



Work patterns of tanker-based bushfire suppression by Australian volunteer firefighters in south-east Australia.

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→ Background

In Australia,

- Annual bushfire threat.
- Rural fire agencies suppress fires from fire tankers.
- 221,000 volunteers (McLennan et al., 2004)
- No published data on work demands or physiological responses during tanker-based bushfire suppression.
- No evidence base for fitness, hydration, nutrition, or recovery requirements for safe & effective tanker-based bushfire suppression.



→ Objective

- Describe firefighters work patterns during tanker-based bushfire suppression.
 - Work intensity.
 - Duration of work efforts within a shift.
 - 'work : rest' patterns.



→ Deliverable to fire agencies

- Advanced knowledge and understanding of fireground stress (stimulus) on the firefighter.
 - Documenting specific fireground stressors e.g. work intensity & duration.



Methods

- 6 fire incidents (5 VIC, 1 NSW).
- Researcher 'call-out' from CFA HQ
- Firefighters recruited at staging area prior to deployment.
 - Verbal consent
- Non-intrusive monitoring of work intensity.

- Work Intensity:
 - Heart rate
 - Physical (work) activity
 - Movement Speed & distance travelled

GPS



Phys.
Activity
(front)

Heart
Rate

→ Participants

- 38 volunteers: 33 men & 5 women.
- 36 CFA VIC, 2 RFS NSW.
- Age: 37.5 ± 2.1 yr
(18 - 67 years).
- Years of service:
 11.2 ± 2.1 yr (1 - 35 yr).
- Height: 174.4 ± 1.9 cm
(155.5 - 188.4 cm).
- Weight: 76.1 ± 2.4 kg (54 - 92 kg).
- BMI: 25.1 ± 0.8 kg·m⁻² (18.2 - 30.4 kg·m⁻²).





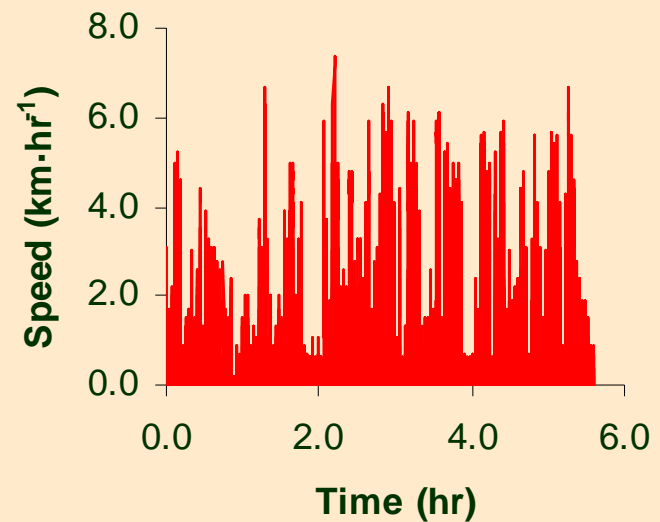
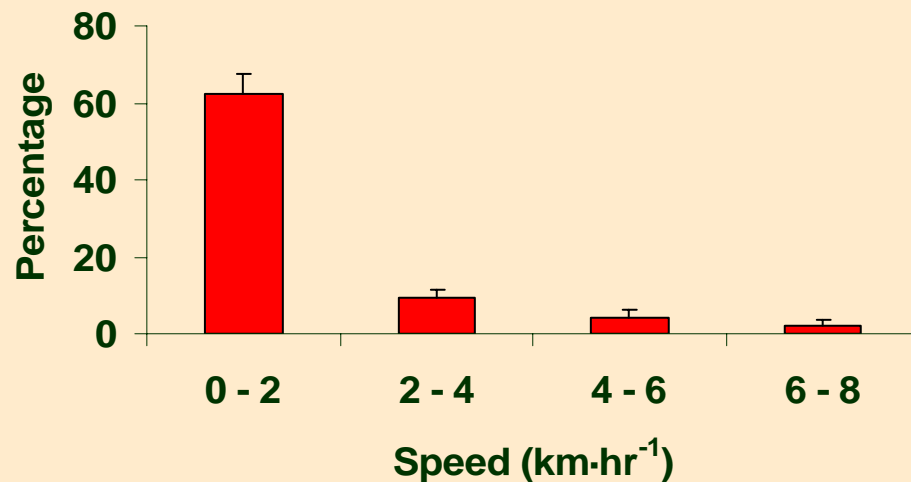
Walking distance & speed.

Shift length: 10.5 ± 0.6 hr

Time on foot: 7.8 ± 1.8 hr

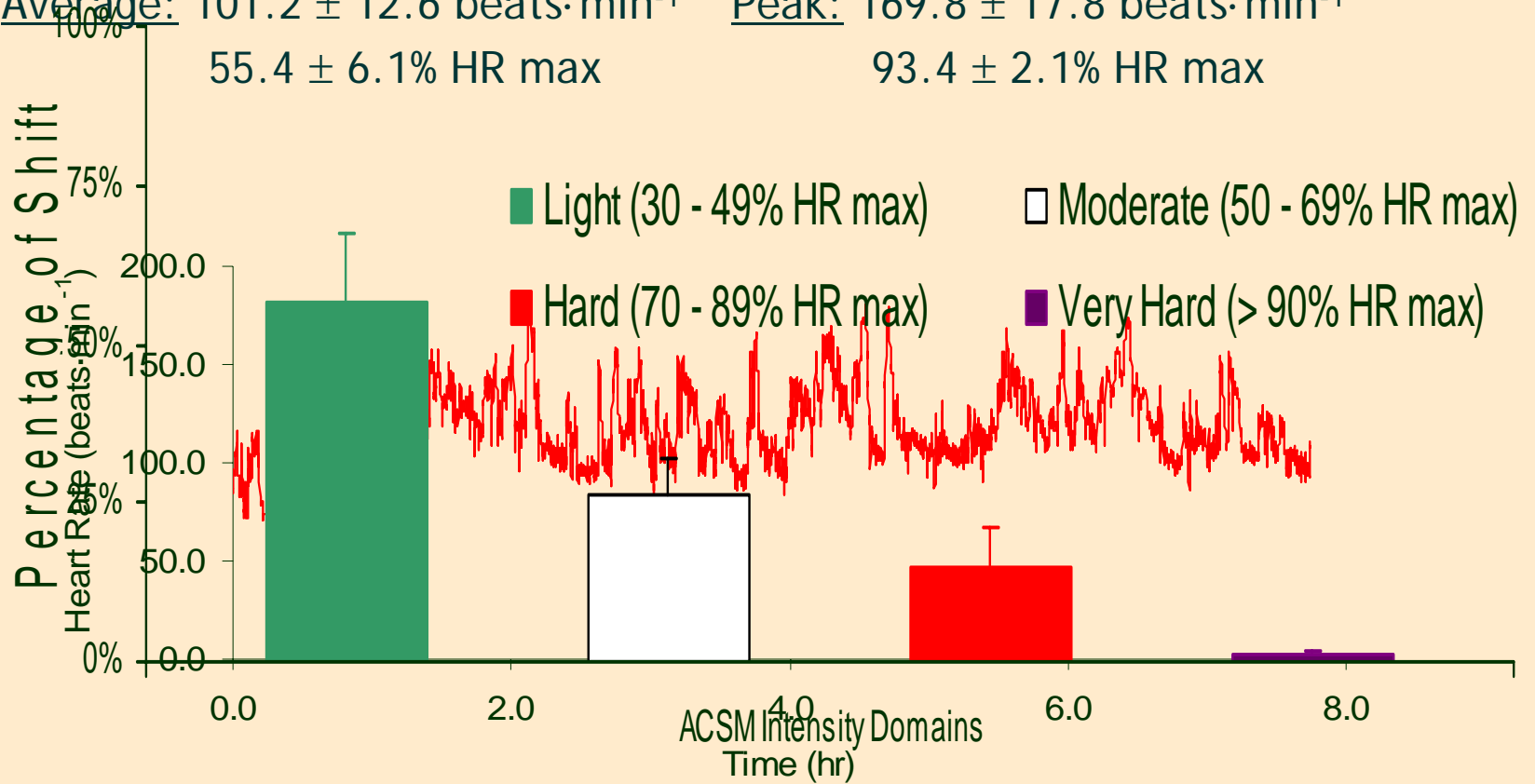
Total distance: 16 ± 5.5 km

Average speed: 2.1 ± 1.0 km·hr⁻¹

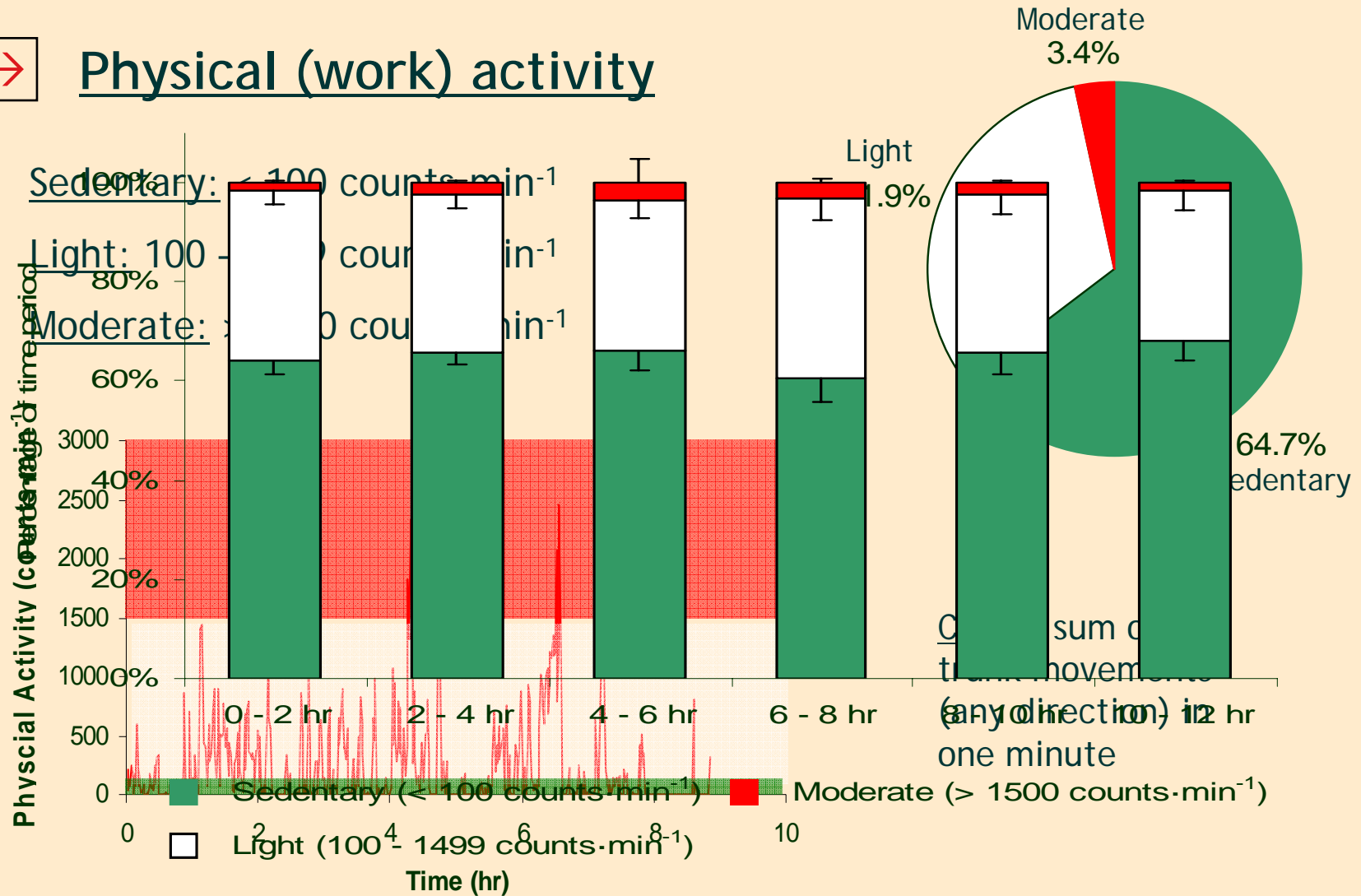


→ Heart Rate

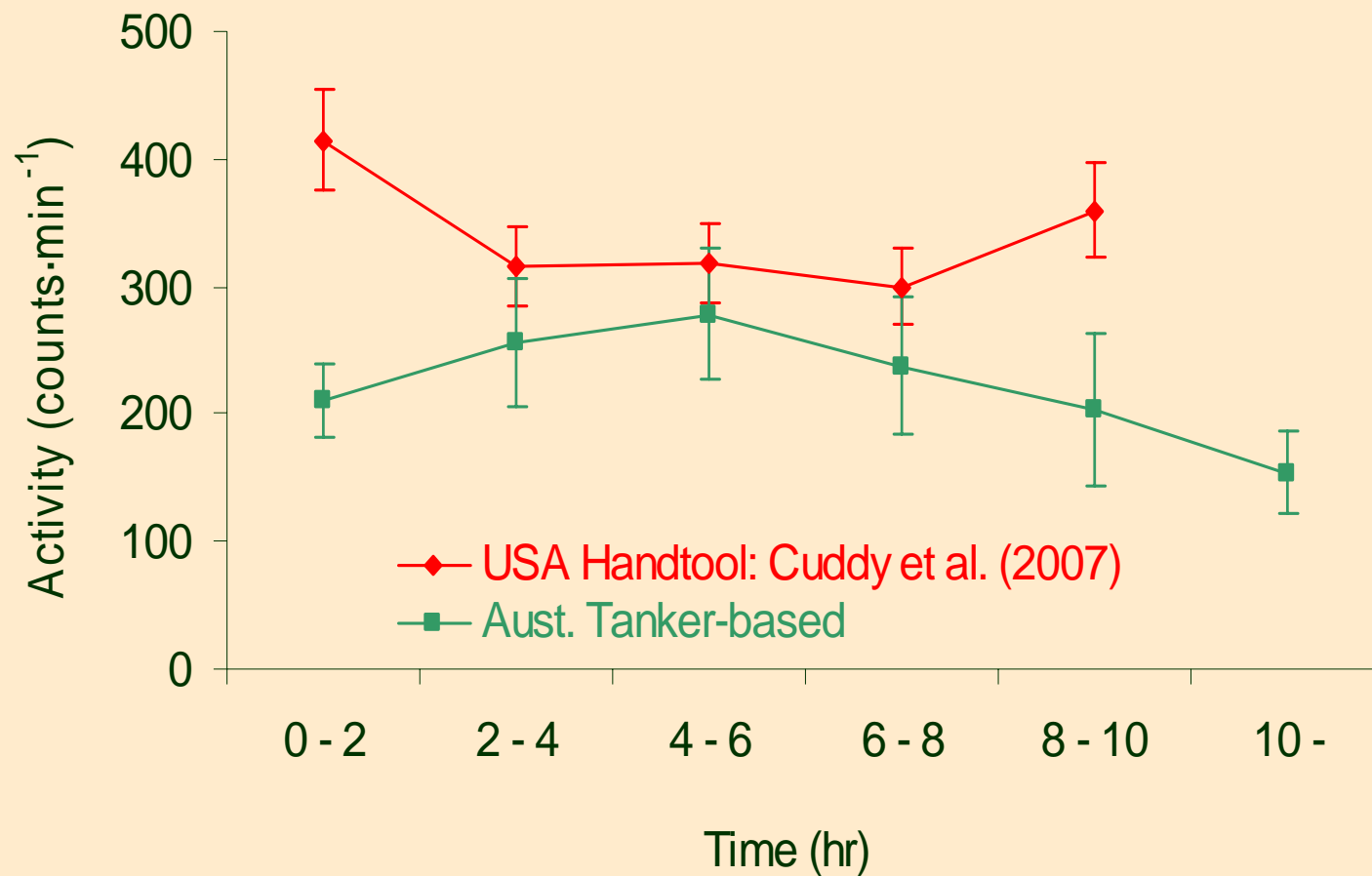
Average: 101.2 ± 12.6 beats·min⁻¹ Peak: 169.8 ± 17.8 beats·min⁻¹
 $55.4 \pm 6.1\%$ HR max $93.4 \pm 2.1\%$ HR max



→ **Physical (work) activity**



→ Physical (work) activity





Important considerations for fire agencies:

- Bushfire suppression comprises brief periods of intense work separated by long periods of low level labour / rest.
- Intense work bouts may put some firefighters at increased risk of cardiac event during a shift.
 - Pre-existing cardiovascular conditions
 - Normally sedentary
- Tanker-based bushfire suppression seems to accrue lower physical activity counts than US wildfire crews using handtools.

→ Future Directions

- Increase study sample
 - More diversity in participants
- Agency-based research
 - Data monitoring by agency personnel trained & overseen by researchers.
- Explore relationships between work intensity &
 - Age
 - Gender
 - BMI
 - Experience



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