

Lesson 5

DRIFT THEORY

Overview

Introduction

This lesson will provide an overview of the drift theory portion of the search planning process. It is designed to demonstrate the overall drift process due to the environmental elements of the maritime environment.

Objectives

After completing this lesson, you should be able to:

- **DEFINE** Datum.
 - **IDENTIFY** which forces are involved in determining Total Surface Drift.
 - **STATE** the proper use of a Datum Marker Buoy (DMB/SLDMB)
 - **DEFINE** Leeway
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References

The information in this lesson can be found in the following references:

1. Coast Guard Addendum, Section 3.3.2.1 - 3.3.2.2, 4.11, H.1.1, H.3-H.3.2.2(a), H.3.4.1, H.3.4.2 (1st para), H.3.4.2(c) (3rd para), H.3.4.3 (1st para), H.3.4.4 (1st para), H.3.4.5 (1st para), H.3.4.6 (1st para), & H.3.4.7.
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Datum

Datum The term datum is defined as the most probable location of the distressed vessel, corrected for drift over a given period of time. Depending on the information available and its accuracy, datum may be:

- a point;
- a line;
- an area.

As the case develops, datum must be corrected to account for wind and current. Datum is usually established by the SMC. When search planning is required, one of the most critical steps is determining *where* your search and rescue units (SRUs) should conduct their search. Placing your SRU(s) in the wrong location could be the difference between life and death for the distressed mariner.

Initial Position One of the first things you must determine is the **initial or last known position (LKP)**. This is where the mariner became distressed and at the mercy of the environment.

Point Datum A point at the center of the area where it is estimated that the search object is most likely located. The probability of detection (POD) is maximal at that point and decreases as you get away from that point.

Line Datum If you cannot pinpoint the location of a distressed boat, you may be able to determine its intended trackline or a line of bearing. The datum line is the intended trackline or line of bearing plotted on the chart. Without more information, it is assumed that the distressed vessel may be anywhere along the length of the plot. The line could also be a direction finding line of position.

Area Datum When you cannot determine either the exact position of the distress or a datum line, a datum area is developed based on many factors, but including as a minimum:

- fuel endurance of the vessel in distress;
 - vessel's maximum cruising range;
 - wind and currents which affect the search object;
 - operator's intentions.
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Drift Forces

Drift

Two forces cause objects on the ocean to move or drift: wind and current. To compute the area where the survivors may be located, it is necessary to estimate the rate and direction of drift. This requires estimates of the winds and currents in and around the area containing the possible distress locations.

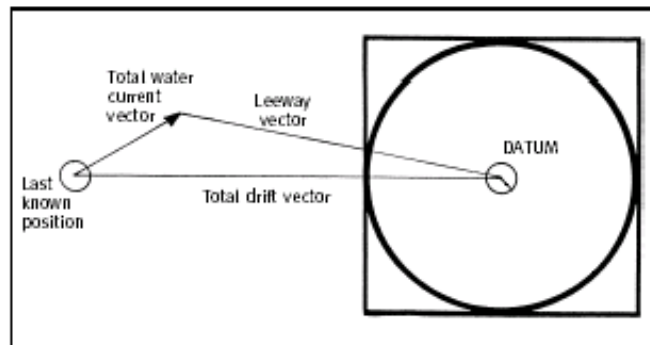
Environmental Data

Surface Currents (SC) include: Sea current, Wind current, Tidal current and other water currents such as: Lake current, River current, and Surf current. These Surface currents are obtained through Environmental Data drift models.

Leeway: Winds that will affect the speed and direction the search object will drift.

Drift: The movement of a search object caused by environmental factors/ forces or in another words Surface Drift or Total Drift = The vector sum of TWC and Leeway.

Surface Currents (TWC) + Leeway Wind = Drift (TSD)



Search Area

Because the environmental data factors are not exact (in other words, the wind current you apply to the calculations are not exactly 135°T @ 20Kts), an error factor is applied. The result of the errors applied to the position is an Area as shown above. The area created will be known as the search area

DMB / SLDMB

DMB / SLDMB

A Datum Marker Buoy (DMB) or Self Locating Datum Marker Buoy (SLDMB) will provide the most reliable water current information data because they provide actual water movement. These are drift tools deployed as near to the distressed mariner's LKP or estimated location and are designed to collect TWC information by drifting with the actual surface current.

DMBs and SLDMBs are still considered valuable tools and are utilized to validate environmental data products obtained through the SAROPS program.

Specific guidance on the use of SLDMB's is described in Section 4.11 of the CG Addendum.

Leeway

Leeway

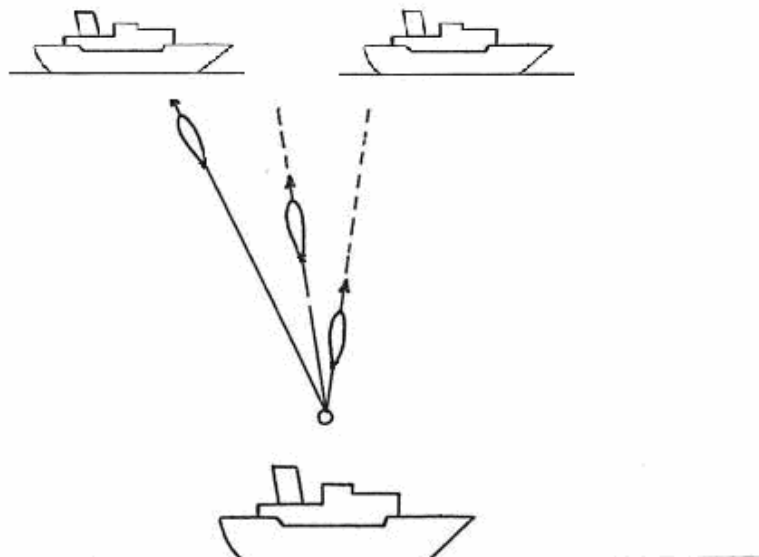
The movement of a search object through water caused by winds blowing against exposed surfaces.

The force of the wind against the exposed surfaces of the craft causes it to move through the water in a generally downwind direction. This is called leeway. A drogue (sea anchor) may be deployed to decrease the rate of leeway. The shapes of the exposed and underwater surfaces can affect the rate of leeway and cause the leeway direction to be somewhat off the downwind direction. Estimates of wind direction and speed may be obtained from direct observation at the scene, output from computer models used for weather prediction, local weather bureaus and, as a last resort, wind roses on pilot charts.

Divergence

Leeway divergence angle is the divergence of the drift object from the downwind direction due to the lack of symmetry of a drift object.

In simple terms, since most search objects are not perfectly symmetric (constant shape) like a bowling ball for example, they will fall to one side or the other when drifting down wind.



Drift Theory

Exercise

1. **What is the definition of Datum?**

2. **What are three possible ways to identify the vessel's distressed location?**

3. **What does TSD consist of?**

4. **List three currents recognized by the CG Addendum.**

5. **What is the best source of TWC?**

6. **What is the definition of Leeway?**

7. **What is the difference between TWC & Total Surface Drift (TSD)?**

Drift Theory

Lab Exercise (Answers)

1. **What is the definition of Datum Area?**

The most probable location of a search object corrected for drift.

2. **What are three possible ways to identify the vessel's distressed location?**

Incident Position.

Last Known Position (LKP).

Estimated Incident Position (EIP).

3. **What does TSD consist of?**

Surface current & Leeway Wind current

4. **List three currents recognized by the CG Addendum.**

Sea current

Wind current

Tidal current

Lake current

River current

Surf current

5. **What is the best source of TWC?**

Self Locating Datum Marker Buoy (SLDMB).

6. **What is the definition of Leeway?**

Movement of the search object through the water caused by winds blowing against the exposed surfaces.

What is the difference between TWC & Total Surface Drift (TSD)?

TWC: The combined affect of the Water current & Wind current.

TSD: The combined affect of TWC + Leeway.

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