mile Run

The 1½-mile run is an accurate indicator of aerobic fitness. Your time will correlate to the Forest Service step test.

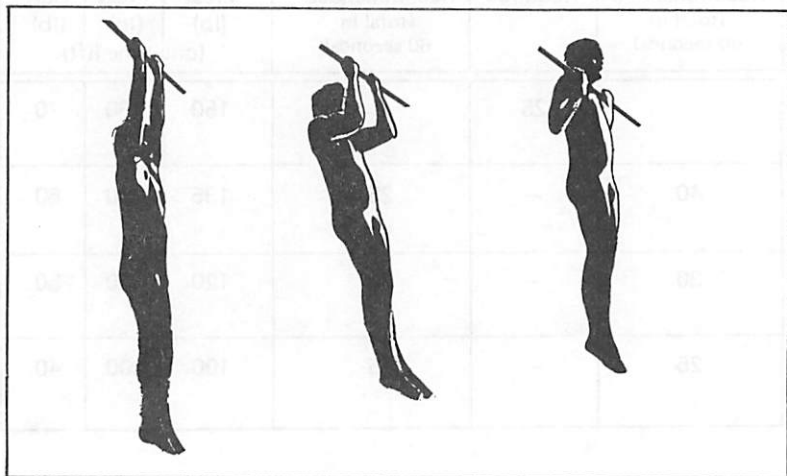
If you have been active, you may take the 1½-mile-run test immediately. But if you've been inactive, assume you are in a low fitness category and turn to page 9 to develop your personal fitness prescription. This will allow you to improve your fitness level so you can attempt the 1½-mile run without undue stress. If you're over 35 years of age, consider a medical examination, including an exercise electrocardiogram.

Muscular Fitness		Pushups		Also Recommended		
Situps				Bench Press (lb)	Leg Press (lb)	Curl (lb)
Required	Recommended (total in 60 seconds)	Required	Recommended (total in 60 seconds)	(one-time lift)		
45		25		150	450	70
—	40	—	25	135	400	60
—	30	—	20	120	350	50
—	25	—	15	100	300	40



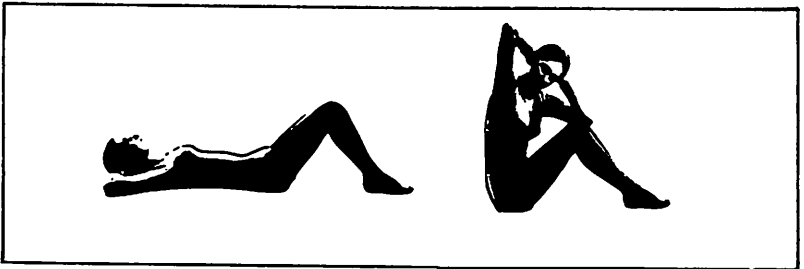
Muscular Fitness

Chinup—Arm and Shoulder Strength. The chinup is a valid test of the muscular strength and endurance of your arms and shoulders.



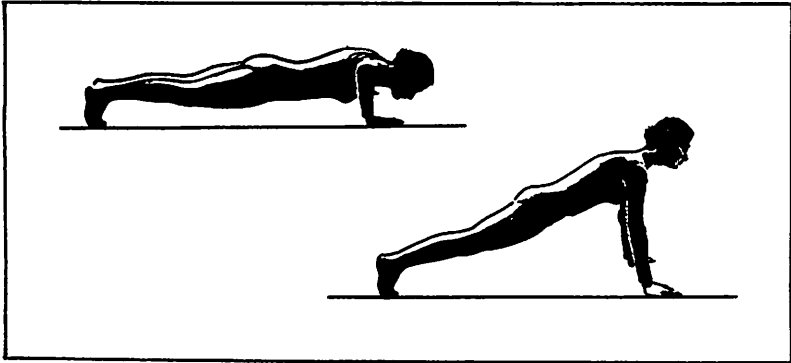
	<i>Required</i>	<i>Recommended</i>
Smokejumper	7	
Hotshot Crew and firefighter standard based on body weight:		Weight > 170 = 4 135-170 = 5 110-135 = 6 < 110 = 7
Forestry Fieldworker		3

Situp—Abdominal Endurance. Abdominal muscular fitness is related to work capacity. The bent knee situp is a good test of minimal muscular fitness of your trunk, particularly the abdomen. Poor abdominal muscle tone can mean low back problems and injuries. More than 50 percent of those engaged in hand labor complain of back troubles. A situp standard has been included to encourage you to emphasize abdominal fitness and avoid such problems.



	<i>Required</i>	<i>Recommended</i>
Smokejumper	45	
Hotshot Crew		40
Firefighter		30
Forestry Fieldworker		25

Pushup—Arm and Shoulder Endurance. The pushup is a measure of the muscular endurance of your arms and shoulder girdle. The test measures the muscular fitness of the extensor muscles of the arms as well as the strength and endurance of muscles in the chest.



	<i>Required</i>	<i>Recommended</i>
Smokejumper	25	
Hotshot Crew		25
Firefighter		20
Forestry Fieldworker		15

Fitness Programs

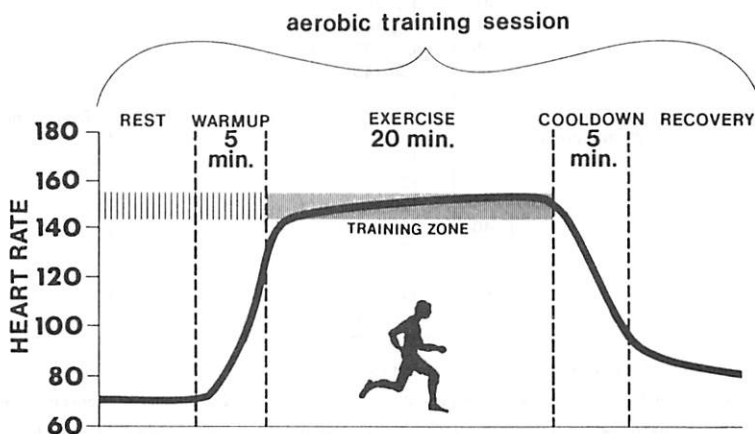
Aerobic Fitness Program

Once you know your level of aerobic fitness, you are ready to develop a personal fitness prescription. Your fitness prescription is the dose of exercise designed to bring about safe, steady improvements in your fitness. Your prescription can be expressed in terms of:

- Intensity = Your training heart rate
- Duration = How many minutes of exercise
- Frequency = How often you need to exercise

Table 2 considers each factor, then summarizes ways you can design your own aerobic fitness program.

Aerobic training sessions include a warmup of flexibility exercises, the aerobic exercise period, and a cooldown to aid recovery. You'll receive an optimal training stimulus if you train within your zone and pick up the pace a bit as you approach the end of the session.



**“Warmup, aerobic exercise, cooldown—
those are the elements of your training session”**

Table 2.—*Aerobic fitness prescriptions*

Fitness Level ¹	Age	Intensity (in beats/min)	Duration (in calories)		Frequency
			Men	Women ²	
High—Faster than 11:40 min (over 45 ml/kg/min)	20	164-178	Over 400 ³	Over 300 ³	6 days weekly
	25	162-176			
	30	160-174			
	35	157-171			
	40	154-168			
	45	151-164			
	50	148-161			
	55	145-158			
Medium—11:40-14:00 min (35-45 ml/kg/min)	20	153-164	200-400	150-300	6 days weekly
	25	151-162			
	30	148-159			
	35	145-157			
	40	142-154			
	45	139-151			
	50	136-149			
	55	133-146			
Low—Slower than 14:00 min (under 35 ml/kg/min)	20	140-154	100-200	75-150	Every other day
	25	137-151			
	30	134-148			
	35	130-144			
	40	126-140			
	45	122-136			
	50	118-132			
	55	114-128			
60	110-124				

¹Based on 1½-mile-run test; Forest Service step test scores in parentheses.

²Caloric expenditure is less for women, because they are smaller than men and burn fewer calories in a given activity.

³For long duration workouts (over 400 calories), training intensity may be reduced to a comfortable level.

Sample Aerobic Activities							
Walk		Jog		Run		Bicycle	
Distance (miles)	Time (min)	Distance (miles)	Time (min)	Distance (miles)	Time (min)	Distance (miles)	Time (min)
—Distance and time remain the same regardless of age—							
4.2+	72+	3.4+	40+	3.4+	27+	7.8+	47+
2.1-4.2	36-72	1.7-3.4	20-40	1.7-3.4	14-27	3.9-7.8	24-47
1.0-2.1	18-36	0.8-1.7	10-20	0.8-1.7	7-14	1.9-3.9	12-24

Consider these suggestions:

- Always warm up before your run.
- Use the correct heart rate training zone.
- Vary the location and distance of the run day by day (long-short; fast-slow; hilly-flat; hard-easy).
- Set distance goals: for example, 20 miles a week.
- Don't be a slave to your goals, and don't increase weekly mileage unless you enjoy it.
- Run 6 days a week if you enjoy it; otherwise, try an alternate day schedule with longer runs.
- Try one long run (not over one-third of weekly distance) on Saturday or Sunday. Many people find they must increase their distance endurance before they can improve in speed.
- Try two shorter runs if the long ones seem difficult: two 5-mile runs instead of one 10-mile run.
- Keep records—you'll be surprised! Record date, distance, comments. Note resting pulse, body weight. Check your fitness score several times a year (1½-mile-run test).
- Don't train with a stopwatch. Wear a wristwatch so you'll know how long you've run.
- Increase speed as you approach the finish of a run.
- Always cool down after a run.

Muscular Fitness Program

To develop your muscular fitness program, follow these simple steps:

- Determine your strength or endurance needs (see table 1).
- Identify muscle groups in need of training by self-testing.
- Consider the need for arm and shoulder, trunk, and leg training.

- Select appropriate exercises using resisted calisthenics, weights, or weight machines.
- Follow the prescriptions in table 3 to achieve your goal.

Table 3.—Prescriptions for strength and muscular endurance

Prescriptions	Strength to lift very heavy loads	Short-term endurance to lift heavy loads for short periods. (up to 3 min)	Intermediate endurance to lift moderate loads for longer periods (up to 10 min)	Long-term endurance to lift loads or use handtools for extended periods
Repetitions Maximum (RM) ¹	6-8 RM	15-25 RM	30-50 RM	over 100 Reps
Sets (time per day)	3	3	2	1
Days per Week	3	3	4	5

¹ RM or repetitions maximum: maximum number of times you can lift a given weight. Increase resistance when you can exceed the recommended RM.

Example for strength: Select a weight you can lift 6 times; 1 set, rest, do 2nd set, rest, do 3rd set. Do 3 sets for each exercise in your program.

Select five or six important exercises that you will do on a regular basis; for example:

Sample Strength Program

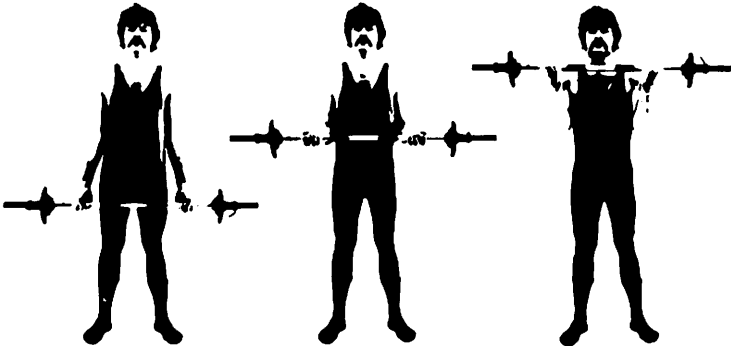
Muscle Groups	Need	Exercise
Arm and Shoulder	Flexion Strength Extension Strength	Curls or Chinups Bench Press or Resisted Pushups
Trunk	Abdominal Tone Back Strength	Trunk Curl (Nautilus) or Situp with Weights Backlift (Universal)
Leg	Extension Strength Flexion Strength	Leg Press or Squat Hamstring Curl

Once you have reached your strength goal, you may want to decrease the weight and increase repetitions to build muscular endurance. See table 3 on page 13 for muscular endurance prescriptions.

When training always remember:

- Never hold your breath during a lift; exhale during the lift and inhale as you lower the weight.
- Always work with a companion or spotter when working with barbells or heavy weights.
- Alternate muscle groups during a training session. Don't do several arm exercises in a row. Allow recovery time between sets of the same exercise.
- Keep accurate records of your progress (see training log). Record weight, repetitions, and sets. Test for maximum strength every few weeks. Record body weight and dimensions (waist, chest, hips, biceps, thighs).
- When strength becomes adequate shift to short-term, intermediate, or long-term endurance training.
- Maintain strength gains with one set of 6 to 8 RM per week.

Emphasize muscular fitness training Monday, Wednesday, and Friday, along with some aerobic training. Do longer aerobic training on alternate days.



Summary

- Fit workers are safer, more productive workers.
- Fitness and work capacity go hand in hand.
- Complete fitness includes aerobic and muscular fitness.
- Aerobic fitness measures the ability to get oxygen to working muscles.
- Muscular fitness includes strength and muscular endurance.
- If you think increased physical activity may present a health problem, play it safe. See a doctor first.
- Fitness can't be rushed. It's a gradual process, so allow at least 6 weeks to get in shape for the job. Don't wait to start conditioning yourself. Report to the job fit.
- Get work-hardened; hike, backpack, cross-country ski, cut and split firewood, garden.
- Work on abdominal muscle tone to avoid back problems.
- Develop a personal fitness prescription to achieve your aerobic fitness goals through safe, steady improvements.
- Emphasize strength and endurance in your muscular fitness activities.
- Carefully follow the weight training tips on page 14.

Training Logs

Aerobic Fitness Training Log (miles)

<i>Wk. No.</i>	<i>M</i>	<i>T</i>	<i>W</i>	<i>TH</i>	<i>F</i>	<i>S</i>	<i>Tot.</i>	<i>Comments</i>
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								

Muscular Fitness Training Log

<i>Wk. No.</i>									<i>Comments</i>
1									
2									
3									
4									
5									
6									
7									
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