

# The work demands of tanker-based bushfire suppression by Australian volunteer firefighters in southern Australia.

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The work demands of suppressing bushfires using tankers have not been investigated. Without this information, Australian fire agencies cannot accurately predict the fitness, hydration, or nutrition requirements for safe and productive bushfire suppression. Work demands were measured in forty-two volunteer firefighters, across six bushfires in southern Australia during the 2006-2007 fire season. Firefighters were fitted with heart rate (HR) monitors and physical activity units to measure the intensity and duration of the work they performed during their fireground shift. Twenty-nine of these firefighters were also fitted with global positioning system tracking devices to measure the speed of their movements and the distance they covered during their shift. Firefighters worked for  $10 \pm 2.1$  hr (mean  $\pm$  SD) in each shift, with  $21.7 \pm 18.4\%$  of that time spent travelling in the tanker. They covered  $16 \pm 5.5$  km on foot at an average speed of  $1.7 \pm 1.0$  km $\cdot$ hr<sup>-1</sup>. During their shift, the firefighters' average HR was  $101.2 \pm 12.6$  beats $\cdot$ min<sup>-1</sup> ( $54.4\% \pm 5.0\%$ HRmax), whilst their peak HR was  $169.0 \pm 17.8$  beats $\cdot$ min<sup>-1</sup> ( $92.0\% \pm 9.2\%$ HRmax). These intensities are considered 'moderate' and 'very hard' by the American College of Sports Medicine. Physical activity data showed firefighters were 'sedentary' (<100 trunk movements per minute) for  $61.8 \pm 15.3\%$  of their shift. They performed 'light' duties (100-1499 trunk movements $\cdot$ min<sup>-1</sup>) for  $29.5 \pm 14.9\%$  of their shift and undertook more vigorous workloads (>1500 trunk movements $\cdot$ min<sup>-1</sup>) for  $2.5 \pm 2.5\%$  of their shift. This study shows, for the first time, that tanker-based bushfire suppression is an intermittent activity with brief periods of very hard work separated by sustained periods of light to moderate labour. Tanker-based firefighters, therefore, require basic cardiovascular fitness coupled with high task-specific muscular endurance to complete the vigorous and sporadic work intervals they face over a long and hot work shift.

## Key Words

Work intensity, work duration, heart rate, and energy expenditure