

# Trialling a common data collection for rescues at NSW beaches

NSW Water Safety Taskforce

SafeWaters

A NSW GOVERNMENT WATER SAFETY INITIATIVE

## Phase 1:

Feasibility trial of the minimum dataset for water rescues prepared by Gabrielle Burrows and Dr Ann Williamson

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## Phase 2:

Sentinel event recording of rescues-major, rescues, preventive actions on NSW beaches prepared by Dr Ann Williamson

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# Executive summary

Many water safety agencies collect information on water-related rescues and incidents, but not all collect the same information or collect it in the same way. Over recent years, the NSW Water Safety Taskforce has funded research to look at the possibility of addressing this problem.

In the first phase of the feasibility trial, a minimum dataset for collecting information on water-related rescues, developed by the Evidence Subcommittee, was trialed over four weeks. The objective was to examine what information on water safety could be collected regularly and accurately by lifeguards and lifesavers in NSW using an hourly record and a details of rescue booklet. The trial was conducted at ten locations in NSW (eight beaches and two public swimming pools).

Some variables from the minimum dataset were consistently and regularly reported, suggesting that they will provide comprehensive information. However, modifications to some of the variables in the dataset were advocated. Items that had a written format, such as crowd attendances or rescue counts, items that required an estimate format, and items that required a long answer were unlikely to be answered. Items consistently not reported in the beach rescue data included age and type of first aid used.

Potential limitations of using lifeguards and lifesavers as data collectors were also considered. In particular, the minimum dataset was less likely to be regularly reported during busier periods, where lifeguards and lifesavers were spending more time conducting water safety actions. No data collection during these periods weakens what can be learnt about the specific variables in the dataset.

A modified version of the minimum dataset for collecting information on water safety rescues was trialed in phase two, taking into consideration the recommendations made in phase one. Using a modified minimum dataset, this phase of the study investigated what information on water safety could be collected regularly and accurately by independent dedicated data collectors.

Fourteen research assistants were recruited and trained. The trial was conducted at five beaches in NSW (Bondi, Maroubra, Freshwater, Palm Beach, and Avoca) and the data collection occurred at all times when the flags were out and the beach was patrolled.

The results of the data collection trial using dedicated data collectors, combined with those of the first trial involving data collection by water safety professionals, indicated that collecting the following information on water safety is feasible:

- Items related to beach conditions: wave type, tide times, sea conditions, rips, and weather and wind conditions.
- Items associated with rescues: sex, age group, activity before rescue, who performed the rescue, depth of water, location of flags, nearest rescue and rescue equipment.

The feasibility trial also indicated that some items were difficult to collect and inclusion of the following items in the minimum dataset may not be useful: exact age, suburb or postcode, indigenous status. The items associated with the swimming ability and strength and age group of the person rescued should also be reviewed given their unknown validity.

Furthermore, the current feasibility trial suggests that dedicated data collectors may not be cost-effective for all beaches and all times throughout the summer. A combination of collections by dedicated collectors on very busy or more dangerous beaches and collections by lifeguard and lifesavers at less busy times would be the most cost-effective.

Overall, the feasibility trial indicated that a larger data collection would be invaluable for a wide range of water safety purposes. These could include analysis of the relationships between beach conditions and water safety incidents, the timing and allocation of water safety staff and evaluation of new water safety programmes.

**Trial 1:**

**Feasibility trial of the  
minimum dataset for water rescues**

# 1. Purpose

The aim of the feasibility trial of the minimum dataset for water rescues was to examine what information on water safety can be collected regularly and accurately by lifeguards/lifesavers on major water-related rescues conducted in NSW. It attempted to determine the reliability and validity of the data recorded throughout the trial. The objective of the project was to decide on the most effective mechanism for data collection that was amenable to all the relevant water safety agencies in NSW.

## 2. Background

Management of water safety requires information on the size and nature of the water safety problem. This information can be used for a range of different purposes including the development of water safety policy, the deployment of rescue services, the development of new water safety interventions and the evaluation of the effectiveness of water safety activities. Many water safety organisations collect information on water safety incidents, but not all collect the same information or collect it in the same way. This limits the degree to which the information can be combined.

The Minister for Sport and Recreation established the NSW Water Safety Taskforce in recognition of the importance of water safety and the need for a coordinated approach to water safety in NSW. The Taskforce developed the NSW Water Safety Framework 2001-2003 to provide strategic advice to the government on water safety-related matters.

Three key priority areas were identified in the Framework: Education, Standards, and Evidence. One of the key objectives of the Evidence area is to have access to comprehensive data on drownings, near drownings and water related injuries through the development and implementation of improved data collection methods. The strategic initiative is to gain information about rescues in order to understand more about the hazards involved, monitor and evaluate, improve standards, and increase public awareness.

The feasibility trial on the data collection method for water rescues began with the Taskforce suggesting the development of a NSW Minimum Dataset for Water Rescues to be used to collect rescue information at beaches and public swimming pools.

The feasibility trial of a minimum dataset was conducted by the Injury Risk Management Research Centre (IRMRC) in NSW in conjunction with the NSW Water Safety Taskforce, using lifeguards and lifesavers as data collectors.

In general, a data collection method should assist in identifying risk factors and provide a basis for the development of subsequent response plans. The feasibility trial should show whether the data collection method improves data quality and timeliness on all water-related rescues.

# 3. Method

A four-week trial of the draft minimum dataset for water rescues (available at [www.safewaters.nsw.gov.au](http://www.safewaters.nsw.gov.au)) took place between February 2002 to May 2002. Ten locations were trialed and data was recorded by Surf Life Saving Australia (SLSA) NSW Branch, Australian Professional Ocean Lifeguard Association (APOLA) and Royal Life Saving Australia (RLSSA) NSW Branch under the coordination and direction of the NSW Injury Risk Management Research Centre, in collaboration with the NSW Water Safety Taskforce Evidence Subcommittee.

Locations for the data collection were chosen according to size of the area, type of area (urban/regional), number of lifesavers/lifeguards, estimated number of people attending location and number of rescues performed. As far as possible the locations chosen reflect high and low pressure rescue locations. SLSA NSW Branch, APOLA and RLSSA NSW Branch chose the locations, in accordance with above conditions.

The data collection methods were designed based on the draft minimum dataset for water rescues, developed by NSW Safety Water Taskforce. The information on water safety was collected using two booklets:

1. *Hourly record*: A short, two-page set of questions completed hourly over the time that the beach or pool was patrolled. The aim was to collect a count of the number of rescues, details of the conditions at the time and of the number of people at the beach or pool.
2. *Details of rescues*: the second booklet collected details of each major rescue. For the purposes of the trial, a major rescue was defined as any rescue where a person was physically assisted to return to shore, the side of the pool or other place of safety (eg. water craft) who may have drowned without assistance. The booklet asks information about the person rescued as well as information about the specific circumstances in which the rescue occurred. All rescues and preventive actions undertaken by lifeguards and lifesavers are considered to be important.

### 3.1 Items examined

Items included in the data collection method were examined. Summarised they included characteristics of people involved in rescues, aspects associated with rescues and information on the rescue environment. The results for each item and relationships between the items were examined to determine target audiences for prevention strategies and education.

The following is a list of the items that were examined in the feasibility study:

#### Items in the *Details of rescues* booklet:

- *Identification of rescue*: determining the beach where the rescue occurred.
- *Date*: determine the patterns of rescues.
- *Time*: time of person rescue.
- *Performed rescue*: to determine who performed the rescue.
- *Age – exact*: Basic demographic details to determine if some age groups may be involved in a greater number of rescues than others.
- *Age – estimate*: Basic demographic details to determine if some age groups may be involved in a greater number of rescues than others.
- *Sex*: Basic demographic details to determine if some sexes may be involved in a greater number of rescues.
- *Postcode*: Basic demographic details to determine if people from remote or close to beach suburbs are to be involved in a greater number of rescues.
- *Main language*: Basic demographic details to determine if people from a non-English speaking background are involved in a greater number of rescues.
- *Indigenous status*: Basic demographic details.
- *Swimming ability*: the rescuers estimate and the person's estimate.
- *Swimming experiences*: try to establish a sense of person – time risk involvement in a rescue.
- *Activity*: To identify water user groups that need to be targeted for risk awareness strategies. (Different for beach and pool)
- *Swimming flags (beach only)*: to identify water user groups that may need to be targeted for risk awareness strategies.
- *Nearest rescue service (beach only)*: determine if some groups who may swim at remote locations may be involved in a greater number of rescues than others. To determine how far away the person was from the nearest flagged area.
- *Rescue equipment used*: determine patterns of equipment use (different for beach and pool).
- *Estimated depth of water*: to assess the possible associated factors that contribute to incidents of spinal injury.
- *First aid*: Description of types of first aid provided.
- *Ambulance assistance*: to monitor the use of ambulance services and protocols that requires the summoning of ambulance services by the rescue agency.
- *Alcohol and drugs*: to try and estimate the contribution of suspected alcohol and drug use to the need to be rescued from the water.
- *Identification of rescue*: How the rescuer knew the person was in difficulties

Items in the *Hourly records* booklet:

- *Flags: (beach only):* Location of flags
- *Number of lifeguards on patrol:* determine the conditions of rescues.
- *Weather:* establish the weather conditions that were present at the time of the rescue.
- *Wind conditions:* to establish the wind conditions that were present at the time of the rescue.
- *Wind direction:* to establish the wind conditions that were present at the time of the rescue.
- *Onshore/Offshore:* to establish the conditions that were present at the time of the rescue (beach only).
- *Air temperature:* To establish the conditions that were present at the time of the rescue.
- *Water temperature:* To establish the conditions that were present at the time of the rescue.
- *High tide:* To establish the conditions that were present at the time of the rescue (beach only).
- *Low tide:* To establish the conditions that were present at the time of the rescue (beach only).
- *Sea conditions:* To establish the conditions that were present at the time of the rescue (beach only).
- *Wave type:* To establish the conditions that were present at the time of the rescue (beach only).
- *Wave height:* To establish the conditions that were present at the time of the rescue (beach only).
- *Rip:* To establish the conditions that were present at the time of the rescue (beach only).
- *Crowd attendance:* Estimate the total number of people present in the water, on the beach and on the beach reserve at the time of the rescue incident. Estimate the total number of people present in the water, in the public pool enclosure at the time of the rescue incident, and around the pool area.
- *Major rescues:* in last hour, flagged area, and outside area for beach, and last hour only for pools.
- *Non-major rescues:* in last hour, flagged area, and outside area, and in last hour for pools.

# 4. Results

## 4.1 Details of rescues reported by beach lifeguards and life savers

In the period of the data collection process, 19 major rescues and 35 non-major rescues were recorded in the hourly records for the beaches. For the major rescues two were in the flagged area, and 17 were outside the flagged area. In the details of rescues booklet, it was recorded that 14 out of the 17 rescues took place outside the flags. For the non-major rescues, six were in the flagged area and 26 were outside the

flagged area. It is evident that the rescues were associated with individuals outside the flagged area. Eighty-two per cent of the major and 74 per cent of non-major rescues were made for individuals outside the flagged area.

Items associated with rescues from the *hourly records* and *detail of rescues* were examined. The following tables indicate the characteristics of the people involved in the rescues (Table 1), aspects of the rescue themselves (Table 2) and the conditions surrounding the rescue (Table 3) for the beaches involved in the study.

**Table 1. Beach rescues: Characteristics of the rescued person**

Item	Aspects involved in greatest number of rescues	Percent of rescues
Age group	6-14 years	29%
	15-64 years	24%
Sex	Male	76%
Postcode	Overseas	12%
Main language	English	58%*
Swimming ability	Non-swimmer (rescuers)	50%
	Swimmer (persons)	35%
Activity	Swimming/paddling/wading	58%

\* 24% of main language was recorded as not known.

The characteristics of persons rescued on beaches are shown in Table 1. The main results showed that:

- All rescues were captured within the age groups of 6-14, 15-24, 25-34 and 35-64 accounted all of the recorded rescues. No specific age group involved a greater number of rescues than others
- Males were involved in a greater percentage of rescues than females
- No evidence exists that people from a non-English speaking background were involved in a greater number of rescues
- Non- swimmers as estimated by the rescuer, were involved in the greatest number of rescues recorded. Similarly swimmers, as estimated by the person rescued were involved in about one-third of the rescues
- The rescued persons were mainly swimming, paddling or wading prior to the rescue.

**Table 2. Beach rescues: Characteristics of rescues**

Item	Aspects involved in greatest number of rescues	Percent of rescues
Rescue service	< 1 km	76%
Rescue equipment	Rescue board	76%
Depth of water	2-3 metres	82%
Ambulance needed	No	80 %
Influence of alcohol or drugs	Neither Don't know	65% 29%
How rescuer knew person was in difficulties	Seen by lifeguard who was on land	88%
Performed rescue	Lifeguard	100%

The main characteristics of rescues for beach rescues are shown in Table 2:

- For the majority of the rescues the person was less than one kilometre from the nearest flagged area
- In 76 per cent of the rescues, a rescue board was used, followed by no rescue equipment (20%)
- The majority of rescues were associated with a depth of water of two to three metres
- There was limited use of the ambulance services in rescues
- There was no contribution of suspected alcohol or drug use to the need to be rescued. Even if there was some contribution it seems that the rescuer was uncertain of it
- The rescuer mainly identified that the rescued person was in difficulties through sighting them whilst on land. This probably reflects the style of life-guarding which involves watching from the beach
- Lifeguards performed all rescues.

**Table 3. Beach rescues: Conditions associated with the rescue**

Item	Aspects involved in greatest number of rescues	Per cent of rescues
Location of swimming flags	Northern end of club	68%
Number of lifeguards on the beach	Two	84%
Weather	Fine	89%
Wind conditions	Light	63%
Wind direction	South East	47%
Onshore/offshore	Onshore	95%
Sea conditions	Choppy	63%
Wave type	Spilling	74%
Wave height	Moderate Small	53% 47%
Rips	Permanent rips	74%
Air temperature (M)	25 degrees	
Water temperature (M)	21 degrees	
Crowd attendance	80-250 people on beach 200-400 people on sand area 50-150 people in water between the flags	(M=112) (M=214) (M=79)

Of all 19 major rescues that were recorded, 16 had two lifeguards on duty at the beach; while three had one lifeguard on the beach (see Table 3). The majority of the rescues were associated with the flags being located at the northern end of the beach. The weather conditions present at the time of most of the rescues were recorded as 'fine'. The wind conditions that were associated with the rescues were light (63%) and moderate (21%). Rescues were also associated with the wind directions of south, southeast, and southwest. These winds were more often onshore than offshore. The sea conditions at the time of the rescues were mainly choppy (63%) or calm (37%). Conditions

present at the time of the rescue involved mainly spilling<sup>1</sup> and plunging/ dumper<sup>2</sup> waves (26%). The wave heights were small (0.5-1 metre) and moderate (1-2 metres). Also present at the time of the rescues were predominately permanent rips, ones that will remain in the same area for months or even years. The average air and water temperatures for the rescues were 25 and 21 degrees, respectively. Crowd attendance for the thirteen major rescues ranged from 80 people to 250 people on the beach. Most rescues occurred with 200 to 400 people on the sand area and with 50 to 150 people in water between the flags.

<sup>1</sup> Spilling waves occur when the crest of the wave tumbles down the face of the wave.

<sup>2</sup> Plunging waves break with tremendous force and can easily throw a swimmer to the bottom.

Similar findings on the conditions associated with major rescues are evident for *non-major rescues*. A *non-major rescue* is defined as any rescue where lifeguards/lifesavers assist to prevent a major rescue (eg. paddling out to a person in trouble and allowing them to rest before swimming to shore). The identical findings were:

- Like major rescues, the non-major rescues were associated with having two lifeguards on duty at the beach (77% of non-major rescues had two lifeguards on duty)
- The non-major rescues were also associated with the flags being located at the northern end of the beach (57% of non-major rescues had flags to the north of surf club)
- The weather conditions present at the time of all the non-major rescues were recorded as 'fine' (66% of non-major rescues had weather conditions that were fine)
- The wind conditions that were associated with the non-major rescues were light (51%), and moderate (40%). These winds were more often onshore (86%) than offshore
- The sea conditions at the time of the non-major rescues were choppy (66%)
- Conditions present at the time of the rescue were spilling<sup>3</sup> waves (63%). The wave heights<sup>4</sup> were small (51%) and moderate (23%). Also present at the time of the rescues were predominately permanent rips, ones that will remain in the same area for months or even years (61%)
- The average air and water temperatures for the non-major rescues were 25 and 22 degrees, respectively

- Crowd attendance for the non-major rescues ranged from 11 people to 900 people on the beach. Most rescues occurred with an average of 46 people between the flags, and an average of 250 people on the sand area.

The relationships between items was also investigated:

- The relationship between the language of the rescued person and whether or not the rescued person was between the flags at the time of the rescue was examined. It was found that a greater number of rescues occurred for English rather than non-English speaking background persons when they were outside the flagged area. Both language groups had equal number of rescues that were located less than one kilometre from the rescue service
- The trial also examine whether the age group of the rescued persons were associated with aspects of the rescue. The age groups of 6-14 and 25-34 year olds were found to be rescued most frequently outside the flagged area. They were also found to be less than one kilometre from the rescued area, at the time of rescue
- The sex of the rescued person and aspects of the rescue were examined. Males were more frequently rescued outside the flagged area, often one kilometre away. They were often swimming, paddling or wading prior to the rescue.

<sup>3</sup> Spilling waves occur when the crest of the wave tumbles down the face of the wave.

<sup>4</sup> This is the vertical distance between the top of the crest and bottom of trough.

## 4.2 Details of rescues reported by swimming pool attendants

In the period in which the data collection took place, 12 major rescues and 146 non-major rescues were recorded in the *Hourly records*.

The conditions and aspects of the non-major rescues at pools were examined (Table 4). It may be that these types of rescues are more common for pool attendants than beach lifeguards, as indicated by the huge numbers of non-major rescues in the trial period. Data from non-major rescues might provide useful information on the conditions associated with rescues.

**Table 4. Pool rescues: Conditions associated with non-major rescues**

Item	Aspects involved in greatest number of non-major rescues
Number of lifeguards at pool	Six
Crowd attendance at pool (M)	953
Crowd attendance around pool (M)	596
Crowd attendance in water (M)	241
Weather	Fine
Air temperature	22.8 degrees
Water temperature	28 degrees

The conditions associated with non-major rescues from swimming pools are shown in Table 4. These results should be interpreted cautiously as there was a considerable amount of missing data. Nevertheless, these results showed that:

- The numbers of lifeguards associated with non-major rescues were six (26% of the data)
- “Fine” weather condition was associated with for 42% of the non-major rescues
- The average air and water temperatures for the non-major rescues were 22.8 and 28 degrees respectively
- Crowd attendance for the non-major rescues ranged from 61 people to 2,650 people at the pool.

### 4.3 Item analysis for beach collection

Examining the missing data for the items of the *Hourly record* it is evident that *Exact count or best estimate for crowd attendance* and *Exact count or best estimate for major rescues* items contained the highest percentage of missing data (Table 5). However these percentages are not considerably high, indicating that lifeguards rated most of the items in the hourly record surveys.

**Table 5. Beach: Missing data of the hourly records**

Item	Per cent of missing data
Exact count or best estimate for attendance	14.8%
Exact count or best estimate for major rescues	13.6%
Major rescues	12.8%
Exact count or best estimate for non-major rescues	12.6%
Non-major rescues	11.7%
Crowd attendance	9.7%
Wind direction	8.8%
Onshore/offshore	7.6%
Air/water temperature	6.0%
Wave height	4.7%
Rips	4.0%
Number of lifeguards	3.5%
Wave type	3.0%
Sea conditions	2.9%
Weather	2.8%
Wind conditions	2.8%
Tide times	2.1%
Location of swimming flags	1.6%

The items that were consistently reported were items that described the conditions of the beach. These included wave type, tide times, sea conditions, wind conditions, weather, wave height, rips, location of swimming flags and number of lifeguards on the beach. This indicates that these are regularly and consistently reported aspects of the data collection method. It would suggest that conditions of the beach are probably well known by the lifeguards and able to be accurately and easily reported. Most of the items in the *Hourly record survey* are useful and valuable aspects of the data collection method, that allow the collection of comprehensive data on rescues and conditions.

Table 5 indicates the particular information was not obtained from the data collection method. Crowd attendance and the major/non-major rescues, and their corresponding exact or best estimates, were often not completed in survey. Notably, These items required counts or best estimates of counts, whereas the items that were consistently reported could be answered by just selecting from a number of possible options.

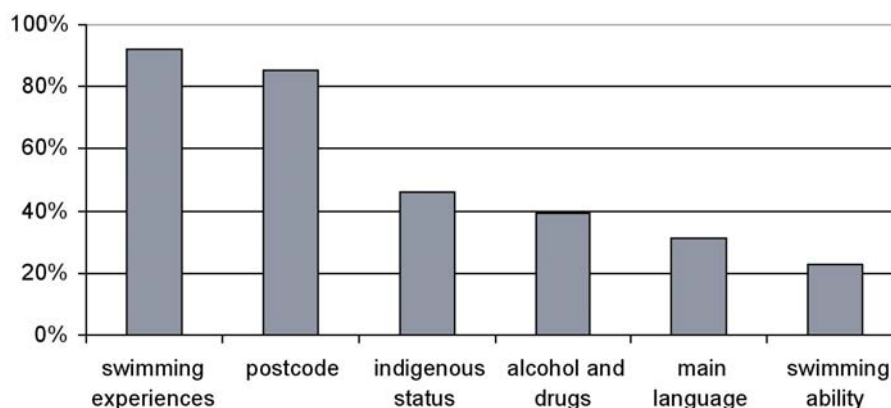
For the items of *Exact or best estimate* of major rescues for the hour, outside the area or between the flags, it was found that lifeguards consistently recorded these as exact estimates and not best estimates. It may be that a best estimate method of calculating the number of major rescues is an irrelevant question to ask, as lifeguards never recorded rescues as best estimates.

From the *Details of rescues* data collection method, the missing data was examined. The only items that were not consistently reported were *age – exact* (53% of missing data), and the *type of first aid used* (82% of missing data). These items may be difficult for lifeguards to obtain information on or not applicable to the rescues. As these items may not provide information on water rescues, their use should be reconsidered.

Consistently reported in the *Details of rescues* data collection method were the items of age group, activity before rescue, performed rescue, depth of water, flags, nearest rescue service and rescue equipment. These aspects are regularly reported, indicating they are reliable aspects of the method. The data items of sex, activity before rescue, location of swimming flags, and rescued equipment used when they were recorded were never recorded as unknown or couldn't tell. These items in the data collection provide reliable and comprehensive information on water safety.

Some items in the data collection method were reported as *unknown* extensively (Figure 1), indicating that these are difficult items to collect any sort of comprehensive information. Notably, these items are generally not directly observable, and requires the person being rescued to be interviewed to obtain the correct information.

**Figure 1: Beach: Items consistently recorded as unknown in the details of rescues records**



The item of *swimming experiences*, where the method was trying to establish how frequently the person swam at the beach, generated very little substantial information. Almost all of the data on this item was rated as unknown (92.3% of data rated as unknown). The item of postcode was recorded in 88 per cent of the rescues as unknown. It may be that this information about a person being rescued is unattainable. None of the rescues recorded the actual postcodes of the persons being rescued. Likewise for *main language*, 24 per cent of the recordings were unknown. The item *Indigenous status* had very little information to offer on the characteristics of people who were rescued. Half of the information obtained on this item indicated that the person rescued was neither an Aboriginal nor Torres Strait Islander, and one-third rated the Indigenous status of the rescued person as unknown. The majority of the data obtained on whether the rescued person was under the *influence of alcohol or drugs* was rated as neither or unknown, providing very little information. It seems that even if there is a contribution of alcohol or drugs the lifeguards are uncertain of it. The item of *swimming ability* had a high percentage of its data rated as unknown, indicating that lifeguards were unable to determine the ability of the person rescued providing little information on the item.

Comparisons were made between the hourly records and the rescue information to examine whether rescue information was being reported accurately. If the information is being reported accurately and efficiently, an identical number of rescues would be recorded in the *Hourly records* and *details of rescues* (ie. expect a perfect correlation of one between rescues recorded in the *hourly records* and *details of rescues*). Nineteen major rescues were recorded in the *Hourly records*, while only 17 were recorded in the *Details of rescues*. The correlation coefficient was 0.69\*. This indicates that although the reporting of rescue information was not perfect, there was a significant positive relationship between the number of rescues reported in the *Hourly records* and *Details of rescues*.

From the data it is evident that there was little distinction between major and non-major rescues. The beach data on the conditions and aspects for major rescues were identical to non-major rescues. Therefore it appears that data from non-major rescues could also provide useful information on the conditions associated with major rescues.

\* Statistically significant  $p < 0.05$

## 4.4. Item analysis for pool collection

Examining the missing data for the items of the *Hourly record*, the items that were consistently reported were: Observation times, Crowd attendance, Exact count or best estimate for crowd attendance and Major/non-major rescues. This indicates that these are regularly reported aspects of the data collection method. Similar to the data collected on the beach by lifeguards, *Crowd attendance* and the corresponding *exact count or best estimates* from the pools data collection contained a similar percentage of missing data.

Many of the conditions describing the pool area had a high percentage of missing data (eg. wind direction, wind conditions, weather and temperature; Table 6). This was not unexpected given that the pools at which the trial occurred were indoor.

**Table 6. Pool: Missing data of the hourly records**

Item	Percent of missing data
Wind direction	99%
Wind conditions	88%
Air temperature	74%
Weather	73%
Water temperature	26%
Exact count or best estimate for non major rescues	15%
Exact count or best estimate for major rescues	11.2%
Number of lifeguards	11.2%
Non major rescue	8.4%
Major rescues	7.8%
Exact count or best estimate for crowd attendance	7.5%
Crowd attendance	5.3%
Observation time	0%

The data indicates that some particular types of information were not obtained from the data collection method for pools. In particular, the items with a high percentage of missing data are unlikely to be consistently reported. Having these items in the survey may not allow for the collection of comprehensive data on the conditions of the pool area, and aspects associated with the pool. The high percentage of missing data in the pool sample was in contrast to the beach data. For example, the percentage of missing data for *Non-major rescues* in the beach survey was 5.0 per cent, compared to 10.8 per cent in the pool survey. For some reason these items were not recorded reliably by pool attendants, making their usefulness limited.

Comparisons were made between the hourly records and rescue information to examine whether rescue information was being reported accurately. From the *Hourly records*, 12 major rescues were recorded while only five were recorded in the *Details of rescues*. This indicates that the major rescues that occurred were not consistently reported in the survey on rescues. There was, however, a significant positive relationship between the rescues reported in the *Hourly record* and *Details of rescues*, with a correlation coefficient of 0.662 ( $p < 0.05$ ).

## 4.5. Interviews/Focus groups

Focus groups and telephone interviews were conducted with representatives from APOLA, SLSA NSW Branch and RLSSA NSW Branch, in order to examine employees' opinions and feelings about the data collection method. The following is a brief summary of the recommendations of respondents.

### 4.5.1 Understanding of method

Employees were asked to evaluate the efficiency of data collection methods/tools in their organisation, the efficiency of the data collection method used in the current feasibility trial, and the perceived benefits of this data collection process.

In general, employees felt there was a lack of efficient data collection methods/tools in their organisation. Time was identified as a major

factor, with employees often lacking the time to fill out the appropriate surveys. Lack of consistency in the data was also an issue, with different lifeguards perceiving items such as crowd attendance differently.

The data collection process used in the feasibility trial was considered as straightforward; the survey had clear instructions and was easy to complete. Time, however, was still a major limitation. Employees found it difficult to find the time to complete the *Hourly record* and *Record of rescue*, completing them when they had spare time (eg. often a couple hours after the rescue). The huge crowd over the Christmas holiday period made it difficult time to collect data, particularly the *Hourly record* form.

Employees highlighted two major benefits of the data collection process. First, the data gathered can help with tenders and for greater funding. Secondly, the information can help identify the equipment needed for rescues.

#### 4.5.2 Process of method

Were you able to fill out the survey and hourly records conveniently?

- Problem with consistent data when overseeing large areas
- Difficult to complete with busy times
- Language issues for people from a Non-English speaking background.

#### 4.5.3 Opinions of the method

Items considered particularly important collect data on:

- Major and non-major rescues
  - Distinction between major and minor rescues is somewhat blurred, and the two terms mean different things to different people
  - It would be worthwhile to introduce this data collection method as a new workplace practice, however it needs to be universal and to reflect what is really happening at the beaches
- Crowd attendances
- Conditions of the beach (eg. tide times, wave conditions, weather)
- Some items were considered redundant or not applicable, especially water and air temperatures: only record once as it rarely changes throughout the day

- Counts of rescue: determine from categories of rescues over time period rather than recording them separately
- Swimming ability and experience: although it is easy for lifeguards to make estimates on a person's swimming ability, a person's estimate of their ability is difficult to record. Difficult to get information as lifeguards are not always conscious of asking these questions of the person they rescue; their concern is with getting them to shore safely and quickly. The rescue situation often prevents the asking these questions about the rescued person
- Characteristics of person rescued: the concern with rescuers is the rescue itself and not the sort of people they are rescuing. Sometimes it is unrealistic to get this information, especially with children, as they are in shock and want to go straight to families rather than be asked a series of questions
- Many items in *details of the rescue* were reported as unknown, providing little information on conditions of rescues or the characteristics of a person who was rescued. These items were: *postcode, main language, Indigenous status, swimming experiences, and first aid used*. Are these aspects too difficult to get information on from the person rescued, or are they seen as unimportant to record?
- First aid: the first aid item is not recorded a lot of time because often rescues do not involve resuscitation.

#### 4.5.4 Improvements to method

A number of specific recommendations were made regarding potential improvements to the collection forms as follows:

To enhance useability of data collection forms:

- Make booklets larger
- Combine the hourly record and the rescues into one booklet
- Reduce paperwork by grouping rescues (eg. according to rescue type, or type of people involved in rescue)
- Make the data collection process less time consuming by using survey questions that require boxes to be ticked, rather than long answers.

To enhance accuracy of data:

- More emphasis on preventive actions; the current data method does not uncover this
- More detailed definitions of major and non-major rescues (eg. major rescues to include near drowning, physical contact, and preventive action). There would need to be agreement over these definitions
- Have an observer with the lifeguard to ensure that the survey is completed correctly and accurately
- Include a general comments section for data collector to make comments about the day (eg. thefts, storms, why the beach was busy, surfing carnivals).

Problem of obtaining a reasonable balance between paper work and job requirements:

- Use a two to three hour time frame rather than an hourly record
- Have a basic survey which is done monthly, but not over the busy Christmas/New Year Summer period
- Easier to complete surveys on weekends when five or six lifeguards are working, compared to weekdays when two or three lifeguards are on duty.

Changes to the survey method:

- Combine *Hourly record* and *Detail of rescue* forms into one survey
- Combine major and minor rescues to capture time lifeguards spend on preventive work.

Include more information about lifeguard:

- Name of lifeguard completing data collection form
- Record role of lifeguard (eg. parent, crime preventer, monitoring jet skis)
- Actions under the *Lifeguard Act*.

Include more information on beach and rescue conditions:

- Conditions that change throughout the day (eg. rips, wind and flags)
- Crowd attendance should cover more areas (eg. beach reserve, car park)
- What people are doing on the beach (eg. running, diving, jumping)
- Collect following rescue details: local or non-local rescue, use of Inflatable Rescue Boat (IRB), board, non-gear, or jet ski during rescue.

# 5. Conclusions

The feasibility trial identified items that were consistently and regularly reported, suggesting that they will provide comprehensive information if included in the data collection method. Items that were regularly reported are considered reliable items within the data collection method. Items in the *Hourly record* that were consistently recorded included items describing beach conditions, such as wave type, tide times, sea conditions, and weather and wind conditions. Items that were consistently reported in the *Detail of rescue* survey were: sex, age group, activity before rescue, who performed the rescue, depth of water, location of flags, nearest rescue and rescue equipment.

The feasibility trial of the data collection method also indicated that it may be necessary to modify some of the data items. The following factors were used to guide recommendations for modifying the data collection method:

- Items that had a written format such as crowd attendances or rescue counts, items that required an estimate format, and items that required a long answer were unlikely to be answered, containing a high percentage of missing data
- Certain data items were consistently reported as unknown, and therefore, considered redundant. These were items related to information on the rescued persons, and included the swimming experience of the rescued person, swimming ability of the person rescued, postcode of the rescued person, their indigenous status, whether the person was under the influence of drugs or alcohol, and main language. The use of these items in the feasibility trial provided little information on the characteristic of the person being rescued. It is possible that the rescue situation may prevent lifeguards from obtaining this information
- Items associated with the conditions of the pool, such as wind conditions, wind direction, weather and temperatures, contained a high proportion of missing data. This was not entirely unexpected as pool attendants collected data from indoor pools during the feasibility trial.

# 6. Recommendations

- (1) Consideration should be given to having comprehensive one month data collection method periods three times a year, to collect information on water-related rescues. An independent observer should assist the lifeguards/pool attendants in collecting the data within the period. The independent observer's primary job is to collect information on the characteristics of the people involved in the rescues. This will enable the collection of more reliable and accurate information, particularly on items associated with persons involved in rescues.
- (2) There is a need to develop stronger definitions on major and non-major rescues, including a definition of a preventive action. There needs to be universal agreement with regard to these definitions.
- (3) Consideration should be given to including a greater emphasis on preventive actions taken within the data collection method.
- (4) Use a format with ticked boxes in the data collection method rather than long answers or estimates.
- (5) There is a need to make modifications to some of the items included in the survey, to ensure items provide comprehensive information on water-related rescues.
- (6) Combine the two data collection booklets into one data collection survey. Completing two booklets is too time consuming and they are difficult to keep together.
- (7) A data collection method involving recordings made hourly is too time consuming, and the information does not change dramatically between the hours. The recordings would be more appropriate at three to four hour time intervals, so that employees are not spending all the time doing paperwork.
- (8) The data collection method needs to be universal and applied by all water safety agencies to obtain accurate and reliable information. There needs to be consensus across the agencies as to the items to include in the data collection.

## **Trial 2:**

**Sentinel event recording of rescues-major, rescues, preventive actions on NSW beaches**

# 1. Introduction

Phase 1 of the feasibility trial of the minimum dataset for water rescues indicated that:

- Information on water-related rescues should be collected using comprehensive data collection periods a few times a year
- There were problems in lifeguards and lifesavers collecting the data, especially at busy times and on busy beaches. It was suggested that dedicated independent observers undertaking comprehensive data collection periods a couple of times a year would enable the collection of reliable and accurate data during busy periods, particularly on data items associated with the rescued person
- There was a need to strengthen the definitions used for rescues, which included major rescues and rescues and to modify a few data items to make them more useable.

Preventative actions should be emphasised as they are likely to counter balance the number of rescues.

The findings and recommendations of Phase 1 were incorporated in Phase 2 of the feasibility trial to develop an effective and efficient common data collection method for water-related rescues<sup>5</sup>. The trial was conducted at surf beaches during the busy Summer and Easter periods using trained dedicated data collectors, and included the use of the trial also included more comprehensive definitions of rescue, which were developed from a focus group with discussions with Sport and Recreation NSW, SLSA, APOLA and RLSSA. These definitions were:

*Rescue-major:* any rescue where the rescue of the person involved more than one lifeguard/ lifesaver or a member of the public to render assistance OR where the rescued persons had to be resuscitated OR where another agency had to render assistance (eg. ambulance, rescue helicopter)

*Rescue:* any rescue where a person was physically assisted or supported to return to shore or other place of safety (eg. retrieving a person in difficulty)

*Preventive action:* any water safety advice provided to the public (eg. asking people to swim between the flags; use of PA and/or whistle)

<sup>5</sup> An interim report on the progress of the study was produced in June, 2003 and a report on part of the data analysis was presented at the National Water Safety Conference in September, 2003.

## 2. Methods

A total of 14 research assistants were recruited and trained for the summer data collection and six of the same research assistants worked on the Easter data collection. All data collectors participated in training sessions of two to three hours in length where the data collection methodology was explained and potential problems discussed.

The following information was collected for each beach at each data collection<sup>6</sup>:

An *Hourly observation sheet* (Appendix A) which detailed:

- The number of lifeguards/lifesavers on the beach over the hour
- Tide times (first hour only)
- Location of the flags for the last hour
- The number of major rescues\*
- The number of rescues\*
- The number of preventive actions in total and inside and outside the flagged area\*
- Details of the weather, including temperature, sea conditions, wind conditions and direction, wave type and wave height, presence of rips
- Number of people in the location including on the sand, in the flagged areas and outside the flagged areas\*.

A *Details of major rescue and rescue sheet* (Appendix B) which covered:

- Age or age group\*
- Gender
- Main language spoken at home
- Suburb of usual residence or overseas
- Indigenous status
- Swimming ability of person rescued\*
- Activities of person just before rescue
- Who performed the rescue and how they knew the person was in difficulties
- Location of the person at rescue point including depth of water and with respect to the flags
- Use of rescue equipment
- Use of first aid equipment
- Need for ambulance
- Involvement of alcohol and drugs
- Narrative description of what happened.

<sup>6</sup> For items marked with an asterix (\*), provision was made for data collectors to make their best estimates. Whether exact or best estimates were made was indicated on the collection form.

Lifeguards and pool attendants involved in the data collection in Phase 1 were critical of the need to collect hourly records particularly during busy periods, highlighting the time consuming nature of the task. The *Hourly records* form was used in Phase 2 to investigate what water-related rescue information could be collected by data collectors whose sole task was to complete the data collection surveys.

The data collection was carried out over a one week period at the end of January (25 January to 1 February, 2003 inclusive which included the long weekend) and during the Easter period (18 to 21 April, 2003 inclusive). The data collection occurred at all times when the flags were out and the beach was patrolled. The beaches involved in the summer collection were Bondi, Maroubra, Freshwater, Palm Beach and Avoca. The Easter collection occurred at Bondi, Maroubra, Freshwater and Palm Beach as these were likely to be the busiest.

For the analysis of the data collected, the number of rescues was counted as the number of persons rescued. *Major rescues* and *rescues* were defined using the definitions described in the Introduction to this section of the report.

# 3. Results

## 3.1 Summer data collection

The period of the trial included a long weekend (Australia Day) and the end of the school holidays (ie. trial covered three weekend days and four week days). It also coincided with a surf carnival at one beach (Freshwater) which disrupted data collection for one afternoon, and a public concert at another (Maroubra) which did not disrupt data collection.

### 3.1.1 Conditions on beaches

Table 7 shows details of the conditions on the beaches averaged across the hourly data collections. As can be seen this data collection period corresponded with a period of good weather for all beaches with fine warm conditions and very little rain on any beach. The sea conditions were light to moderate, with mainly small, spilling waves for all beaches. Only Avoca and Maroubra had waves at any time that were estimated to be above one metre in height. The waves were rated as flat for around 20 per cent of the time on Freshwater and North Bondi beaches. All beaches had at least one rip most of the time, except Palm Beach, and in each case, this was a fixed or permanent feature of the beach.

The number of beach attendances showed similar average numbers for Avoca, Freshwater and Maroubra, with much smaller numbers at North Bondi and Palm Beach.

### 3.1.2 Details of rescues

Over the summer trial period, 60 people were involved in major rescues and rescues during the study period, with more than half occurring at Avoca Beach (56.9%) and the least at Freshwater, North Bondi and Palm Beach (see Table 8). Approximately half of the incidents occurred during the long weekend (54%). Twelve people were involved in incidents that were classified as major rescues, including one drowning fatality. Avoca had the most major rescues followed by North Bondi and Palm Beach, and there were no major rescues at Maroubra. All except one of the major rescues occurred outside the flagged areas, and just over 10 per cent of other rescues occurred inside the flagged areas. Three incidents involved non-submersion-related events such as a cut, a sprain and a missing person.

A summary of the information available on the characteristics of the persons involved in major rescues and rescues is shown in Table 9. Information on the characteristics of the persons involved in major rescues and rescues was available for approximately two-thirds of cases (63.3%). All of the rescue cases with missing information were from one beach, Avoca, where no details were able to be collected for any major rescue and for just under one-third of other rescues (32.1%). Most of the incidents involved males and most were in the six to 25 year age group (73.7%). The greater majority were classified as English-speaking and most were classified as non-Indigenous, with Indigenous status cases classified as unknown for only three cases.

**Table 7. Trial 2: Average hourly beach conditions (Summer period)**

Beach (Mean, SD)*	Avoca 76 occasions	Freshwater 65 occasions	Maroubra 88 occasions	North Bondi 89 occasions	Palm Beach 75 occasions
Number of Lifeguards and Lifesavers	5.0 (3.3)	4.4 (3.8)	5.3 (5.3)	4.1 (5.5)	4.3 (3.2)
Weather					
Fine	66.7(%)	76.6(%)	81.8(%)	77.5(%)	70.3(%)
Overcast	33.3(%)	23.4(%)	17.0(%)	21.3(%)	28.4(%)
Raining	0.0(%)	0(%)	1.1(%)	1.1(%)	1.4(%)
Air temperature (°C)	25.4 (4.5)	26.0 (2.5)	31.1 (5.8)	23.7 (2.5)	27.7 (3.0)
Water temperature (°C)	20.1 (1.0)	21.2 (2.5)	21.9 (0.2)	20.4 (1.5)	21.4 (0.7)
Sea conditions					
Calm	57.9(%)	76.6(%)	64.8(%)	78.7(%)	76.0(%)
Choppy	42.1(%)	23.4(%)	20.5(%)	21.3(%)	24.0(%)
Rough	0.0(%)	0.0(%)	14.8(%)	0.0(%)	0.0(%)
Very rough	0.0(%)	0.0(%)	0.0(%)	0.0(%)	0.0(%)
Wind conditions					
None	5.3(%)	1.6(%)	0.0(%)	12.4(%)	9.5(%)
Light	55.3(%)	57.8(%)	38.6(%)	44.9(%)	51.4(%)
Moderate	30.3(%)	32.8(%)	36.4(%)	32.6(%)	31.1(%)
Strong	9.2(%)	7.8(%)	25.0(%)	10.1(%)	8.1(%)
Storm	0.0(%)	0.0(%)	0.0(%)	0.0(%)	0.0(%)
Wave type					
Spilling	81.3(%)	76.6(%)	100.0(%)	64.0(%)	100.0(%)
Flat	1.3(%)	23.4(%)	0.0(%)	21.3(%)	0.0(%)
Surging	17.3(%)	0.0(%)	0.0(%)	14.6(%)	0.0(%)
Plunging/dumpers	0.0(%)	0.0(%)	0.0(%)	0.0(%)	0.0(%)
Wave height					
0.5-<1M	69.7(%)	100.0(%)	67.0(%)	92.9(%)	93.3(%)
1-<2M	30.3(%)	0(%)	33.0(%)	7.1(%)	6.7(%)
2+M	0.0(%)	0.0(%)	0.0(%)	0.0(%)	0.0(%)
Presence of rip					
No rip	1.3(%)	0.0(%)	0.0(%)	0.0(%)	86.7(%)
One rip	46.1(%)	79.7(%)	26.1(%)	100.0(%)	13.3(%)
Two rips	52.6(%)	20.3(%)	73.9(%)	0.0(%)	0.0(%)
Rip type					
Fixed	0.0(%)	0.0(%)	8.0(%)	100.0(%)	100.0(%)
Permanent	46.7(%)	79.7(%)	18.2(%)	0.0(%)	0.0(%)
Permanent + fixed	41.3(%)	0.0(%)	73.9(%)	0.0(%)	0.0(%)
Permanent + travelling	12.0(%)	17.2(%)	0.0(%)	0.0(%)	0.0(%)
Fixed + travelling	0.0(%)	3.1(%)	0.0(%)	0.0(%)	0.0(%)
Flash, travelling, littoral	0.0(%)	0.0(%)	0.0(%)	0.0(%)	0.0(%)
Permanent + flash	0.0(%)	0.0(%)	0.0(%)	0.0(%)	0.0(%)
Number of people on the sand	415.6 (684.2)	411.4 (769.5)	425.3 (940.5)	224.1 (239.4)	206.5 (185.0)
Number of people in the water between the flags	113.07 (102.8)	116.0 (75.3)	64.5 (64.1)	55.1 (51.1)	41. (37.0)
Number of people in the water outside the flags	46.4 (40.2)	70.8 (40.7)	51.0 (39.53)	29.4 (31.3)	24.6 (21.2)

\* total of 392 observations

**Table 8. Triail 2: Number of people involved in major rescues and rescues occurring inside and outside flagged areas during study period (Summer period)**

Beach	Major Rescue			Rescue			Overall Total n, %
	In flag	Out flag	Total	In flag	Out flag	Total	
Avoca	0	5	5	2	26	28	33, 55.0%
North Bondi	0	3	3	2	1	3	6, 10.0%
Palm Beach	1	2	3	0	0	0	3, 5.0%
Freshwater	0	1	1	1	3	4	5, 8.3%
Maroubra	0	0	0	0	13	13	13, 21.7%
<b>TOTAL</b>	<b>1</b>	<b>11</b>	<b>12</b>	<b>5</b>	<b>43</b>	<b>48</b>	<b>60, 100%</b>

For most cases, the rescuer made a judgment about the swimming ability of the person they rescued, but for around one in five cases, the estimate was made by the person themselves. Based on this, just over half were judged to be weak swimmers and only two cases were judged to be strong swimmers. Most were swimming, wading or paddling at the time of the incident, with a few cases involving body boarders and the one drowning fatality occurred while skin diving. Almost all cases were judged to not be under the influence of drugs, although for three cases drug involvement was judged to be unknown.

Table 10 shows characteristics of the rescue. Lifeguards and lifesavers were involved in approximately equal numbers of rescues, and three cases involved members of the public. In the majority of cases the need for the rescue was established by a rescuer on land, in only

four cases, the rescuer was also in the water when they noticed the person in difficulties. In eight cases, the incident occurred in one metre of water or less, although the estimated depth of water ranged from 0.75 metres to 20 metres. Information was available on whether the incident occurred inside or outside of the flags for around two-thirds of cases. Where this was known, most of the incidents occurred outside the flagged area (82.1%), with half occurring more than 60 metres away. Two cases occurred within 10 metres outside the flagged area, and six cases occurred within the flags. Where rescue equipment was used, it mostly involved a rescue board, with the remainder involving rescue boats. Three cases involved at least one of expired air resuscitation (EAR), cardio-pulmonary resuscitation (CPR) and oxygen and an Ambulance was called for each of these cases, although in one case, it was refused.

**Table 9. Trial 2: Characteristics of rescued persons in major rescues and rescues (Summer period)**

Characteristic of rescued person*		Percent
Age group (n=38)	0-5 years	5.3
	6-14 years	42.1
	15-24 years	31.6
	25-34 years	10.5
	35-65 years	7.9
	65+ years	2.6
Gender (n=39)	Male	66.7
	Female	33.3
Main language spoken at home (n=38)	English	73.7
	Non-English	15.8
	Unknown	10.5
Indigenous status (n=38)	Yes	0.0
	No	89.5
	Unknown	10.5
Swimming ability estimator (n=31)	Rescuer's estimate	71.0
	Self-estimate	22.6
	Rescuer and self estimate	6.5
Rescuee's swimming ability (n=37)	Weak swimmer	59.5
	Ordinary swimmer	13.5
	Strong swimmer	5.4
	Unknown swimming ability	2.7
	Nonswimmer	8.1
	Don't know	10.8
Rescuee's activities prior to being rescued? (n=38)	Swimming, paddling or wading	73.7
	Body boarding	13.2
	Using a motorised craft	7.9
	Riding other craft	2.6
	Skin diving or snorkelling	2.6
	Walking or playing near the water, attempting a rescue	0.0
	Rock walking, rock fishing, other fishing	0.0
	Using a personal water craft, water skiing	0.0
	SCUBA or SSBA or platform	0.0
	Windsurfing or kite surfing, sailing	0.0
	Suspected suicide	0.0
	Unknown, other	0.0
Was rescuee under the influence of drugs? (n=38)	No	92.1
	Alcohol suspected	0.0
	Other drug suspected	0.0
	Both alcohol and drugs suspected	0.0
	Don't know	7.9

\* n=60

**Table 10. Trial 2: Characteristics of rescue in major rescues and rescues (Summer period)**

Rescue characteristic*		Percent
Rescuer (n=35)	Lifeguard	48.6
	Lifesaver	42.9
	Member of public	11.5
How the rescuer knew the person was in difficulty (n=38)	On land	89.5
	In water	10.5
Water depth at point of rescue (M) (n=36)		2.9 (3.4)
Was rescuee between the flags (n=60)	Yes	10.0
	No	53.3
	No flags on beach	1.7
	Unknown	35.0
	Distance from flags (M)	166.0 (182.9)
Number of rescue equipment used (n=38)	None	31.6
	One	65.8
	Two	2.6
Type of rescue equipment used (n=26)	Rescue board	69.2
	Inflatable rescue boat	23.1
	Other personal flotation device	3.8
	Jet rescue boat or offshore rescue boat	3.8
	Personal water craft or rescue water vehicle	3.8
	Spinal board, durfboard or body board, not known	0.0
Number of first aid used (n=37)	None	86.5
	One	8.1
	Two	2.7
	Three	2.7

\* n=60

There were 1,117 preventive actions counted across all of the beaches during the trial period (see Table 11). The number of preventive actions varied considerably between the beaches, with the least at North Bondi (1.3%) and the most at Maroubra (38.4%). Just under 10 per cent of these were related to events and circumstances occurring in the flagged area. Interestingly, Palm Beach had a high number of preventive actions relating to the flagged area compared to the other beaches. It would be worthwhile to explore why this might be the

case. While the number of preventive actions is likely to be influenced by the work style of the lifesavers or lifeguards, this pattern may also be related to the rated level of danger at each of the beaches. Based on the ratings developed by Short (2000)<sup>7</sup>, Maroubra Beach, is rated at 7 and North Bondi is rated at 4 which correspond respectively to the highest and lowest (safest) ratings of the beaches in the trial and these beaches had the highest and lowest numbers of preventive actions.

<sup>7</sup> Short A (2000) *Beaches of the NSW coast: a guide to their nature, characteristics, surf and safety*. Australian Beach Safety and Management Program, Sydney, University of Sydney.

**Table 11. Trial 2: Frequency of preventive actions occurring inside and outside flags (Summer period)**

Beach	Beach safety rating#	Preventive action		
		In flag	out flag	Total
Avoca	6	9 (9%)	220 (26.4%)	293 (26.2%)
North Bondi	4	3 (3%)	12 (1.3%)	15 (1.3%)
Palm Beach	4-6	57 (57%)	70 (7.5%)	127 (11.4%)
Freshwater	7	11 (11%)	241 (25.8%)	253 (22.6%)
Maroubra	7	20 (20%)	390 (41.8%)	429 (38.4%)
TOTAL		100 (100%)	933 (100%)	1117* (100%)

\* Discrepancy between sum of "In flag" and "Out flag" and Total is due to missing data  
 # Short, A. (2000).

## 3.2. Easter data collection

The second data collection coincided with the four days of the Easter break, from Good Friday to Easter Monday inclusive. Collections were started on four beaches, Freshwater, Maroubra, Palm Beach and Middle Bondi. Data was collected at Middle Bondi for the second collection period after consultation with lifesavers and lifeguards indicated that there was typically more activity at this section of Bondi Beach. Unfortunately, the second data collection period coincided with very bad weather and beach attendance and data was only collected from two beaches over the period; Freshwater and Middle Bondi. Middle Bondi Beach was the only beach that was open (a flagged area was patrolled) during the period. The other three beaches were closed for the majority of the data collection period. Data was still collected at Freshwater Beach only.

### 3.2.1 Conditions on beaches

As shown in Table 12, the conditions on the beaches over the Easter period were overcast and raining with rough and very rough seas for all of the time on Freshwater Beach, and at least choppy for most of the time on Middle Bondi Beach. Wave heights were over one metre for the entire data collection period at Freshwater and for around one-third of the time at Middle Bondi. There was one permanent rip at Freshwater for the entire data collection and two rips, either a permanent and flash rip or permanent and fixed rip, at Middle Bondi. Consistent with the poor conditions on the beach, the number of beach attendances were low compared to the summer collection period, with higher numbers at the more popular Middle Bondi Beach.

**Table 12. Trial 2: Average hourly beach conditions (Easter period)**

		Freshwater (35 observations)	Middle Bondi (35 observations)
Number of Lifeguards and Lifesavers		6.3 (1.6)	7.1 (4.4)
Weather (%)	Fine	34.3	0.0
	Overcast	60.0	94.3
	Raining	5.7	5.7
Air temperature (°C)		20.5 (1.0)	20.1 (0.2)
Water temperature (°C)		21.5 (0.5)	20.4 (0.2)
Sea conditions (%)	Calm	0.0	25.7
	Choppy	0.0	48.6
	Rough	57.1	0.0
	Very rough	42.9	25.7
Wind conditions (%)	None	2.9	0.0
	Light	45.7	28.6
	Moderate	48.6	25.7
	Strong	2.9	45.7
	Storm	0.0	0.0
Wave type (%)	Spilling	28.6	94.3
	Flat	2.9	0.0
	Surging	0.0	0.0
	Plunging/dumpers	68.6	5.7
Wave height (%)	0.5-<1M	0.0	65.7
	1-<2M	48.6	28.6
	2+M	51.4	5.7
Presence of rip (%)	No rip	0.0	0.0
	One rip	100.0	0.0
	Two rips	0.0	100.0
Rip type	Fixed	0.0	0.0
	Permanent	100	0.0
	Permanent + Fixed,	0.0	25.7
	Permanent + Travelling,	0.0	0.0
	Fixed + Travelling, Flash,	0.0	0.0
	Travelling, Littoral	0.0	0.0
	Permanent + Flash	0.0	74.3
Number of people on the sand		7.9 (9.4)	67.7 (54.0)
Number of people in the water	Between the flags	N/A*	10.5 (14.4)
	Outside the flags	1.0 (0.2)	26.2 (26.6)

\* Beach closed (ie. no flags)

### 3.2.2 Details of rescues

During the Easter collection period there were a total of six rescues, two major rescues and four rescues, all at Middle Bondi Beach (see Table 13). In addition, there were 30 preventive actions at Middle Bondi Beach. All of the rescues and most preventive actions occurred outside the flagged area.

**Table 13. Trial 2: Major rescue, rescue, and preventive actions occurring inside and outside flags (Easter period)**

Beach	Major rescue			Rescue			Preventive action		
	In flag	Out flag	Total	In flag	Out flag	Total	In flag	Out flag	Total
Middle Bondi	0	2	2	0	4	4	6	24	30
Freshwater	0	0	0	0	0	0	0	0	0

The rescued persons over the Easter period tended to be older than in the Summer period, with most in the 15 to 35 year age group, and all were male. All were judged to be English-speaking and from a non-Indigenous background. All were swimming, paddling or wading at the time, however for most, the rescuer was not able to make a judgment on their swimming ability. In two cases, the rescuer suspected that the person had been drinking alcohol.

Half of the rescues involved lifeguards and half involved lifesavers. The person was identified as being in difficulties from the land for half of the rescues and from the water for the remainder. All of the rescues occurred outside the flags and all but one were 30 metres or less from the flags in water ranging from 0.75 to three metres in depth. A rescue board was used in half of the cases and for half a spinal board was used. One case needed resuscitation, including oxygen and defibrillation and required an ambulance.

### 3.3. Quality of data collection

The results indicate that almost all of the hourly observation variables were able to be collected by data collectors for both data collections. Most importantly, the collectors were able to use the type of rescue variables and to differentiate major rescues and rescues and preventive actions. They were also able to make estimates of the size of the crowd at various locations on the beach and to code the details of the weather and beach conditions.

Table 14 shows a comparison of the percentage of missing data for variables collected in the hourly records for the first trial data collection in which lifeguards and lifesavers collected the information (see Trial 1) with those collected in the two collections of the current trial using dedicated data collectors. For almost all variables, there was less missing data with the dedicated collectors in Trial 2 than in the first trial, in fact in the second trial the amount of missing data was very small and virtually all in the first or summer data collection. The main exceptions were for coding of air temperature and whether the wind was on or off-shore. Examination of the patterns of missing data in Trial 2 showed that air and water temperature was not coded at all for the first four days of coding on one beach which accounted for almost of the missing cases. Similarly coding of on/off shore wind direction was not coded at all during the Easter data

collection on one beach, although the actual wind direction was coded. These appeared to be problems with specific coders rather than problems with the coding methodology itself. The amount of missing data on attendance numbers was very low for the summer data collection in the second trial. There was no missing data for the Easter data collection, which was probably due to the much smaller crowd numbers due to the bad weather.

**Table 14. Missing data from hourly records for Trial 1 compared to Trial 2**

Variable	Trial 1	Trial 2 Collection 1 (Summer)	Trial 2 Collection 2 (Easter)
Exact count or best estimate for attendance	14.8%	4.1%	0
– on sand		1.5%	0
– within flags		2.5%	0*
– outside flags		2.8%	0
Exact count or best estimate for major rescues	13.6%	0.5%	0
Exact count or best estimate for rescues	12.6%	0.5%	0
Exact count or best estimate for preventive actions		1.5%	0
Wind direction	8.8%	0	0
Onshore or offshore	7.6%	5.6%	50%#
Air/water temperature	6.0%		
– Air temperature		14.0%	0
– Water temperature		1.3%	0
Wave height	4.7%	5.1%	0
Rips	4.0%	0.3%	0
Wave type	3.0%	0.5%	0
Sea conditions	2.9%	0.3%	0
Weather	2.8%	0.5%	0
Wind conditions	2.8%	0.5%	0

\* no flagged area on Freshwater Beach during Easter collection.

# variable not coded at all on one beach

As can be seen in Table 15, most of the counts of attendances were by dedicated data collectors making best estimates rather than exact counts of numbers. As might be expected, there was a clear correlation

between increasing numbers on the beach and the need for data collectors to estimate the numbers (on the sand,  $r(387)=0.25, p<0.0001$ ; in flags  $r(381)=0.6, p<0.0001$ ; outside flags,  $r(382)=0.57, p<0.001$ ).

**Table 15. Number and percent of observations made with exact counts, best estimates and total counts for each section of the beach over the Summer collection**

		Number on sand			Number in flagged area			Number outside flagged area		
		Exact count	Best estimate	Total	Exact count	Best estimate	Total	Exact count	Best estimate	Total
Avoca	Count %	8 11.1%	64 88.9%	72 100.0%	13 18.1%	59 81.9%	72 100.0%	19 26.4%	53 73.6%	72 100.0%
Freshwater	Count %	16 25.0%	48 75.0%	64 100.0%	16 25.8%	46 74.2%	62 100.0%	26 44.1%	33 55.9%	59 100.0%
Maroubra	Count %	17 19.3%	71 80.7%	88 100.0%	28 31.8%	60 68.2%	88 100.0%	16 18.2%	72 81.8%	88 100.0%
Bondi	Count %	28 31.5%	61 68.5%	89 100.0%	46 53.5%	40 46.5%	86 100.0%	46 51.7%	43 48.3%	89 100.0%
Palm Beach	Count %	20 27.0%	54 73.0%	74 100.0%	40 54.8%	33 45.2%	73 100.0%	44 60.3%	29 39.7%	73 100.0%
Total	Count %	89 23.0%	298 77.0%	387 100%	143 37.5%	238 62.5%	381 100.0%	151 39.6%	230 60.4%	381 100.0%

Data collectors had no difficulty in distinguishing major rescues and rescues and preventive actions. The rescue details sheet was not completed for five of major rescues (35.7%) and 12 rescues (23.1%). The missed information for both major rescues and other rescues occurred from one beach only and tended to occur on occasions where a number of people were rescued at the same time. This was almost certainly due to the logistical problems of following-up some people when others were in danger, although information was collected in some rescues involving multiple persons. Most of the missing data occurred early in the data collection period which suggests that the data collectors on this beach may have been becoming used to the requirements of the data collection.

Most of the variables on the major rescue and rescue data collection sheet were also able to be collected, although some presented problems. The suburb of usual residence could only be collected in 12 cases. The person's exact age was only collected in eight cases, but the data collectors were able to make estimates of age group for most cases. A number of other variables were also able to be estimated, including language spoken at home which was not coded at all in 22 cases (33.3%) and coded as unknown in four cases.

Swimming ability was collected directly from the person rescued in nine cases (13.6%), and combined with estimates from rescuers.

Swimming ability was coded in more than half of cases (51.5%) with the remainder of cases

coded as don't know (13.6%) or missing (21.3%). The data collectors were clearly less confident in estimating the swimming ability of the person rescued. It is also possible that where swimming ability was estimated, there was a tendency to classify the person as a weak swimmer, possibly on the basis that they had needed to be rescued. There was only one case where a person was judged to be a strong swimmer and this was the rescued person's self-estimate. Defining swimming ability is a contentious issue in any case, so

further work is needed to explore the validity of collecting information on swimming ability.

Information on the first aid equipment used in the rescue was better collected in the second trial with dedicated collectors (Table 16). For all other variables that had significant missing data, however, there was not much difference between the two trials indicating that lifeguards and lifesavers and dedicated data collectors had the same sorts of problems in obtaining data

**Table 16. Percent of missing data for selected variables from the major rescues and rescues data collection: Trial 1 compared to the combined results for Trial 2 (Summer and Easter collections)**

Variable from rescue details data collection	Trial 1	Trial 2 (combined collections 1 and 2)
Year of age	53%	81.8%
Age group	27%	27.3%
Postcode	88%	86%
Language	24%	33%
Swimming ability	22%	34.8%
First aid used	82%	34.8%
Drug and alcohol involvement	40%	33.3%

In conclusion, the results of Trial 2 indicate that:

## 4. Conclusions

- Dedicated data collectors would be an effective method for collecting water safety relevant information as they were able to collect information about a range of types of incidents occurring on beaches. Analysis of best estimate data indicates that the data collectors felt able to make estimates for some variables like age group and attendance numbers. This type of information will be useful in the long term for assessing the likelihood of incidents occurring at different beach locations, under different conditions and at different times. In general, however, the variables that were shown in the first trial to be difficult for lifeguards and lifesavers to collect were also difficult for dedicated data collectors. The rescue and preventive action definitions were usable and would be very useful additions to the minimum dataset for water rescues
  - The information collected is clearly of value for water safety, even from this brief trial. This
- shows that a larger data collection would be invaluable for a wide range of water safety purposes. These could include analysis of the relationships between beach conditions and water safety incidents, the timing and allocation of water safety staff and evaluation of new water safety programmes
- The results of this trial, combined with those of the first trial involving data collection by water safety professions (Section A), suggest that dedicated data collectors may not be cost-effective for all beaches and at all times. A combination of collections by dedicated collectors on very busy or more dangerous beaches, and collections by lifeguard and lifesavers at less busy times would be the most cost effective collection of rescue data.

# 5. Recommendations

A number of recommendations on the methodology for collecting information on water-related rescues at NSW beaches were derived from the findings of the two feasibility trials. These recommendations relate to how, when and what should be collected and are as follows:

- (1) A single systematic data collection on water safety-related incidents should be implemented for all patrolled NSW beaches. This data collection should replace and extend the multiple data collections that have been collected on beaches in the past by different authorities (eg. SLSA, local councils, APOLA, etc.). The advantage of the single collection is that it will ensure that the same data is being collected in the same way by all agencies. This data collection would still need to be supplemented by additional information from existing sources (mortality and hospital separation data collections) in order to attempt to account for all drownings and near-drownings on unpatrolled beaches. Nevertheless, this new data collection would greatly add to the depth of the data available about how and why these water safety incidents occur.
- (2) The most cost-effective approach to implementation of the data collection system is for the data to be collected by the lifeguards and lifesavers who are already on the beaches. For popular beaches that are always particularly busy or busy at particularly times, dedicated data collectors could be used to ensure that as much information is collected as possible. The advantage of this approach will be that water safety data would be collected for the entire time that beaches are patrolled. An alternative, but less desirable approach, would be to only collect data for parts of the period that beaches are patrolled (eg. on weekends, on random days, etc.). This would still add to the depth of information available on the causes and circumstances of water safety incidents, but would not be a complete collection. One of the major disadvantages of a partial collection is that it is not possible to identify when water safety incidents are likely to occur, so a partial collection could miss most of the water safety incidents over a period.
- (3) The minimum dataset for water rescues is a feasible means of collecting water safety information on beaches and is likely to add value to existing information on water safety. The items related to beach conditions that were reliably and consistently recorded were: wave type, tide times, sea conditions, rips, and weather and wind conditions. The items associated with rescues that were that were reliably and consistently recorded were: sex, age group, activity before rescue, who performed the rescue, depth of water, location of flags, nearest rescue and rescue equipment. The dedicated data collectors were able to collect data on an hourly basis using the two data collection booklets and were more reliable at collecting data on: exact or best estimates for attendance, exact or best estimates for major rescues and rescues, wind direction and first aid used.
- (4) The second trial demonstrated that the definitions of major rescue, rescue and preventive actions, derived from Trial 1, are useable.
- (5) Consideration should be give to dropping the following items in the current minimum dataset for water rescues as they proved to be very difficult to collect: exact age, suburb or postcode and indigenous status. Swimming ability and strength and age group of the person rescued also need to be reviewed as while the data could be collected in most cases, the validity of this information is unknown.

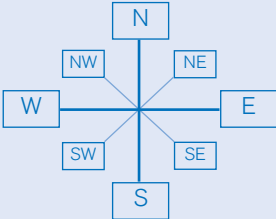
## Overall recommendations

The recommendations from the two feasibility trials of a common data collection of rescues at NSW beaches are summarised below:

- (1) A single systematic data collection on water safety-related incidents should be implemented for all patrolled NSW beaches. The minimum dataset for water rescues is a feasible means of collecting water safety information on beaches and should be implemented in the data collection
- (2) The most cost-effective approach to implementation of the data collection system is for the data to be collected by the lifeguards and lifesavers who are already on the beaches. Dedicated data collectors could be used at busy beaches and during busy periods to ensure that as much information is collected as possible.
- (3) Complete data collection will provide a more comprehensive and accurate account of the causes and circumstances of water safety incidents water than partial collection.
- (4) The minimum dataset for water rescues should incorporate the major rescue, rescue and preventive actions definitions. These definitions will provide are useful distinctions for policy and water safety intervention development.
- (5) The current feasibility trial provided a clear indication of the water safety related items that could be reliably reported, and also those items that were unlikely to be consistently reported. The items related to beach conditions that were reliably reported were: wave type, tide times, sea conditions, rips, and weather and wind conditions. The items associated with rescues that were that were reliably reported were: sex, age group, activity before rescue, who performed the rescue, depth of water, location of flags, nearest rescue and rescue equipment. The dedicated data collectors were able to collect data on an hourly basis using the two data collection booklets and were more reliable at collecting data on: exact or best estimates for attendance, exact or best estimates for major rescues and rescues, wind direction and first aid used. The inclusion of the following items should be reviewed as they proved to be very difficult to collect: exact age, suburb or postcode, Indigenous status. Swimming ability and strength and age group of the person rescued also need to be reviewed as while the data could be collected in most cases, the validity of this information is unknown.
- (6) Where possible, the data collecting bodies should look at using computer-based technology to facilitate the data collection and analysis.

# Appendix 1

## NSW Water safety questionnaire

1. Identifier: A/45/
2. Day: (circle)    Saturday    Sunday    Monday    Tuesday    Wednesday    Thursday    Friday
3. Date: \_\_\_\_\_
4. Time: (tick one)    7am     10am                       2pm     5pm
5. Tide times today:            High tide \_\_\_\_\_am/pm            Low tide \_\_\_\_\_am/pm
6. What is the location of the flagged area on the beach for this period? (briefly describe)  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
7. Number of Rescues in period since last count: \_\_\_\_\_  
Is this? (tick one)             Exact number     Best estimate
8. Number of rescues in flagged area? \_\_\_\_\_
9. Number of rescues outside flagged area? \_\_\_\_\_  
Description of conditions at the time:  
\_\_\_\_\_  
\_\_\_\_\_
10. Weather (tick one)             Fine             Raining             Overcast
11. Wind conditions (tick one)     None             Light             Moderate     Strong             Storm
12. Wind direction  
(Place cross on current direction)  

13. Is the wind? (tick one)             Onshore             Offshore

14. Air temperature \_\_\_\_\_ (degrees Celsius)  
Is this?  Best estimate  Exact reading
15. Water temperature \_\_\_\_\_ (degrees Celsius)  
Is this?  Best estimate  Exact reading
16. Sea conditions (*tick one*)  Calm  Choppy  Rough  Very rough
17. Wave type (*tick one*)  Spilling  Surging  Plunging/dumpers  
 Flat (no waves)
18. Wave height (*tick one*)  Small (0.5-<1 metres)  Moderate (1- <2 metres)  
 Large (2+ metres)
19. Presence of rip (*tick one*)  No rip  Permanent rip  
What type of rip? (*tick one*)  Fixed rip  Flash rip  Travelling rip  
 Littoral rip
20. Number of people currently on beach?  
In the water between flags \_\_\_\_\_ (including at waters edge)  
On sand area \_\_\_\_\_  
On beach reserve \_\_\_\_\_  
Is this?  Best estimate  Exact count

# Appendix 2

## NSW Water safety questionnaire

### DETAILS OF RESCUE

Identifier: A/45/

1. Day: *(circle)*    Saturday    Sunday    Monday    Tuesday    Wednesday    Thursday    Friday

2. Date: \_\_\_\_\_

3. Time of rescue: \_\_\_\_\_ am/pm    Is this?     Exact     Approximate *(please tick)*

4. How was it identified that the person was in difficulties? *(please tick)*

Seen by lifeguard who was on land

Seen by lifeguard who was in water

Seen by lifesaver who was on land

Seen by lifesaver who was in water

Seen by member of public who was on land

Seen by member of public who was in the water

Identified by electronic means (alarm, GPS)

Other (write in) \_\_\_\_\_

Don't know

5. Who performed the rescue? *(please tick)*

Lifeguard     Lifesaver     Member of public \_\_\_\_\_

Other (write in) \_\_\_\_\_

Don't know \_\_\_\_\_

### DETAILS OF PERSON RESCUED

6. Age: \_\_\_\_\_

Age group: *(if need to guess, please tick)*

0-5years

6-14 years

15-24years

25-34 years

35-64 years

65+ years

7. Sex: *(please tick)*     Male     Female     Unknown

8. Postcode of usual residence: \_\_\_\_\_

OR *(please tick)*     Unknown     Overseas     No fixed address

9. Main language spoken at home? \_\_\_\_\_

OR best guess *(please tick)*     English     Non English speaking     Unknown

10. Indigenous status: *(please tick)*

- Neither Aboriginal or Torres Strait Islander
- Aboriginal or Torres Strait Islander
- Aboriginal not Torres Strait Islander
- Torres Strait Islander not Aboriginal
- Unknown

11. Swimming ability of person rescued? *(please tick)*

Person's estimate:

OR

Rescuers estimate:

- |  |  |
|--|--|
| <input type="checkbox"/> Swimmer         | <input type="checkbox"/> Swimmer       |
| <input type="checkbox"/> Non-swimmer     | <input type="checkbox"/> Non-swimmer   |
| <input type="checkbox"/> Couldn't answer | <input type="checkbox"/> Couldn't tell |

12. Swimming experiences at beach or pool for person rescued? *(please tick)*

- |   |  |
|---|--|
| <input type="checkbox"/> More than once each week | <input type="checkbox"/> A few times a month |
| <input type="checkbox"/> Only on holidays         | <input type="checkbox"/> Unknown             |

13. What was rescued person doing just before rescue? *(please tick)*

- Swimming paddling or wading
- Walking/playing near water
- Body board
- Craft riding (surf board, wave, surf ski, knee board)
- Rock fishing
- Other types of fishing
- Attempting a rescue
- Using a motorised water craft
- Using a Personal Water Craft
- Water skiing
- Skin diving/SCUBA/ SSBA/ Platform
- Windsurfing/Kite surfing
- Sailing
- Rock walking
- Suspected suicide
- Other *(please write in)* \_\_\_\_\_
- Unknown

14. Was the person located between the flags at time of incident? *(please tick)*

- Yes     No     Unknown

If No, How close was the incident to nearest rescue service? *(please tick)*

- < 1km     1 to 5 km     >5km

15. What rescue equipment was used? *(please tick)*

- No rescue equipment  
 Rescue board  
 Spinal board  
 Inflatable rescue boat  
 Rescue tube or other personal floatation device  
 Jet rescue boat/Offshore Rescue boat  
 Personal Water craft or Rescue water vehicle  
 Surfboard/ body board  
 Other *(please specify)* \_\_\_\_\_  
 Not known

16. How deep was the water where the person was rescued? \_\_\_\_\_ metres

17. What type of first aid was used by the person rescued? *(please tick)*

- Expired Airway Resuscitation (EAR)  
 Cardio-Pulmonary Resuscitation (CPR)  
 Oxygen administered  
 Defibrillator  
 Suspected spinal injuries  
 Marine stingers  
 Aid for severe laceration  
 Other *(please specify)* \_\_\_\_\_  
 Unknown

18. Was an ambulance needed to treat/transport the rescued person? *(please tick)*

- Yes     No     Unknown

19. In your opinion, was the person under the influence of alcohol or other drugs? *(please tick)*

- Neither     Suspect alcohol     Suspect other drugs  
 Suspect both alcohol and drugs     Don't know

