A SURVEY TO IDENTIFY PHYSICALLY DEMANDING TASKS PERFORMED DURING STORM DAMAGE OPERATIONS BY AUSTRALIAN STATE EMERGENCY SERVICES PERSONNEL

Brianna Larsen¹, Tony Graham², Dr. Brad Aisbett¹

 $^{\rm 1}$ Centre for Exercise and Sports Science (C-ESS), Deakin University

² ACT State Emergency Services

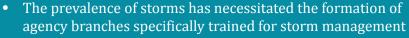
CRICOS Provider Code: 00113E



BACKGROUND



- Storm events and floods account for 40-50% of all disasterrelated deaths worldwide
- In Australia, storms cause more damage than any other event
- Storms = \$\$\$ major storm events in Australia can cause insurance losses of more than \$1.5 billion

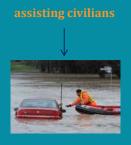




STORM MANAGEMENT

- In Australia, the **State Emergency Services** (SES) is the lead storm response organization
- ~27,000 volunteer members nationwide
- SES personnel typically perform tasks such as;









WHAT ELSE DO WE KNOW...?

....not much!

Little is known about the tasks performed by the SES

- which tasks are most important?
- how physically demanding are they?
- **how often** do they occur, and **how long** do they take?
- what are the principal actions and fitness components used?

....and why is this information important?







- Recent legislation states that volunteers are owed the same duty of care as paid workers
- **SO?** The SES is **legally responsible** for ensuring that volunteers are capable of the work required of them









 Identifying and characterizing SES tasks may allow development of fitness guidelines to ensure volunteers safety



CRICOS Provider Code: 00113B

JOB TASK ANALYSIS

STEP 1 Job inventory

• **STEP 2** Use **objective** or **subjective** methods?

CHECKIET

STEP 3 Large scale survey or small committee?



CRICOS Provider Code: 00113

AIM: To undertake a subjective JTA to identify the most physically demanding tasks performed by SES personnel during storm damage work, and then characterize their:

- operational importance
- frequency
- duration
- principal actions (i.e., movements)
- underlying fitness components



CRICOS Provider Code: 00113E

METHODS

- Job inventory of tasks compiled from <u>training manuals</u>, <u>policy documents</u> & <u>subject</u> <u>matter expert consultation</u>
- Tasks filtered by operational importance
- Important tasks included in an anonymous online survey
- 903 SES personnel responded to the survey
- Provided information on:
 - importance physical demand frequency duration movements fitness components
- Most <u>physically demanding</u> tasks chosen for further analysis



RESULTS & DISCUSSION



CRICOS Provider Code: 00113

Participant Demographics

Age (years)	43.1 ± 13
Height (cm)	173.9 ± 11.5
Weight (kg)	86.0 ± 18.8
Years in SES	9.6 ± 8.8
Storm damage responses in past 2 years	22.1 ± 25.1
Males (%)	74
Females (%)	26

DEAKIN UNIVERSITY AUSTRALIA Worldly

12 PHYSICALLY DEMANDING TASKS

- 1. Box lifting (single-person)
- 2. Moving in a roof
- 3. Erecting external weather proofing
- 4. Clearing debris using hand/power tools (at heights)
- 5. Covering roof damages with tarpaulin
- 6. Constructing support for storm damaged walls
- 7. Shoveling sand (with hands)
- 8. Shoveling sand (using handtools)
- 9. Filling sandbags
- 10. Lifting sandbags
- 11. Holding sandbags
- 12. Carrying sandbags





CRICOS Provider Code: 00113B

		nysical Dema = low, 7 = hig		Operational Importance (1 = low, 7 = high)			
Task	Mean	Median	Mode (%)	Mean	Median	Mode (%)	
1. Box lifting (single-person)	5.0± 1.4	5	6 (25)	5.2 ± 1.5	5	6 (26)	
2. Moving in a roof	5.0± 1.5	5	6 (26)	5.7 ± 1.4	6	7 (36)	
3. Erecting external weather proofing	5.2 ± 1.3	5	6 (29)	6.1 ± 1.1	6	7 (46)	
4. Clearing debris using hand and/or power tools (at heights)	5.6 ± 1.2	6	6 (35)	5.8 ± 1.2	6	7 (35)	
5. Covering roof damages with tarpaulin	5.5 ± 1.3	6	6 (33)	6.3 ± 0.9	7	7 (51)	
6. Constructing temporary support for storm damaged walls	5.2 ± 1.3	5	6 (33)	5.7 ± 1.4	6	7 (33)	
7. Shoveling sand (with hands)	5.9 ± 1.3	6	7 (45)	4.4 ± 2.1	5	7 (20)	
8. Shoveling sand (using handtools)	5.7 ± 1.2	6	6 (33)	5.7 ± 1.3	6	7 (34)	
9. Filling sandbags	5.5 ± 1.3	6	6 (31)	5.8 ± 1.2	6	7 (36)	
10. Lifting sandbags	6.1 ± 1.0	6	7 (44)	5.8 ± 1.2	6	7 (35)	
11. Holding sandbags	5.3 ± 1.6	6	6 (26)	5.6 ± 1.4	6	6 (30)	
12. Carrying sandbags	6.2 ± 0.9	6	7 (27)	5.8 ± 1.2	6	7 (35)	

- All 12 tasks have <u>mean</u>, <u>median</u> and <u>mode</u> values of ≥ 5 out of 7 for physical demand
- All tasks ranked highly for operational importance



	Freque	ncy (times p	er shift)	Duration (m	inutes per ta	sk repetition)
Task	Mean	Median	Mode (%)	Mean	Median	Mode (%)
1. Box lifting (single-person)	5.9 ± 8.2	4	2 (20)	11.2 ±21.9	5	5 (32)
2. Moving in a roof	3.6 ± 7.6	2	1 (32)	23.5 ±45.6	15	20 (17)
3. Erecting external weather proofing	4.5 ± 7.2	3	2 (20)	37.0 ±37.0	30	30 (20)
4. Clearing debris using hand/power tools (at heights)	4.1 ± 7.4	3	1 (24)	26.5 ±26.2	20	20 (16)
5. Covering roof damages with tarpaulin	4.4 ± 8.5	3	1 (23)	42.4 ±43.1	30	30 (22)
6. Constructing temporary support for storm damaged walls	1.8 ± 7.3	1	1 (49)	32.0 ±32.3	30	30 (20)
7. Shoveling sand (with hands)	3.7 ± 14.3	0	0 (57)	15.1 ±31.4	5	0 (43)
8. Shoveling sand (using handtools)	20.2 ± 167.7	3	1 (22)	32.8 ±67.8	20	30 (18)
9. Filling sandbags	35.3 ± 194.4	4	1 (19)	24.1 ±36.9	15	30 (13)
10. Lifting sandbags	40.6 ± 216.4	5	1 (14)	17.0 ±33.7	10	1 (17)
11. Holding sandbags	41.6 ± 223.6	5	1 (15)	16.5 ±33.8	5	5 (16)
12. Carrying sandbags	41 ± 216.4	5	1 (15)	22.9 ±64.4	10	5 (18)

- Frequency and duration results are highly variable
 - Open ended responses

- Genuine within-job differences
- Influenced by type/severity of storm
- Problems with frequency recall



RICOS Provider Code: 00113

ask		Bend	Lift	Twist	Carry	Walk	Pull	Climb	Push	Crawl	Sit	Dig	Muscular Strength	Muscular Endurance
	Box lifting (single- person)	Х	Х	Х	Х	Х							х	Х
2.	Moving in a roof	х		X		Х		Х		X	Х		Х	X
3.	Erecting external weather proofing	х	Χ	Х	Х	Х	Х	Х	X	Х	Х		х	Х
	Clearing debris using hand/power tools	Х	Х	Х	Х	Х	х	х	Х				Х	х
	(at heights) Covering roof damages with tarpaulin	х	Х	х	Х	Х	х	Х	Х	Х	х		x	х
Ď.	Constructing temporary support for storm damaged walls	х	Х	х	Х	X	Х		Х				х	Х
7.	Shoveling sand (with hands)	х	Χ	Х	Х							Х	х	Х
	Shoveling sand (using handtools)	х	Х	Х	Х	Х						Х	x	х
).	Filling sandbags	Х	X	X								Х	Х	X
).	Lifting sandbags	Х	Х	X	X								Х	X
1.	Holding sandbags	Х	Χ		X								Х	X
2.	Carrying sandbags	Х	Х	Х	Х	Х							Х	Х

WHAT DO WE KNOW NOW?

- Storm damage work has 12 physically demanding tasks
 - Carrying sandbags
 - Lifting sandbags
 - Shoveling sand (with hands)
- All tasks are considered operationally important
 - Covering roof damages with tarpaulin
 - Erecting external weather proofing
- Bend, lift, twist, carry & walk most common actions
- Muscular strength & endurance required for all tasks

• Frequency & Duration results are highly variable



Information could be used to develop a personal screening test for SES personnel



Acknowledgements

- State Emergency Services Australia
 - especially our SME panel and the volunteers who responded to the survey
- Tony Graham and the ACT State Emergency Services
- Brad Aisbett and Deakin University

