Dehydration in Australian Bushfire Fighters Across Consecutive Shifts
Jenni Raines¹, Rod Snow¹, Chris Abbiss¹, David Nichols² & Brad Aisbett¹
¹ School of Exercise and Nutrition Sciences, Deakin University, VIC. ² Research and Development, Country Fire Authority, VIC.

Purpose
The purpose of this study was to describe the hydration levels of Department of Environment and Heritage (DEH) seasonal firefighters over successive days of experimental burn operations in Ngarkat, South Australia.

Methods
Twelve male firefighters (age 19-44 y, weight 56-110 kg, BMI 19-33 kg/m²) worked an average of 12 hours (range 9.5-14.5 hours) over consecutive shifts during experimental burns. (Temperature 16-39° C; relative humidity 12-64%; FFDI 3-49). Blood, urine, saliva samples and body weight were collected first thing in the morning, at the end-shift point and two hours after the end of the shift (recovery). A Step test was also performed in the morning and at the end-shift time point. All data is presented as means ± standard deviation.

Results

Figure 1. Heart Rate Recovery following the Step Test
Heart rate recovery was significantly slower (P=0.03) after the work shift compared to before the shift.

Figure 2. Average Body Weight Changes
Firefighters body weight fluctuated at the end-shift point. After 2 hours of recovery, firefighters had gained weight on both days.

Figure 3. Urine Specific Gravity of Bushfire Fighters
Firefighters started their shifts seriously dehydrated and only marginally rehydrated after the second shift.

Figure 4. Urine Colour of Bushfire Fighters
There were no differences in urine colour indicating this measurement was unable to clearly determine the hydration status of firefighters.

Figure 5. Actual Water Intakes versus Agency Recommendations for a 12-hour shift
Firefighters did not meet Agency recommended fluid intakes for a 12-hour shift.

Practical Importance for Fire Agencies
Firefighters began work in an extremely dehydrated state and remained so throughout the two day work period. Dehydration may increase cardiovascular strain and fatigue especially during periods of greater stress such as emergency campaign fires. Scientifically valid and realistic fluid intake guidelines tested across multiple days of firefighting, are required to better manage firefighter fatigue.