



## **Search and Recovery in Drowning**

South Eastern Alberta Search & Rescue (SEASAR)

Locating and recovering a drowning victim can be a difficult and sometimes dangerous task. These tips, garnered from research and experience, are intended to increase the probability of a successful recovery operations. A search manager requires knowledge of:

- 1) the subject and circumstances,
- 2) the nature of the water,
- 3) search planning.

### **Subject and Circumstances**

- Contrary to what's seen in movies, drowning is not dramatic. <sup>1</sup>
- Typically, the victim will be holding some air in the lungs, there will be some trapped in clothing, and instinctive swimming movements will bring the victim back to the surface. They may gasp, take in air and water, and sink again. This cycle may be repeated until the lungs fill and they sink to the bottom.
- It is possible for a subject to inhale a great deal of water quickly. In this case the subject may disappear and sink rapidly. Conversely, a person who struggles for a longer period may sink more slowly as it takes more time for the lungs to fill with water.
- Once below the surface, and the lungs full of water, the subject will continue to sink to the bottom of the body of water.
- According to "*Time Required for a Drowning Victim to Reach Bottom*," published in the Journal of Search and Rescue, a child may sink 2.4 m in just over 7 seconds. An adult will sink as far in about five seconds. Estimating the time to sink to the bottom may be helpful in determining the subject's distance from the PLS in moving water.

#### **Immediate Disappearance Syndrome (IDS)**

A person who can usually swim but suddenly disappears about 15 minutes after immersion. Witnesses relate they saw the victim swimming, usually toward shore, but when they looked again, the subject had suddenly disappeared.

#### **Drowning Non-Swimmer Syndrome (DNS):**

This syndrome needs very little explanation. However, there are characteristics which are common, and rescuers should recognize their implications. These outward signs are; head tilted back, mouth open (to establish and maintain an airway, seldom any vocal response), arms in unison pushing at the water.

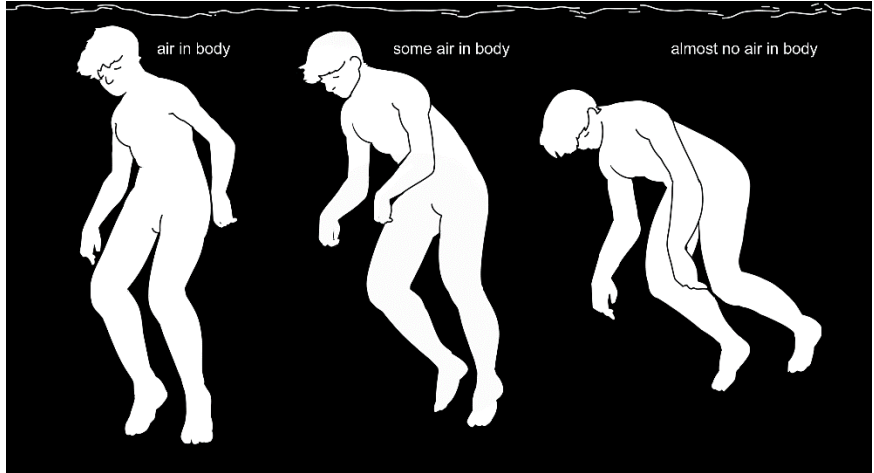
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<sup>1</sup> <https://www.redcross.ca/blog/2019/6/what-does-drowning-sound-and-look-like>

**Sudden Disappearance Syndrome (SDS):**

This category normally involves the unexpected disappearance of poor swimmers or fatigued or cold-debilitated persons who may be partially supported by air trapped in their clothing. They either attempt to swim or struggle. They will usually sink rapidly below the surface.

- The position of the body in the water depends upon the amount of water in the lungs and stomach. In drowning cases where there is little water or no water in the lungs and stomach, the body will be in an almost upright position. With less air in the lungs and stomach, the body will be in a crouched position, and with almost no air in the body it will be in a crawling position.



- Immediately after submersion, if the water is very calm, the victim may be located by a thin stream of air bubbles coming from the body. These bubbles are caused by water pressure on the chest and abdomen forcing out the air remaining in the body. Even under these circumstances, the body may be 3-4m from the spot where the bubbles are breaking the surface of the water. Other things can give off similar streams of air bubbles, but any such leads should be checked out.
- The average body has about the same specific gravity as water. This means that the body will displace its own volume of water; the volume of water displaced will weigh about the same amount as the body.
- If the body is totally submerged in water, it will weigh about 2 to 4 kg (depending on the size of the victim). For this reason, heavy drag hooks are not needed to make recovery. The slightest hook in the clothes or body will bring the body to the surface provided gentle pressure is used and the hook is not torn out of the body or clothing.
- A body will rise slowly to the surface when enough gas is formed in the intestinal tract to make the body buoyant; this gas is the result of bacterial decomposition. The time to generate the necessary gas will depend upon the temperature of the water and contents of the victim's stomach when drowned. A body will not rise suddenly from the bottom but rises gradually as more gas is formed and it becomes buoyant.

Water Temp (degrees f)	Days to Surface
40	14-20
50	10-14
60	7 to 10
70	3 to 7
80	1-2

## Progression of Body Changes

Hours	
5 to 7	Early rigor mortis appears in 2 to 3 hours. Fully established by 5 to 7 hours and lasting longer
7 to 9	Body will be face down on the bottom with rigor fully established
12 to 18	Rigor fully established; gas will begin to develop in the intestines depending upon food content
24 to 36	Rigor still present. Skin markedly wrinkled, especially hands and feet. Rigor will subside in 2 to 4 days
Days	
2	Skin will start to slip in hot weather
2 to 3	Body will float in warm hot weather. Skin will be slipping and comes off easily
3 to 4	Discoloration at the root of the neck
5 to 6	Neck and face discolored and swollen. Body will float within 6 to 30 days depending upon water temperature. Decomposition present
Weeks	
2	Skin peeling and hair loosening can be easily pulled out. Nails can be pulled out easily
3	Face swollen and discolored
4	Body greatly swollen with gases present. Hair easily wiped away. Hands and feet easily separated from the body

## Water Conditions

- Surface conditions are far less relevant than water conditions. For example, a strong wind across the surface of a lake will not affect the subject after they are submerged.
- Water in a deep stream or creek is not moving at a uniform rate.
  - The current is fastest at the surface and slower to almost stationary at the bottom.
  - The current is fastest at the center of the stream and slower at the banks.
  - The current is fastest on the outside of a bend and slower on the inside.

Reading and evaluating current may be necessary to estimate the location of the subject.

- Note the difference between flow rate (volume of water measured as cubic meters per second) and the speed of the current (meters per second). Online information about rivers usually shows flow rate. It may be necessary to estimate current speed of by timing how fast an object moves in the water at the PLS.

## Search Planning

- Defining the PLS is a critical step in search planning.
- To gain a fix, all witnesses should be questioned on the location of the last sighting. A line to some prominent object combined with a distance will often give a reasonable accuracy. Even greater accuracy is possible if two or more witnesses can give cross lines to prominent objects.

- Once a witness has identified a PLS, have them look away as a buoy is set at that location. Once the buoy is set, ask them to confirm their initial estimate.

- The next task for search teams is to determine the current and possible movement of a drowned body in elapsed time. Buoys can then be laid to define the boundaries of the likely area of search.

- A body will usually remain in the general area where it submerged and will likely be found within 10-20m of that location. Even with a strong current, it will probably be found within 30-60m of where it went down. It has been established that the average body under average conditions will be within one and one-half times the depth of the water; for example, if the water is 10m deep the body will probably be found within 15m of where it went down.

- Where a strong current exists, or where the victim was wearing a life jacket, a body may drift to the first eddy or deep hole, depending upon the force of the current and obstructions on the bottom. If the body is floating, it may hang up on some obstruction down current or downstream. If a recovery operation has enough manpower available at the scene, it is good policy to dispatch personnel down current on the chance that the body was floating.

- The initial thought that the Incident Commander gives to the operation is essential if a rapid and successful recovery operational is to be made. The following should be considered:

- Where was the victim last seen?
- How long has the victim been submerged?
- How was the victim dressed?
- Type of river bottom?
- Current flow?
- Wind direction?
- Depth of water?
- Width of water?
- Obstructions, snags, eddies, etc.?
- Banks undergrowth, trees, etc.

