START SAD & SAC

KNOWLEDGE CHECK TEST

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With thanks to Martin Paget, NZ Police.

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START Videos Knowledge Check

http://nzsar.org.nz/Knowledge-Training/START/Marine-SAR

Introduction

The START video material has been provided to assist you in understanding the basic methodology of Search Area Determination and Search Area Coverage. It is important that you can remember that information when you take part in the face-to-face training.

In the following Sections are questions about key concepts mentioned within the videos so you can self-check your recall of facts.

The test is self-marking, at the end of each Section the correct answers are shown. Compare your thoughts with those, if your answer matched well done, you have a good memory of the information within the videos.

If some, or all, of an answer was wrong you can:

- Make a mental note of the right answer(s).
- Rewatch the related part of the video to refresh your memory.
- Discuss the details with someone who is experienced.
- Talk to your tutor about the facts during the training course.

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Search Area Determination (SAD)

Section 1: The purpose of search planning

a. List **three** main aims of search planning.

Section 2: Evaluating the situation

a. What sort of information would you gather in order to evaluate the situation?

b. Why is time so important?

c. What do the intitals LKP stand for?

Section 1 and 2 Answers

Tick if your answer matched.

1. Purpose of search planning

a. List **three** main aims of search planning.

- ④ To eliminate as much of the earth's surface as possible.
- ④ To determine the most likely area in which the target may be found.
- ④ To determine a most probable position for the target (MPP).

2. Evaluating the Situation

a. What sort of information would you gather in order to evaluate the situation?

- ④ Results of previous searches.
- ④ Information about the target which includes the vessel and the people.
- ④ A vessel profile. Type and size. Vessel and equipment characteristics - brand/name, general performance, style, colour, seaworthiness, equipment, propulsion details including fuel on board, alternative propulsion.
- ④ People profile including names, ages, addresses, cell phones, physical description and characteristics, skill sets, mental issues, what they are wearing.
- ④ What the skipper and crew's trip intention were.
- ④ Environmental: weather, past and projected, currents.

b. Why is time so important?

- ④ Time affects survivability.
- ④ Time increases potential search area.

c. What do the intials LKP stand for?

- ④ Last Known Position.

Section 3: Determining the datum

a. What is Datum?

b. What is a Line Datum?

c. What is an Area Datum?

d. What effect does time have on a search area?

e. Why do we need to calculate a search area that is for a future point in time?

f. What is target drift?

g. List the **two** elements of drift.

h. What is TWC?

i. How does water current affect a target?

j. Where do you get information about the speed and direction of currents?

k. What is leeway?

l. Where do you get information about how fast a target will move when affected by wind?

Section 3 Answers

Tick if your answer matched.

a. What is Datum
   - ④ A point.

b. What is a Line Datum?
   - ④ A number of points connected.

c. What is an Area Datum?
   - ④ An area.

d. What effect does time have on a search area?
   - ④ It expands and gets bigger requiring more time to search.

e. Why do we need to calculate a search area that is for a future point in time?
   - ④ To allow for Search and Rescue Units to get to the area and complete a search, otherwise the target will be outside of the search area before it is completed.

f. What is target drift?
   - ④ The movement of the target when it is affected by currents and the wind.

g. List the **two** elements of drift.
   - ④ Direction, and speed of drift.

h. What is TWC?
   - ④ Total Water Current.

i. How does water current affect a target?
   - ④ It moves across the surface of the Earth at the same speed and the same direction as the water current.

j. Where do you get information about the speed and direction of currents?
   - ④ From a nautical / marine chart.

k. What is leeway?

④ Movement of the target caused by wind.

l. Where do you get information about how fast a target will move when affected by wind?

④ The Leeway Tables (NZSAR Resources / Forms: http://nzsar.org.nz/Resources/NZSAR-Forms

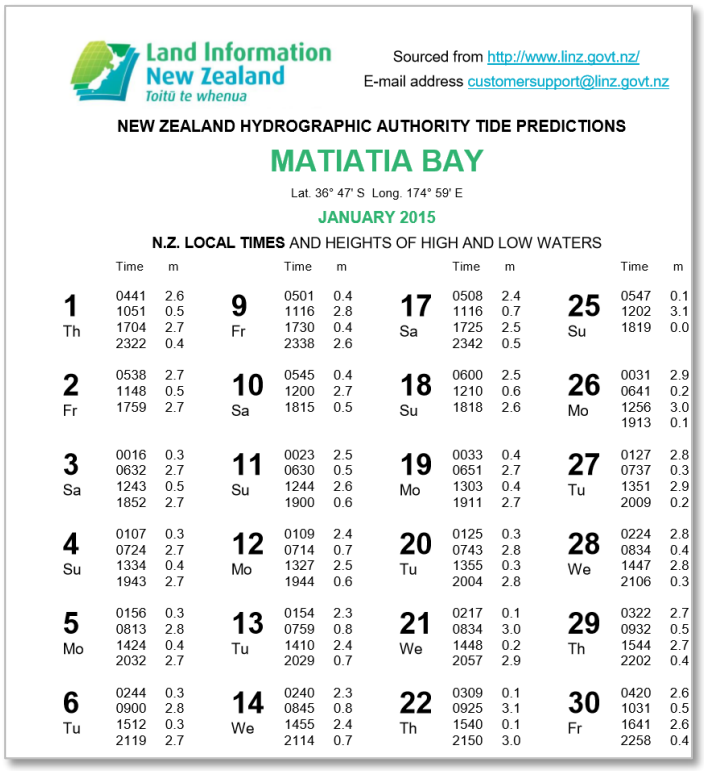
Section 4: Total Water Current

a. What is Total Water Current?

b. What direction does it move in?

c. List **three** sources you could use to get water current information from.

d. Using the Tide Prediction Table below, is the tide on the 5th of January a Spring tide or a Neap tide?



Land Information New Zealand
Toitū te whenua

Sourced from http://www.linz.govt.nz/
E-mail address customersupport@linz.govt.nz

NEW ZEALAND HYDROGRAPHIC AUTHORITY TIDE PREDICTIONS

MATIATIA BAY

Lat. 36° 47' S Long. 174° 59' E

JANUARY 2015

N.Z. LOCAL TIMES AND HEIGHTS OF HIGH AND LOW WATERS

	Time	m		Time	m		Time	m		Time	m
1 Th	0441	2.6	**9** Fr	0501	0.4	**17** Sa	0508	2.4	**25** Su	0547	0.1
	1051	0.5		1116	2.8		1116	0.7		1202	3.1
	1704	2.7		1730	0.4		1725	2.5		1819	0.0
	2322	0.4		2338	2.6		2342	0.5			
2 Fr	0538	2.7	**10** Sa	0545	0.4	**18** Su	0600	2.5	**26** Mo	0031	2.9
	1148	0.5		1200	2.7		1210	0.6		0641	0.2
	1759	2.7		1815	0.5		1818	2.6		1256	3.0
										1913	0.1
3 Sa	0016	0.3	**11** Su	0023	2.5	**19** Mo	0033	0.4	**27** Tu	0127	2.8
	0632	2.7		0630	0.5		0651	2.7		0737	0.3
	1243	0.5		1244	2.6		1303	0.4		1351	2.9
	1852	2.7		1900	0.6		1911	2.7		2009	0.2
4 Su	0107	0.3	**12** Mo	0109	2.4	**20** Tu	0125	0.3	**28** We	0224	2.8
	0724	2.7		0714	0.7		0743	2.8		0834	0.4
	1334	0.4		1327	2.5		1355	0.3		1447	2.8
	1943	2.7		1944	0.6		2004	2.8		2106	0.3
5 Mo	0156	0.3	**13** Tu	0154	2.3	**21** We	0217	0.1	**29** Th	0322	2.7
	0813	2.8		0759	0.8		0834	3.0		0932	0.5
	1424	0.4		1410	2.4		1448	0.2		1544	2.7
	2032	2.7		2029	0.7		2057	2.9		2202	0.4
6 Tu	0244	0.3	**14** We	0240	2.3	**22** Th	0309	0.1	**30** Fr	0420	2.6
	0900	2.8		0845	0.8		0925	3.1		1031	0.5
	1512	0.3		1455	2.4		1540	0.1		1641	2.6
	2119	2.7		2114	0.7		2150	3.0		2258	0.4

e. When plotting, how is water current calculated for use?

f. Use Chart NZ5125 (downloadable from the START website).
    i. Plot position: 35°11'S. 174°10'E (in the vicinity of Tidal Diamond E).
    ii. Plot a North East (NE or 045°) current of 2 Knots for 1.5 hours.

g. Plot the following position on Chart NZ5125 and label it the LKP.
    i. Determine the Tide: High Water Time for Opua for 2015 8th January.
    ii. Ascertain if this is a Spring Tide or Neap.
    iii. Determine the water current rate & direction using the Tide Diamond B from Chart 5125. Plot this water current for a period of 1 hour.

Section 4 Answers

Tick if your answer matched.

a. What is Total Water Current?

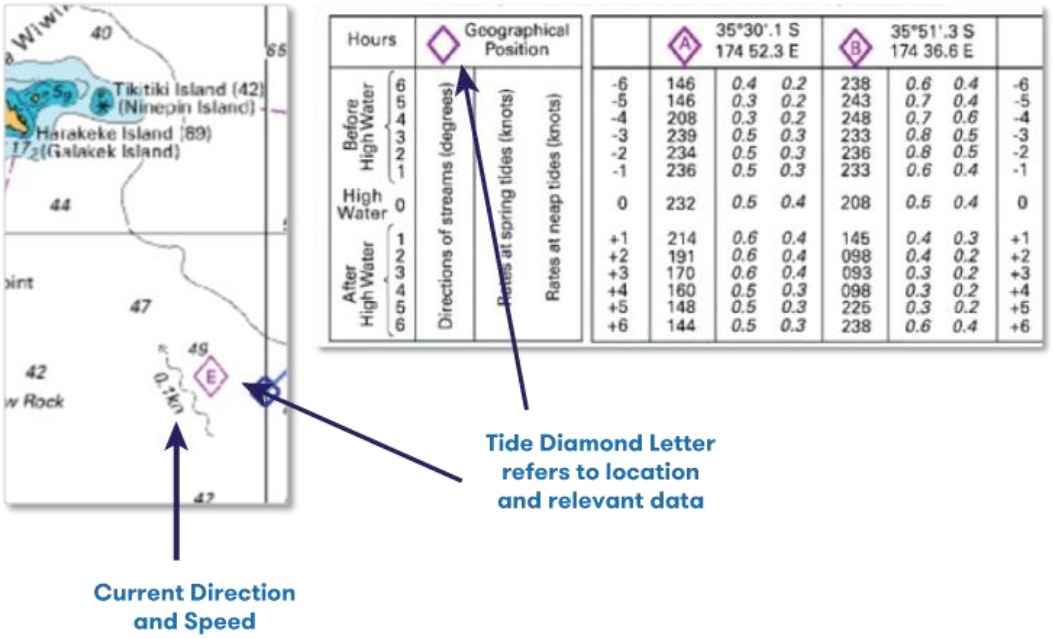
- ④ The combined force of all water currents in the search area.

b. What direction does it move in?

- ④ It is described as a current with a direction eg: an east current. This means it is moving from the west towards the east (it 'sets' towards the east).

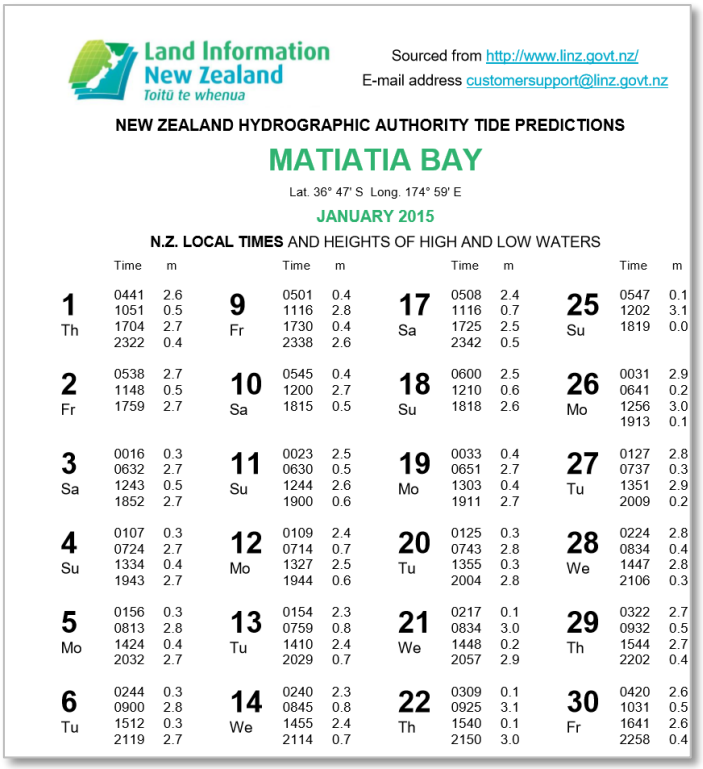
c. List **three** sources you could use to get current information from.

- ④ Charts for ocean currents.
- ④ Tide prediction tables (LINZ).
- ④ Charts for tidal currents.



d. Using the Tide Prediction Table below, is the tide on the 5th of January a Spring tide or a Neap tide?

④ Spring tide



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MATIATIA BAY

Lat. 36° 47' S Long. 174° 59' E

JANUARY 2015

N.Z. LOCAL TIMES AND HEIGHTS OF HIGH AND LOW WATERS

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	2119	2.7		2114	0.7		2150	3.0		2258	0.4

e. When plotting, how is water current calculated for use?

④ TWC = water current rate (in Knots) x duration (in hours and decimal hours)

④ TWC will be a distance.

Chart NZ5125

f. Use Chart NZ5125 (downloadable from the START website).

i. Plot position: 35º11'S. 174º10'E (in the vicinity of Tidal Diamond E).

ii. Plot a North East (NE or 045º) current of 2 Knots for 1.5 hours.

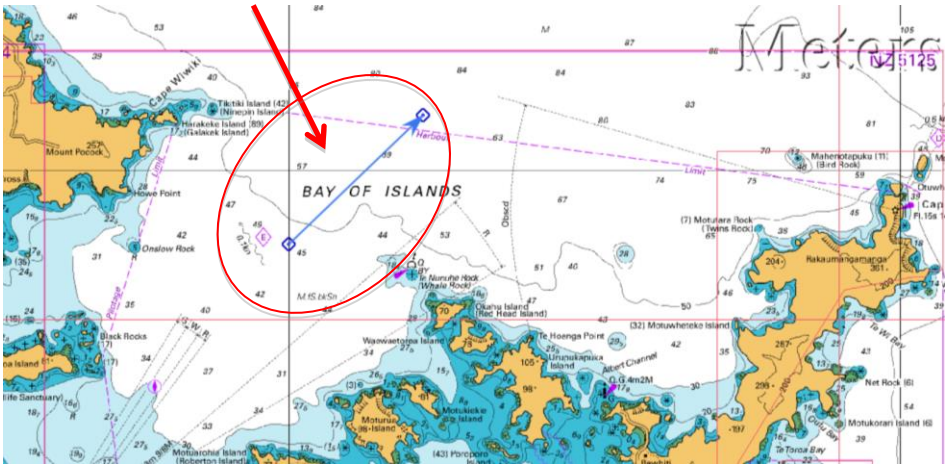
g. Plot the following position on Chart NZ5125 and label it the LKP.

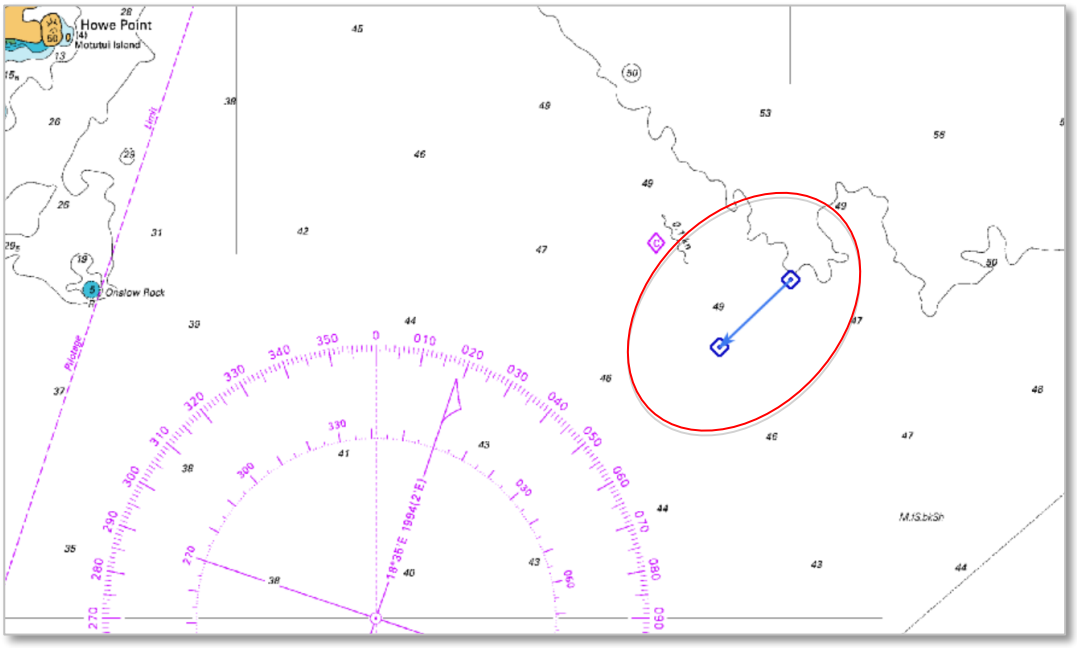
i. Determine the Tide: High Water Time for Opua for 2015 8th January.

ii. Ascertain if this is a Spring Tide or Neap.

iii. Determine the water current rate & direction using the Tide Diamond B from Chart 5125. Plot this water current for a period of 1 hour.

Check your plot, it should look like this:





④ It is a Spring Tide.

④ HW is 2.5 metres at 1040 NZDT.

④ Rate is 0.1 knts 226º 3hours after Spring HW.

④ Check your plot, it should look like that above.

Section 5: Leeway

a. List what you need in order to calculate the leeway or wind generated drift of a target.

b. Write the formula that is used to determine how long the plot for the Leeway is.

LEEWAY TARGET CLASS				Leeway Speed		Divergence
Category	**Sub Categories**	**Primary Leeway Descriptors**	**Secondry Leeway Descriptors**	**Multiplier**	**Modifier (kts)**	**Angle (deg)**
PIW				0.011	0.070	30
	Vertical			0.005	0.070	18
	Sitting			0.012	0.000	18
	Horizontal	Survival Suit		0.014	0.100	30
		Scuba Suit		0.007	0.080	30
		Deceased		0.015	0.080	30
Survival Craft	Maritime Life Rafts			0.042	0.030	28
		No Ballast Systems	no canopy, no drogue	0.057	0.210	24
			no canopy, w/ drogue	0.044	-0.200	28
			canopy, no drogue	0.037	0.110	24
			caopy, w/ drogue	0.030	0.000	28
		Shallow Ballast Systems and Canopy		0.029	0.000	22
			no drogue	0.032	-0.020	22
			with drogue	0.025	0.010	22
			capzised	0.017	-0.100	8
		Deep Ballast Systems & Canopies	(See Table 1-2 for Levels 4-6)	0.030	0.020	13
	Other Maritime Survival Craft	Life Capsule		0.038	-0.080	22
		USCG Sea Rescue Kit		0.025	-0.040	7
	Aviation Life Rafts	no bllast, w/ canopy	4-6 person w/o drogue	0.037	0.110	24
		Evac Slide	46 person	0.028	-0.010	15
Person Powered Craft	Sea Kayak	W/ person of aft deck		0.011	0.240	15
	Surf Board	W/ person of aft deck		0.020	0.000	15
	Windsurfer	w/ person and mast & sail in water		0.023	0.100	12
Sailing Vessels	Mono Hull	Full Keel	Deep Draft	0.030	0.000	48
		Fin Keel	Shoal Draft	0.040	0.000	48
Power Vessels	Skiffs	Flat Bottom	Boston whaler	0.034	0.040	22
		V-Hull	Std Configuration	0.030	0.080	15
			Swamped	0.017	0.000	15
	Sport Boats	Cuddy Cabin	Modified V Hull	0.069	-0.080	19

Using the Leeway Table above.

c. What is the Multiplier for a Surf Board?

_____

_____

_____

_____

d. What is the Modifier for a Surf Board?

_____

_____

_____

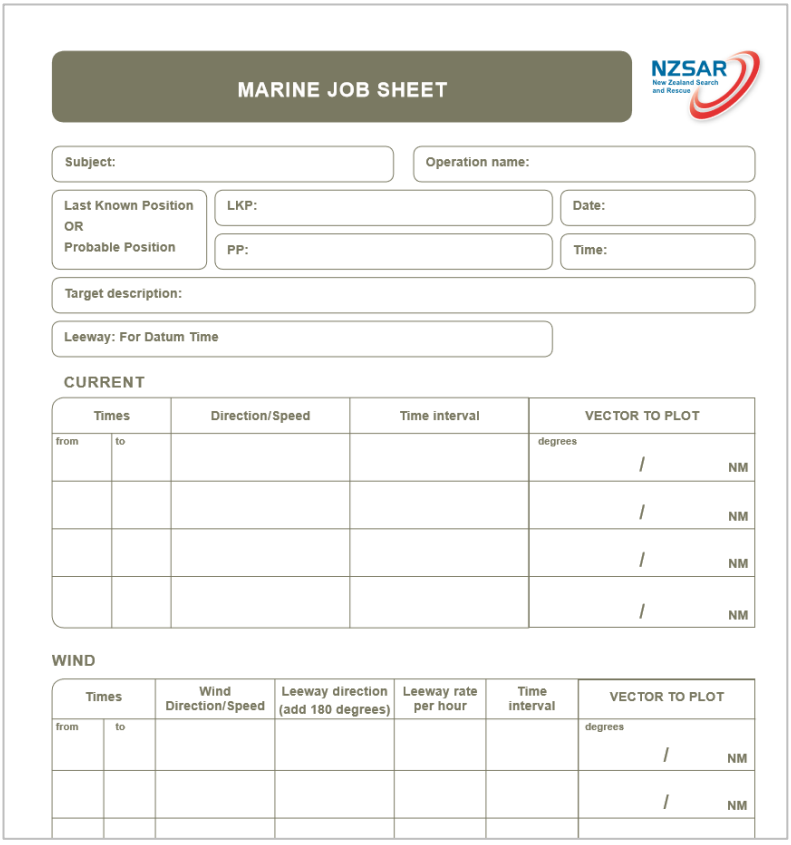
_____

Section 5 Answers

Tick if your answer matched.

a. List what you need in order to calculate the leeway or wind generated drift of a target?

- ④ The target type.
- ④ The wind speed or speeds for the whole period which needs to be calculated.
- ④ The wind direction or directions for the whole period which needs to be calculated. (Obtainable from Met Service (Met-connect) or local sources).
- ④ Leeway Tables.
- ④ The SAD Worksheet (NZSAR/Forms).



MARINE JOB SHEET

NZSAR New Zealand Search and Rescue

Subject:		Operation name:	
Last Known Position OR Probable Position	LKP:	Date:	
	PP:	Time:	
Target description:			
Leeway: For Datum Time			

CURRENT

Times		Direction/Speed	Time interval	VECTOR TO PLOT
from	to			degrees / NM
				/ NM
				/ NM
				/ NM

WIND

Times		Wind Direction/Speed	Leeway direction (add 180 degrees)	Leeway rate per hour	Time interval	VECTOR TO PLOT
from	to					degrees / NM
						/ NM

b. Write the formula that is used to determine how long the plot for the Leeway is.

- ④ (Wind x multiplier)+-modifier x time = Distance (in Nautical Miles)

LEEWAY TARGET CLASS				Leeway Speed		Divergence
Category	**Sub Categories**	**Primary Leeway Descriptors**	**Secondry Leeway Descriptors**	**Multiplier**	**Modifier (kts)**	**Angle (deg)**
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		Scuba Suit		0.007	0.080	30
		Deceased		0.015	0.080	30
Survival Craft	Maritime Life Rafts			0.042	0.030	28
		No Ballast Systems	no canopy, no drogue	0.057	0.210	24
			no canopy, w/ drogue	0.044	-0.200	28
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			capzised	0.017	-0.100	8
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		V-Hull	Std Configuration	0.030	0.080	15
			Swamped	0.017	0.000	15
	Sport Boats	Cuddy Cabin	Modified V Hull	0.069	-0.080	19

Using the Leeway Table above.

c. What is the Multiplier for a Surf Board?

④ The Multiplier is 0.020

d. What is the Modifier for a Surf Board?

④ The Modifier is 0.0

Section 6: Ways to define a search

a. What are **three** ways to define a search?

b. What is a search defined as “Position Uncertainty”?

c. What is a search defined as “Time Uncertainty”?

d. What is a search define as Track line overdue?

e. Explain what a SARMAP is.

f. How do you access the SARMAP programme?

g. What information do you need to supply?

h. Name **three** products SARMAP can produce for a SAD.

Section 6 Answers

Tick if your answer matched.

a. What are three ways to define a search?

- ④ Position Uncertainty
- ④ Time Uncertainty
- ④ Tack line overdue

b. What is a search defined as “Position Uncertainty”?

- ④ You have a time that the target vessel was last seen, but are unsure of the exact location as there are two sightings of the vessel.

c. What is a search defined as “Time Uncertainty”?

- ④ You know exactly where the target vessel left from but you don’t know what time.

d. What is a search define as Track line overdue?

- ④ You know exactly where the target vessel left from and their intended course and destination but are unsure of their departure time or intended ETA.

e. Explain what a SARMAP is.

- ④ It is a computer based system that can produce Search Area Determinations and Search Area.

f. How do you access the SARMAP programme?

- ④ By contacting the RCCNZ.

g. What information do you need to supply?

- ④ The same information you would gather to manually calculate a SAD and SAC.

h. Name three products SARMAP can produce for a SAD

- ④ A IAMSAR SAD
- ④ A Monte Carlo SAD
- ④ A Back Track SAD
- ④ A Probability Map
- ④ Search Area Coverage (SAC)

Search Area Coverage (SAC)

Section 7: Selecting the Search Pattern

a. There are **three** main considerations for selecting a search pattern, what are they?

b. What does Feasibility mean?

c. While you are gathering information and conducting a series of calculations to determine the area that you will search, what is the term that is used to describe the activity you request SAR resources to undertake?

d. What does AOP stand for?

Section 7 Answers

Tick if your answer matched.

a. There are three main considerations for selecting a search pattern, what are they?

- ④ Suitability
- ④ Feasibility
- ④ Acceptability

b. What does Feasibility mean?

- ④ Can your SAR units actually do what you task them to do?

c. While you are gathering information and conducting a series of calculations to determine the area that you will search, what is the term that is used to describe the activity you request SAR resources to undertake?

- ④ Initial Action.

d. What does AOP stand for?

- ④ Area of probability.

Section 8: Types of search patterns

a. Name **four** types of Search Patterns.

b. What angle to the targets drift is the Creeping Line search pattern?

c. If two vessels are used for a Box search, what angle is the second box pattern set at in relation to the first one?

d. If a searching vessel is tasked to do a shoreline search and it is fitted with radar, what radar feature can be used to maintain distance offshore?

Section 8 Answers

Tick if your answer matched.

a. Name **four** types of Search Patterns.

- ④ Shoreline
- ④ Track line
- ④ Barrier
- ④ Sector
- ④ Box
- ④ Parallel Track
- ④ Creeping line

b. What angle to the targets drift is the Creeping Line search pattern?

- ④ Right Angles.

c. If two vessels are used for a Box search, what angle is the second box pattern set at in relation to the first one?

- ④ 45 degrees.

d. If a searching vessel is tasked to do a shoreline search and it is fitted with radar, what radar feature can be used to maintain distance offshore?

- ④ VRM (Variable range marker).

Section 9: Defining search pattern parameters

a. What is Sweep Width?

b. Why does the height of the searching vessel affect the maximum detection range?

c. What is track spacing?

d. In addition to determining the initial sweep width for any target and a specific search asset, what else is good practice that assist to fine tune the sweep width?

e. What is used to establish the initial sweep width?

f. Do the sweep width tables make allowance for weather conditions?

Section 9 Answers

Tick if your answer matched.

a. What is sweep width

④ The sum of the total distance effectively search on each side of the vessel.

b. Why does the height of the searching vessel affect the maximum detection range?

④ Due to the curvature of the Earth.

c. What is track spacing?

④ The distance between successive tracks of the searching vessel or aircraft.

d. In addition to determining the initial sweep width for any target and a specific search asset, what else is good practice that assist to fine tune the sweep width?

④ The Search Asset checks while on the way to the search area and advises the Search Incident Controller.

e. What is used to establish the initial sweep width?

④ Sweep Width Tables.

f. Do the sweep width tables make allowance for weather conditions?

④ Yes, by supplying weather correction factors.

Section 10: Search pattern calculations

a. What happens to a search area over time?

b. In Time/speed/distance calculations what is the formula for determining time?

c. In time/speed/distance calculations what is the distance measurement used?

d. In time/speed/distance calculations what are the other two measurements used?

e. In the ATVS triangle what does the V stand for?

f. In the ATVS triangle what does the S stand for?

g. What is Coverage Factor?

h. What two factors do you need to determine the coverage factor?

i. What is one reason why a coverage factor of 1 only result in a Probability of Detection of 78-79%

Section 10 Answers

Tick if your answer matched.

a. What happens to a search area over time?

④ It expands.

b. In Time/speed/distance calculations what is the formula for determining time?

④ Distance divided by speed.

c. In time/speed/distance calculations what is the distance measurement used?

④ Nautical Miles (Nm).

d. In time/speed/distance calculations what are the other two measurements used?

④ Knots (Nautical miles per hours) and hours.

e. In the ATVS triangle what does the V stand for?

④ Velocity (speed).

f. In the ATVS triangle what does the S stand for?

④ Track spacing.

g. What is Coverage Factor?

④ A measure of search effectiveness or quality.

h. What two factors do you need to determine the coverage factor?

④ Sweep width and track spacing.

i. What is one reason why a coverage factor of 1 only result in a Probability of Detection of 78-79%

- ④ The target may not be in the search area.
- ④ The searching assets may not see the target.