

## Lesson 6

### SEARCH PLAN VARIABLES

#### Overview

---

#### Introduction

The objective of this lesson is to describe some basic concepts of search planning. Practical examples are provided for each concept, showing how it may be applied to collate variable to determine a corrected sweep width, track spacing and coverage factor. These examples require only basic arithmetic skills and an understanding of the basic probability concepts encountered in everyday life. Although search planning is sometimes perceived to be complex, each step is relatively simple. Practice and perseverance in proceeding through all the steps will enable the search planner to make the most effective use of the available search facilities.

---

#### Objectives

After completing this lesson, you will be able to:

- **DEMONSTRATE** the relationship between Track Spacing (S); Corrected Sweep Width (W); Coverage Factor (C).
  - **STATE** the factors needed to obtain a corrected visual sweep width.
  - **LOCATE** the visual sweep width estimate for night detection aids.
  - **COMPUTE** Coverage Factor (C).
- 

#### References

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

1. Coast Guard Addendum, Section H.5 - H.5.7
-

## Search Plan Variables

---

### **The Goal of Search Planning**

The goal of search planning is to cover *as much* of the search area *as possible* with a *reasonable* probability of *detection* (POD) with the ultimate aim to maximize the probability of *success* (POS).

The way the Coast Guard calculates POD is by calculating a Coverage Factor. A Coverage Factor of one means that the assigned Track Spacing (S) is equal to the Corrected Sweep Width (W).

The Commandants goal is to have a coverage factor of one for all searches; however, this may not be possible due to limited assets available, limited time on scene or size of the search area.

As an On Scene Coordinator (OSC) or a Search and Rescue Unit (SRU), you have a great influence on the outcome of the search plan. The initial actions you take and the modifications to given Search Action Plans (SAP), have a great impact on the SAR case. With that being said, you need to understand what effects and to what extent the changes you make have on the SAR case. Sweep Width (W), Track Spacing (S) and Coverage Factor (C) are the backbone of what we are going to be discussing and the lab that follows will help you understand these concepts.

## Search Plan Variables Exercise

---

### Introduction

This lab is designed to give you practice with Search Planning Variables. Complete both Part A and B; the answers are given at the end of each part. If you're having difficulty with a specific question, you may wish to review the reading assignment, or ask your instructor for assistance.

---

### Part A – Determining a Corrected Sweep Width

Determine sweep width for the following cases, correcting when necessary:

Case Number	A – 1			
<b>Search Object</b>	6-Person Raft			
<b>SRU Type</b>	CG Auxiliary Fixed Wing Aircraft at 500 Feet			
<b>Visibility</b>	20 NM			
<b>Wind Speed &amp; Direction</b>	20 Knots at 340T			
<b>Seas</b>	2-3 Feet			
<b>Crew Fatigue</b>	No			
<b>SRU Speed</b>	150 Knots			
$W_u =$	$f_w =$	$f_r =$	$f_v =$	$W =$

---

Case Number	A – 2			
<b>Search Object</b>	PIW			
<b>SRU Type</b>	CG Auxiliary Helicopter at 500 Feet			
<b>Visibility</b>	5 NM			
<b>Wind Speed &amp; Direction</b>	10 Knots at 225T			
<b>Seas</b>	1 Foot			
<b>Crew Fatigue</b>	No			
<b>SRU Speed</b>	60 Knots			
$W_u =$	$f_w =$	$f_r =$	$f_v =$	$W =$

---

## Search Plan Variables Exercise

**Part A –  
Determining  
and Correcting  
Sweep Width  
(Cont'd)**

<b>Case Number</b>		<b>A – 3</b>		
<b>Search Object</b>		30-Foot Sailboat		
<b>SRU Type</b>		Coast Guard 27' Auxiliary Vessel		
<b>Visibility</b>		15 NM		
<b>Wind Speed &amp; Direction</b>		5 Knots at 025T		
<b>Seas</b>		Calm		
<b>Crew Fatigue</b>		Yes		
<b>SRU Speed</b>		10 Knots		
$W_u =$	$f_w =$	$f_r =$	$f_v =$	$W =$

<b>Case Number</b>		<b>A – 4</b>		
<b>Search Object</b>		20-foot Powerboat		
<b>SRU Type</b>		Coast Guard 33' Auxiliary Vessel		
<b>Visibility</b>		10 NM		
<b>Wind Speed &amp; Direction</b>		18 Knots at 345T		
<b>Seas</b>		5 Feet		
<b>Crew Fatigue</b>		Yes		
<b>SRU Speed</b>		15 Knots		
$W_u =$	$f_w =$	$f_r =$	$f_v =$	$W =$

## Search Plan Variables Exercise

---

**Part B –  
Relationship between  
(C), (S) &  
(W)**

The SMC has tasked a small boat to begin a daylight visual search for a 33-foot Powerboat with 2 POB, which struck a submerged object and is in imminent danger of sinking.

On scene conditions:

Visibility: 15 NM  
Wind: 10 knots at 330T  
Seas: 1 foot  
Crew Fatigue: YES

---

- a. A Coverage Factor (C) of 1.0 is desired, what Track Spacing (S) must be assigned?

---

---

- b. The small boat has arrived on scene and is searching with negative results so far. The vessel carries a 4-person life raft. Concern grows that perhaps the vessel has already sunk, and the crew is in the life raft. Explain the consequences if you continue the search as planned using the same track spacing as in “a”.

---

---

- c. What if the search object was a Person in the Water (PIW) without a life jacket? Explain the consequences if you continue the search as planned using the same track spacing as in “a”.

---

---

- d. You have decided to change your (S) to 2.5NM. What is the new (C) for the 33 ft powerboat, the life raft and the PIW, and explain this concept.

---

---

---

## Search Plan Variable Exercise Answers

---

### Part A - Answers

	$W_u$	$f_w$	$f_f$	$f_v$	$W$
A - 1	2.8	0.5	1.0	1.1	1.5
A - 2	0.1	1.0	1.0	1.5	0.15
A - 3	6.6	1.0	0.9	N/A	5.9
A - 4	3.8	0.5	0.9	1.0	1.7

---

### Part B - Answers

- a.  $S = 5.3$  NM (always round  $S$  down to the nearest  $10^{\text{th}}$ )

$W_u = 5.9$	$f_w = 1.0$	$f_f = 0.9$	$f_v = \text{N/A}$	$W = 5.31$
-------------	-------------	-------------	--------------------	------------

$$S = W / C$$

$$S = 5.31 / 1.0$$

$$S = 5.31$$


---

- b. Your coverage factor will be reduced to 0.59 and the chances of sighting the life raft will be less.

$W_u = 3.5$	$f_w = 1.0$	$f_f = 0.9$	$f_v = \text{N/A}$	$W = 3.15$
-------------	-------------	-------------	--------------------	------------

$$C = W / S$$

$$C = 3.15 / 5.3$$

$$C = 0.59$$


---

- c. Your coverage factor will be reduced to 0.05 and the chances of sighting the PIW will be considerably less.

$W_u = 0.3$	$f_w = 1.0$	$f_f = 0.9$	$f_v = \text{N/A}$	$W = 0.27$
-------------	-------------	-------------	--------------------	------------

$$C = W / S$$

$$C = 0.27 / 5.3$$

$$C = 0.05$$


---

## Search Plan Variable Exercise Answers

---

- d. **33 ft powerboat:** Your coverage factor will be increased to 2.12 and the chances of sighting the powerboat will be much better.

$W_u = 5.9$	$f_w = 1.0$	$ff = 0.9$	$f_v = \text{N/A}$	$W = 5.31$
-------------	-------------	------------	--------------------	------------

$$C = W / S \quad C = 5.3 / 2.5 \quad C = 2.12$$

**Life raft:** Your coverage factor will be increased to 1.26 and the chances of sighting the life raft will be better.

$W_u = 3.5$	$f_w = 1.0$	$ff = 0.9$	$f_v = \text{N/A}$	$W = 3.15$
-------------	-------------	------------	--------------------	------------

$$C = W / S \quad C = 3.15 / 2.5 \quad C = 1.26$$

---

**PIW:** Your coverage factor will be increased from 0.05 to 0.10 and the chance of sighting the PIW is still pretty low.

$W_u = 0.3$	$f_w = 1.0$	$ff = 0.9$	$f_v = \text{N/A}$	$W = 0.27$
-------------	-------------	------------	--------------------	------------

$$C = W / S \quad C = 0.27 / 2.5 \quad C = 0.10$$

---

**This Page Intentionally Left Blank**

---