Diving Deaths Downunder

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Project Stickybeak

- Conducted by Dr Douglas Walker since 1968
- Solo and determined effort
- Incorporated in DAN AP Fatality Data Collection & reporting Project from 2003

Asia-Pacific Dive-related Deaths 2009 (Provisional)
Data Collection

- Good data from Australia
- Reasonable data from NZ & Singapore
- Poor data collection elsewhere in Region due to:
  - remoteness
  - cultural issues
  - attempts to hide accidents
    (perceived threat to tourism?)
Data Collection

- Early information from witnesses
- Coroner’s report
- Autopsy report
- Police report
- Witness statements
Autopsy

- In many places pathologists have no idea of diving autopsies
- In Australia, situation is improving, partly as a result of better dissemination of information to pathologists

Diving Activity

• **Certifications**
  1988 – 50,550\(^1\)
  1991 – 54,153\(^2\)
  2007 – 48,000\(^3\)

• **Scuba dives conducted (Qld)**
  1994 – 1.3 M\(^4\)
  2007 – 1.2 M\(^5\)

2. Wilks J. Calculating diver numbers: Critical info for scuba safety & marketing programs. SPUMS J. 1993; 23:11-14
4. Windsor D. A study into the number of dives conducted on the GBR in 1994. SPUMS J. 1996; 26:72-4
5. Qld scuba diving & snorkelling report.- visitor characteristics. Qld Govt:2007 (internal report)
## Average Fatalities per Year per Period

**Years** | **All Modes (n = 566)** | **Scuba (n = 290)**
--- | --- | ---
1972-79 | 12.6 | 6.8
1980-89 | 12.8 | 7.9
1990-99 | 18.4 | 9.2
2000-06 | 23.0 | 9.1

- **Scuba** - slight trend but not significant \((p = 0.12)\)

Scuba Fatality Rate in Australia

- **Australian Residents:**
  - 0.7 /100,000 dives (95% CI = 0.3, 1.5)
  - 8.5 /100,000 divers (95% CI = 4.2, 17.5)

- **Overseas visitors:**
  - 0.4 /100,000 dives (95% CI = 0.1, 1.2)
  - 1.5 /100,000 divers (95% CI = 0.5, 4.3)

### Global Risk Estimates for Scuba Deaths

<table>
<thead>
<tr>
<th>Group</th>
<th>Deaths / 100,000 dives</th>
<th>95% CI</th>
<th>Deaths / 100,000 divers or visitors</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australian residents</td>
<td>0.7</td>
<td>0.3, 1.5</td>
<td>8.5</td>
<td>4.2, 17.5</td>
</tr>
<tr>
<td>Australian visitors</td>
<td>0.4</td>
<td>0.1, 1.2</td>
<td>1.5</td>
<td>0.5, 4.3</td>
</tr>
<tr>
<td>DAN A members</td>
<td>-</td>
<td>-</td>
<td>11-18</td>
<td>-</td>
</tr>
<tr>
<td>UK divers</td>
<td>0.8</td>
<td>0.5, 1.3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Okinawa</td>
<td>1.3</td>
<td>0.3, 7.2</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Stoney Cove visitors</td>
<td>-</td>
<td>-</td>
<td>2.9</td>
<td>1.4, 6.0</td>
</tr>
</tbody>
</table>

Sequential Analysis

- Trigger
- Disabling Agent
- Disabling Injury
- Cause of Death

Sequential Analysis

- **Trigger**

  Earliest identifiable event that appeared to precipitate an emergency
Sequential Analysis

• **Disabling agent**

Hazardous behaviour /circumstance associated with the trigger, perhaps causing the Event
Sequential Analysis

• **Disabling injury**

Directly responsible for death or incapacitation leading to death by drowning
Sequential Analysis

• **Cause of Death**

As specified by medical examiner. Might be same as Disabling Injury (DI) or might be drowning secondary to DI
Sequential Analysis

• DI often provides a clearer picture than COD
Sequential Analysis

Ex. Diver runs out of air, makes an emergency ascent to the surface, suffers a CAGE, becomes unconscious and subsequently drowns …

- **Trigger** – Gas supply-related
- **Disabling agent** – Ascent-related
- **Disabling Injury** – GAGE
- **COD** – Drowning
Analysis of Australian Scuba Deaths 1972 – 2005

- 315 cases
  - 257 x Scuba (inc. 5 rebreather)
  - 58 x SSBA
Trigger

EQUIPMENT-RELATED

• BCD (e.g. sticky inflator)
• Hose entanglement
• Broken fin/mask strap
• Dry suit blow-up
• Weight belt detachment
• Tank slippage
Trigger

GAS SUPPLY-RELATED

- Out of gas
- Inappropriate gas
- Gas contamination
- Gas supply interruption
Trigger

ROUGH WATER

- Surface conditions
- Current
- Surge
- Suction
Trigger

OTHER

- Hit by boat
- Silting
- Spearfishing / fish collecting
- Vomiting
- Water in snorkel
- Suicidal intentions
Trigger
(n = 351) (%)
Disabling Agent

**GAS SUPPLY-RELATED**

- Out of gas
- Inappropriate gas
- Gas contamination
- Gas supply interruption
Disabling Agent

CARDIOVASCULAR DISEASE

- Older recruits to diving
- Ageing divers
- Unfit divers
Disabling Agent

ASCENT RELATED

- Rapid ascent
- Breath-holding on ascent
- Gas-sharing on ascent
Disabling Agent

**BUOYANCY RELATED**

- Lack / loss of buoyancy on surface
- Inadequate buoyancy control underwater (negative or positive)
Disabling Agent

OTHER

- Blow to head
- Boat propeller
- Vomiting underwater
- Hypothermia
- Crocodile attack
- Inadequate decompression
- Laryngospasm
- Narcosis / CO₂
Disabling Agent
(n = 351) (%)
Disabling Injury

- Asphyxia
- CAGE / PBT
- Cardiac
- Trauma
- DCS
Disabling Injury

OTHER

• Stroke
• Gastrointestinal haemorrhage
• Head injury
Disabling Injury
(n = 351) (%)

- Asphyxia: 44
- CAGE / PBT: 22
- Cardiac: 16
- Trauma: 12
- Other: 1
- Unknown: 1
- DCS: 4
- 1
Cause of Death
(n = 351) (%)
Cause of Death (Cardiac)
(2003-2005; compressed gas divers, n = 32)

- 2003 – 4/9 (44%)
- 2004 – 4/13 (31%)
- 2005 – 2/10 (20%)

= 32% cardiac-related
Experience
(n = 351)

- Experienced: 44
- Some: 23
- None: 17
- Inexperienced: 14
- Unknown: 3

Total: 351
Weights management

(n = 351)
BCD Management
(n = 351)

- Not inflated: 36
- None: 32
- Inflated: 9
- Not infalted - faulty: 3
- Part inflated: 6
- Buddy inflated: 4
- Not applicable: 9
- Not stated: 1

Total: 351
Remaining Gas
(n = 351)

- Adequate: 33
- None: 25
- Low: 15
- Not stated: 10
- Not applicable: 17
Remaining Gas

- Adequate
- None
- Low
- Not stated
- Not applicable

Legend:
- 72-05
- 76-85
- 86-95
- 96-05
Purpose of Dive
(n = 351)

- Recreation
- Collect seafood
- Work
- Training
- Cave
- Resort
- Military
- Other
Gender

PADI Worldwide Certifications & Experiences

Worldwide by Gender

 Represents total diving certifications, non-diving certifications and experiences for all PADI Offices combined with the exception of PADI Japan. Divers and participants may have multiple certifications or experiences.

Source: PRJ8327 report

8 - PADI Confidential

http://www.padi.com/scuba/about-padi/PADI-statistics/default.aspx#Graph_8
Gender
(n = 351)

- Male: 88
- Female: 12