

# Camp Marine Module



*Canadian Camping Association  
Association des camps du Canada*

# Camp Marine Module Agenda

## Course Classroom Topics

1. Introduction
2. Canada Shipping Act 2001 and Regulations
3. Safe Working Practices and Safety Culture
4. Vessel Construction
5. Propulsion and Fuel Systems
6. Pollution Prevention
7. Marine Weather and Forecasts
8. Canadian Buoyage System
9. Basic Seamanship
10. Vessel Stability
11. Manoeuvring a Vessel
12. Departure Preparation
13. Safe Pilotage and Collision Prevention
14. Emergency Situations
15. Survival and Rescue
16. Maintenance of skills
17. Navigation

# Camp Marine Module Agenda

## Training Course Practical Components

- 5. Propulsion and Fuel Systems
- 9. Basic Seamanship
- 11. Manoeuvring a Vessel
- 14. Emergency Situations
- 15. Survival and Rescue
- 17. Navigation

## Camp Marine Module Disclaimer

This training material has been developed to support the information and recommendations in the Camp Marine Module Training Course Manual.

Information is provided in good faith as general advice and guidance to mariners operating in Canadian and International waters.

The author of this work accepts no liability for any consequences that may result from accepting the advice, information, recommendations, practices and procedures presented herein.

# 1. Introduction

## Why This Course

- Camp boats are Passenger Carrying vessels
- Commercial Operation under the Canada Shipping Act

### Requirement for training and certification

- Duty of care – responsible for passengers
- Legal responsibilities and obligations as vessel operator/master
- Master responsibility
  - safety of passengers, crew, vessel
  - Obey laws / operate responsibly

### This Course

- Basic knowledge for commercial operation of a vessel
- Limited to 12 passengers plus crew

# 1. Introduction

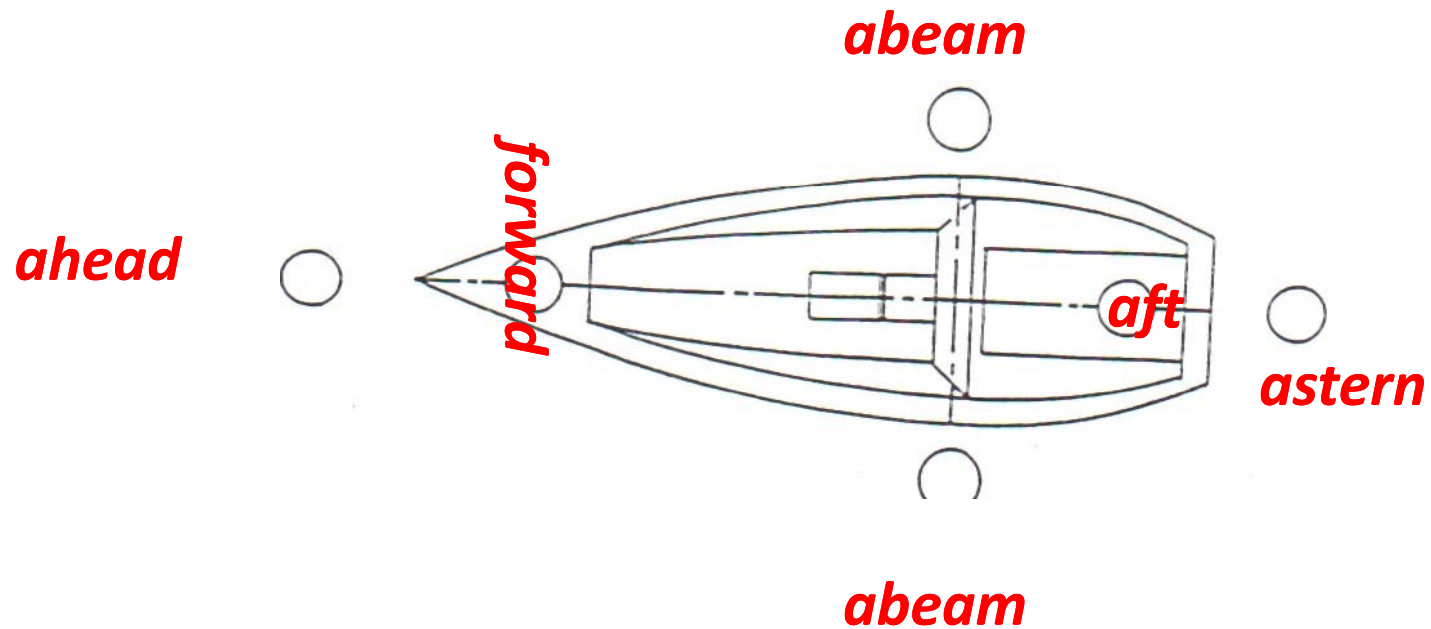
## Operator Responsibilities

To safely operate a vessel

- Keep watch / lookout
- Navigate safely
- Operate the engine
- Deal with emergencies
- Ensure safety of passengers, vessel and crew

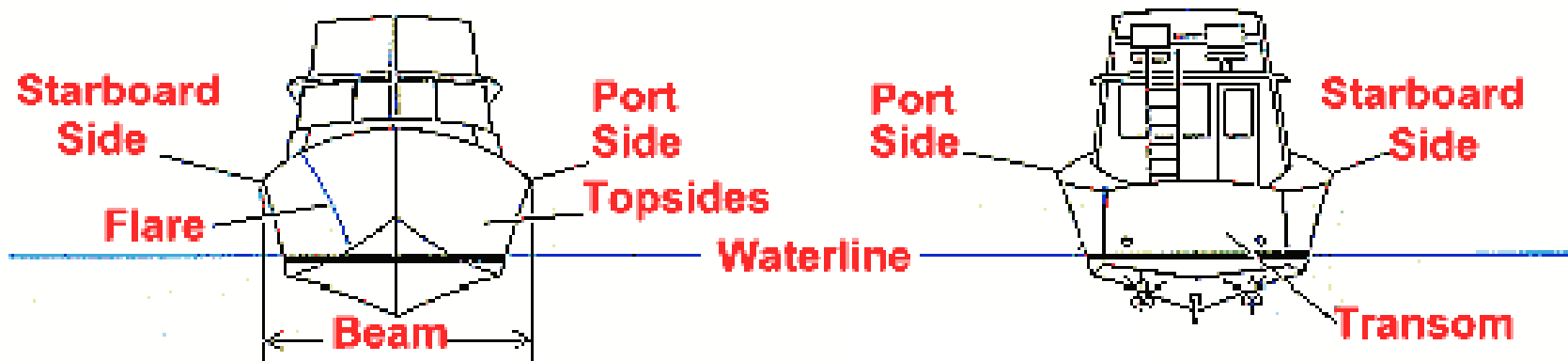
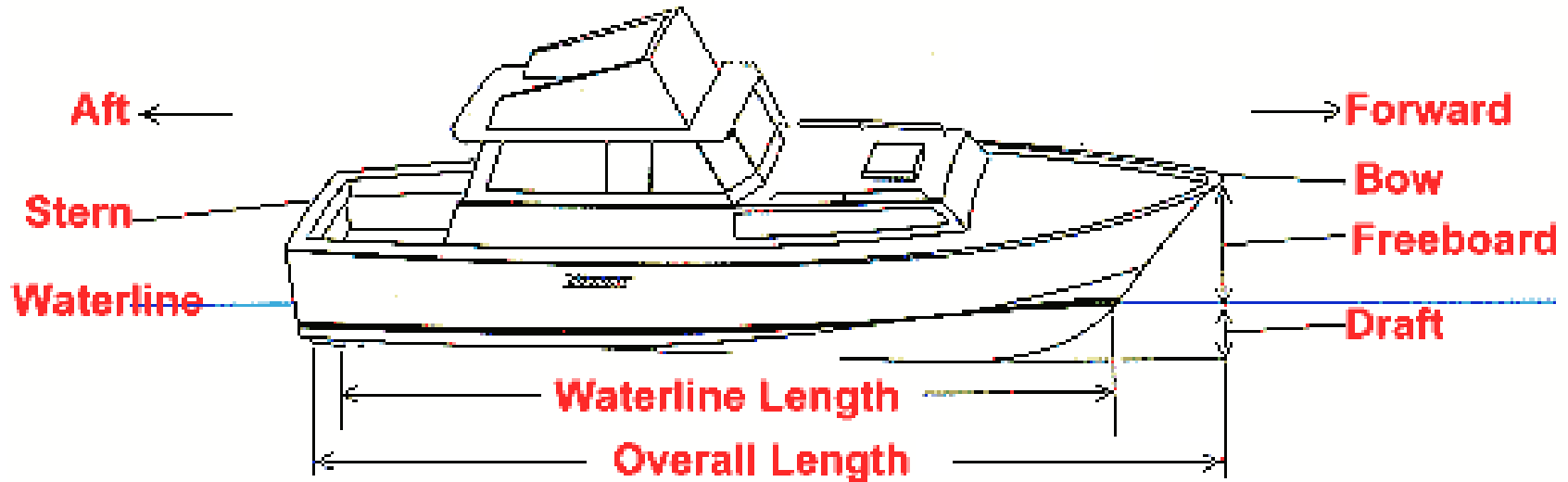
# 1. Introduction

## Terminology : Relative Positions



# 1. Introduction

## Terminology : Boat Parts





# 1. Introduction

## Terminology : Vessel Types



### **SAILING VESSEL**

**Any vessel under sail provided that an engine is not being used**

### **POWER DRIVEN VESSEL**

**Any vessel propelled by machine**



## 2. Canada Shipping Act 2001 and Regulations

### Canada Shipping Act 2001

Applies to:

- All vessels in Canadian waters
- Canadian vessels in foreign waters

Provides some key definitions:

- **Pleasure Craft** – a vessel used for pleasure and does not carry passengers. Is not not used to carry goods or persons for hire or for profit
- **Passenger** – person who is not the master or crew of a vessel and is not a guest on a pleasure craft
- **Vessel** - a boat, ship or vessel designed for navigation (transportation) on or in the water
- **Master** - the person in command and charge of a vessel.

## 2. Canada Shipping Act 2001 and Regulations

### Canada Shipping Act 2001

Intent (in part):

- **Promote safety** in marine transportation and recreational boating;
- **Protect the marine environment** from damage due to navigation and shipping activities;
- Develop a regulatory scheme that *encourages viable, effective and economical use*:
  - Marine transportation and commerce
  - Use of Canadian waters by recreational boaters
- **Establish an effective inspection and enforcement program**

## 2. Canada Shipping Act 2001 and Regulations

### Canada Shipping Act 2001

- Provides a framework and enables regulations that will meet these objectives
- All commercial vessels must be registered. Registration is voluntary for small sailing and power vessels (<10 h.p.)
- Provides framework for the management of navigation (Vessel Traffic Services, Buoyage and Aids to navigation)
- Provides the framework for provision of rescue services and requires that a master shall provide aid to persons at risk

## 2. Canada Shipping Act 2001 and Regulations

### Canada Shipping Act 2001

- Defines authority of the master, duties of the master and requirement for proof of training for those working on the vessel
- Defines responsibility of the Master, Crew and passengers
  - Master : to ensure that the vessel is and remains seaworthy and that the vessel machinery is in good and safe working condition
  - Crew : to comply with directions of the master and to carry out duties in a way that does not jeopardize the vessel.
  - Passengers : to comply with directions of the master

## 2. Canada Shipping Act 2001 and Regulations

### Canada Shipping Act 2001

- Defines the responsibility to comply with regulations for the prevention of and management of pollution
- Enables regulations related to the construction and inspection of equipment on pleasure craft and the training of pleasure craft operators
- Defines the authority of Transport Canada to enforce the act and related regulations
- Defines penalties for failure to comply with the various parts of the act

## 2. Canada Shipping Act 2001 and Regulations

### Small Vessel Regulations

#### Application

- (a) a pleasure craft up to 24 metres;
- (b) a passenger-carrying vessel of not more than 15 gross tonnage that carries not more than 12 passengers and is not a human-powered vessel;
- (c) a workboat of not more than 15 gross tonnage;
- (d) a human-powered vessel other than a pleasure craft.

## 2. Canada Shipping Act 2001 and Regulations

### Small Vessel Regulations

- Define the safety equipment to be carried, the characteristics of that equipment and the standards the equipment must meet
- Requirements vary by vessel size:
  - Up to 6 metres
  - 6 to 9 metres
  - 9 to 12 metres
  - 12 to 24 metres
- Requires that equipment be kept in good working order and be available for immediate use and maintained according to manufacturer instructions (excluding life rafts)



## 2. Canada Shipping Act 2001 and Regulations

### Small Vessel Regulations

- Defines the specific characteristics of:
  - First aid kit
  - Personal life saving appliances
  - Portable fire extinguishers
  - Fire buckets and bailers
  - Pyrotechnic distress signals
  - Life Rafts
  - Bilge Pumps

## 2. Canada Shipping Act 2001 and Regulations

### Small Vessel Regulations

#### **Pre-departure briefing:**

- the location of lifejackets, especially those for children and the nearest lifejackets
- the location of survival craft and the nearest craft;
- the location and use of personal life-saving appliances, visual signals and vessel safety equipment;
- safety measures to be taken, including those relating to the protection of limbs, the avoidance of ropes and docking lines;
- the effect of the movement and grouping of passengers on the stability of the vessel;
- the prevention of fire and explosions;
- A demonstration on how to don available types of lifejackets

## 2. Canada Shipping Act 2001 and Regulations

### Small Vessel Regulations – Section 4

- File a sail plan, leave a passenger list
- Designate someone to call for help/initiate rescue if do not return in a specified period of time
- If the water is cold, be aware of risk / plan to deal with cold shock and hypothermia
- Equipment requirements vary by vessel size
- All vessels must carry
  - A first aid kit,
  - A life jacket for each person on board
  - A reboarding device (if . 0.5 metres freeboard)
  - A watertight flashlight
  - A magnetic compass (that meets Navigation Safety Regs)  
(exempts vessels < 8 metres)

## 2. Canada Shipping Act 2001 and Regulations

### Small Vessel Regulations – Section 4

#### Additional lifesaving equipment

| Vessel Size         | Equipment  |
|---------------------|--|
| Up to 6 metres      | 15 m heaving line  |
| 6 to 9 metres       | 15 m heaving line <b>or</b> lifebuoy with 15 metres buoyant line                         |
| 9 to 12 metres      | 15 m heaving line <b>and</b> lifebuoy with 15 metres buoyant line                        |
| More than 12 metres | 15 m heaving line <b>and</b> lifebuoy with 15 metres buoyant line or self igniting light |

## 2. Canada Shipping Act 2001 and Regulations

### Small Vessel Regulations– Section 4

#### Vessel Safety Equipment

| Vessel Size         | Equipment   |
|---------------------|---|
| Up to 9 metres      | Manual propelling device or anchor with 15m rode<br>Bailer or Manual bilge pump |
| 9 to 12 metres      | Anchor with 30m rode<br>Manual bilge pump                                       |
| More than 12 metres | Anchor with 50m rode<br>Manual bilge pump                                       |

## 2. Canada Shipping Act 2001 and Regulations

### Small Vessel Regulations– Section 4

#### Additional Vessel Safety Equipment

| Vessel Size         | Equipment  |
|---------------------|--|
| Up to 9 metres      | Sound signal device or appliance<br>Navigation Lights if operated in dark or restricted visibility |
| 9 to 12 metres      | Sound signal device or appliance<br>Navigation Lights  |
| More than 12 metres | Sound signal appliance<br>Navigation Lights  |

## 2. Canada Shipping Act 2001 and Regulations

### Small Vessel Regulations– Section 4

#### Fire Fighting Equipment

| Vessel Size         | Equipment  |
|---------------------|--|
| Up to 6 metres      | 1A:5B:C extinguisher<br>Second 1A:5B:C extinguisher if fuel burning appliance  |
| 6 to 9 metres       | 2A:10B:C extinguisher<br>Second 2A:10B:C extinguisher if fuel burning appliance<br>10B:C at engine compartment   |
| 9 to 12 metres      | 2A:10B:C extinguisher<br>Second 2A:10B:C extinguisher if fuel burning appliance<br>10B:C at engine compartment<br>Fire axe and fire bucket   |
| More than 12 metres | 2A:20B:C extinguisher<br>Additional 2A:10B:C extinguisher each fuel burning appliance location and accommodation space<br>Pump at engine compartment with hose reaching vessel extent<br>Fire axe and two fire buckets |

## 2. Canada Shipping Act 2001 and Regulations

### Small Vessel Regulations – Section 4

#### Fire Fighting Equipment

- Vessels more than 6 metres with enclosed engine space need a fire port with appropriate extinguisher (extinguisher size character is specified in SVR)
- Vessels more than 6 metres need a heat detector with warning light and audible alarm in each engine space
- Vessels more than 6 metres need a fire detectors in each accommodation and service space



## 2. Canada Shipping Act 2001 and Regulations

### Small Vessel Regulations

#### Life Raft

- A Vessel must carry life rafts to accommodate all passengers and crew unless it is :
  - Less than 8.5 metres in length
  - Less than 2 miles from shore
  - On a sheltered waters voyage

## 2. Canada Shipping Act 2001 and Regulations

### Small Vessel Regulations – Section 7

This section of the SVR covers construction standards, vessel modifications and labeling requirements.

Topics covered include:

- Structural strength,
- Watertight integrity
- Hull Design
- Ventilation
- Fuel systems
- Electrical systems
- Machinery systems
- Fire protection

## 2. Canada Shipping Act 2001 and Regulations

### Other Sources of information

#### TP 14070 – Small Commercial Vessel Safety Guide

- A guide for owners and operators of small vessels

#### TP 1332 – Small Vessel Construction Requirements

- In addition to section 7 of the Small Vessel Regulations defines required physical characteristics of a vessel for builders and importers

## 2. Canada Shipping Act 2001 and Regulations

### Vessel Certificates Regulations

- Define the certificates required for passenger carrying and cargo vessels
- Certificates confirm the physical vessel construction is appropriate for its intended use and area of operation

### Voyage Definitions

- Sheltered Waters
- Near Coastal Class 2
- Near Coastal Class 1
- Unlimited Voyage

## 2. Canada Shipping Act 2001 and Regulations

### Vessel Certificates Regulations - Voyage Definitions

#### Sheltered Waters Voyages

- (a) that is in Canada on a lake, or a river above tidal waters, where a vessel can never be further than 2.5 nautical miles from the closest shore;
- (b) that is on the waters listed in column 1 of an item of Schedule 1 during the period specified in column 2 of that item; or
- (c) that is made by a ferry between two or more points listed in column 1 of an item of Schedule 2 during the period specified in column 2 of that item. (*voyage en eaux abritées*)

## 2. Canada Shipping Act 2001 and Regulations

### Vessel Certificates Regulations - Voyage Definitions

#### Sheltered Waters voyages

| SCHEDULE 1<br>(Section 1)                 |   |  |
|---|---|--|
| SHELTERED WATERS VOYAGES — WATERS         |   |  |
| PART 1                                    |   |  |
| ONTARIO                                   |   |  |
| Item                                      | Column 1<br>Waters  | Column 2<br>Period                           |
| <i>Lake Huron and Georgian Bay Region</i> |   |  |
| 1.  | The waters of the North Channel in Lake Huron east of a line drawn from Bruce Mines to De Tour Light, Michigan, in the United States and west of a line drawn from Red Rock Point at the east end of Killarney to Cape Smith on Manitoulin Island | Beginning on May 15 and ending on October 15 |
| 2.  | The waters of Parry Sound (sound) and the waters off Thirty Thousand Islands east of  | Beginning on May 15 and ending on October 15 |

| SCHEDULE 2<br>(Section 1)                |   |  |
|--|---|--|
| SHELTERED WATERS VOYAGES MADE BY A FERRY |   |  |
| PART 1                                   |   |  |
| ONTARIO                                  |   |  |
| Item                                     | Column 1<br>Points  | Column 2<br>Period                               |
| 1.                                       | Cochenour and McKenzie Island on Red Lake (51°4.3'N, 93°48.5'W)       | Beginning on January 1 and ending on December 31 |
| 2.                                       | Glenora and Adolphustown (44°2.5'N, 77°3'W)                           | Beginning on January 1 and ending on December 31 |
| 3.                                       | Kingston (44°13.5'N, 76°28.3'W) and Marysville (44°11.4'N, 76°26.3'W) | Beginning on January 1 and ending on December 31 |
| 4.                                       | Kingston (44°13.5'N, 76°28.3'W)                                       | Beginning on January 1 and ending on December 31 |

## 2. Canada Shipping Act 2001 and Regulations

### Vessel Certificates Regulations - Voyage Definitions

#### **Near Coastal Class 2**

- (a) that is not a sheltered waters voyage; and
- (b) during which the vessel engaged on the voyage is always:
  - (i) within 25 nautical miles from shore in waters contiguous to Canada, the United States (except Hawaii) or Saint Pierre and Miquelon, and
  - (ii) within 100 nautical miles from a place of refuge.

## 2. Canada Shipping Act 2001 and Regulations

### Vessel Certificates Regulations - Voyage Definitions

#### Near Coastal Class 1

- (a) that is not a sheltered waters voyage; and
- (b) that is between places in Canada, the United States (except Hawaii), Saint Pierre and Miquelon, the West Indies, Mexico, Central America or the northeast coast of South America; and
- (c) during which the vessel engaged on the voyage is always:
  - (i) north of latitude °N, and
  - (ii) within 200 nautical miles from shore or above the continental shelf.

#### Unlimited Voyage

means a voyage that is not a sheltered waters voyage, a near coastal voyage, Class 2 or a near coastal voyage, Class 1



## 2. Canada Shipping Act 2001 and Regulations

### Marine Personnel Regulations

- Define the certifications required to fill specific roles on vessels
  - Certifications require prior experience on similar vessels
  - Certifications may require previous certifications at lower tonnage/responsibility levels
  - Certifications include requirements for completion of training and knowledge evaluations
  - Certifications often require completion of additional training (MED – Marine Emergency Duties/STCW - Standards of Training, Certification and Watchkeeping)
  - Certifications may require proof of physical fitness

## 2. Canada Shipping Act 2001 and Regulations

### Marine Personnel Regulations

- Certifications are usually limited by
  - The role to be filled
  - The size of vessel
  - The area of operation
- Examples:
  - *Chief Mate, Near Coastal*
  - *Master 500 Gross Tonnage, Domestic*

## 2. Canada Shipping Act 2001 and Regulations

### Parks and Marine Mammal Legislation

- Concern that the cumulative effects of repetitive exposure to and interaction with humans may interrupt or prevent marine mammals from completing normal life processes
- Legislation focus on the disturbances caused by whale watching

### 3. Safe Working Practices and Safety Culture

Safety must be a priority onboard

Maintain a safe working environment

Keep equipment stowed in its assigned locations

Manage fuel carefully (gasoline is a major hazard)

Maintain equipment and test it regularly

Reduce risk while onboard

- Don't jump
- Maintain balance
- Be aware of weight distribution
- Don't put feet near moving lines
- Wear and use proper equipment
- Communicate your plans to passengers
- Complete safety briefings
- Plan to deal with emergencies

## **4. Vessel Construction Standards**

### **Vessel Construction Specifications**

- Vessels are built and maintained to a standard (SVR section 7)
- Vessels must meet the requirements in effect when the vessel was built
- TP1332 defines the standard (see page 17 of manual)

### **Compliance notices**

- Less than 6 metres, notice includes capacity maxima
  - Identifies maximum power, loading and passengers
- Larger than six metres notice includes:
  - Date of manufacture, model and builder
  - Unique vessel identification
  - Indication of compliance with specific construction standards and vessel limitations
  - Identification whether a pleasure or non-pleasure vessel

## 4. Vessel Construction Standards

### Vessel Maintenance Checks

|            |   |
|------------|---|
| Vessel     | Check cleats and fittings<br>Look for changes since last operation<br>Check hull integrity  |
| Machinery  | Engine Securely attached<br>Fluid levels (oil, fuel)<br>Bilge pump (see Manual page 21)<br>Engine start, stop, operation, kill switch |
| Electrical | Inspect wiring(if any)<br>Check operation of electrical equipment   |
| Other      | Safety equipment<br>Fuel tank   |

## 5. Vessel Propulsion and Fuel Systems

### Outboard

- Secured to bracket at stern
- Fuel: gas(2/4 stroke), electric, diesel, propane
- Controls tiller or wheel & shift/throttle
- Most include a kill switch
- Various sizes
- Secure with engine clamps and cable or bolts
- May tilt up when not in use
- Integrated or removable tank



## 5. Vessel Propulsion and Fuel Systems

### Inboard / Outboard

- Inboard engine with drive unit like outboard (transmission and propeller outboard)
- Rubber gasket between drive unit and transom
- Typically gas with fixed tank
- Wheel & throttle/shift
- Engine mounted at vessel stern





## 5. Vessel Propulsion and Fuel Systems

### Inboard

- Inboard engine, transmission inboard connected to a shaft and propeller outboard
- Typically gas or diesel with fixed tank
- Wheel & throttle/shift
- Engine mounted amidships
- May have skeg to protect propeller
- Angle of shaft and propeller generates prop walk



## 5. Vessel Propulsion and Fuel Systems

### Jet Drive

- Inboard engine drives a large water pump, high pressure water expelled generates forward propulsion
- Typically gas with fixed tank
- Wheel & throttle/shift
- Vessel steered by turning water jet
- Designed for use in shallow water



## 5. Vessel Propulsion and Fuel Systems

### Twin engine

- May be inboard, outboard or Inboard/Outboard
- Typically gas with fixed tank
- Wheel & throttle/shift
- Vessel usually steered differential engine speed and gear
- More manoeuvrable than a single engine vessel



## 5. Vessel Propulsion and Fuel Systems

### Cautions

- Propellers and jet drives are dangerous when in operation
- Keep away from swimmers and divers when the engine is running
  - Propeller may turn even when in neutral
  - Risk of inadvertently shifting into gear

## 5. Vessel Propulsion and Fuel Systems

### Engine start ( see manual page 23/24)

- Turn on batteries
- Ventilate bilges (run blower)
- Pump fuel line bulb (if outboard)
- Open cooling system (some have valves at through-hull)
- Gearshift into neutral
- Engage kill switch/connect lanyard
- Set throttle, choke if needed, turn key/pull starter cord
- When running release key
- Listen for noises
- Check for cooling water flow
- Allow to warm up; check gauges (ammeter and oil pressure)

## 5. Vessel Propulsion and Fuel Systems

### Engine stop

- Throttle down, into neutral
- Switch off with key / stop switch
- Tilt engine (if outboard)
- Close fuel supply valves if fitted
- Pump bilge
- Switches off
- Power off
- Close seacocks/through-hulls

## 5. Vessel Propulsion and Fuel Systems

### Refueling

- Moor the boat securely to prevent spillage.
- Shut off all engines.
- Take portable tanks ashore to refuel
- Passengers and crew go ashore.
- Extinguish all open flames; Do not smoke
- Turn off electrical switches and batteries, and refrain from operating electrical devices.
- Close all windows, portholes, hatches and cabin doors.
- Ground nozzle against filler pipe.
- Do not overfill tank (prevent overflow) clean up any spillage.
- Check for fuel vapour odours.
- Open portholes and hatches, run blower for 4 minutes

## 6.Pollution Prevention

Regulated in the *Vessel Pollution and Dangerous Chemicals Regulations* and in the *Canada Shipping Act (2001)*

- Wilful discharge is illegal – all spills must be reported to Coast Guard or to local authorities

Sources/types:

- Oils / fuels
- Chemicals
- Garbage
- Blackwater (sewage)
- Grey water



## 6. Pollution Prevention

Some discharges are allowed

- To save lives
- Due to accident of navigation where equipment is damaged and reasonable precautions were taken
- Small discharges related to normal operation
- Garbage resulting from damage to a vessel

However even if the discharge is legal, you are still responsible for reporting it and for cleaning it up

## Types of Pollution

### Sewage

- No discharge allowed in fresh water lakes, rivers or streams
- No discharge allowed within 3 miles of shore (coastal waters)
- Vessels with heads should be fitted with holding tanks

### GreyWater

- Not regulated

### Garbage

- Discharge is prohibited.
- Collect and take to shore

## 6. Pollution Prevention

### Pollution Reporting

Every spill must be reported

ASAP to a Transport Canada office  
(to a marine safety inspector) or via  
radio to Canada Coast Guard

See the Transport Canada website at:  
<https://www.tc.gc.ca/eng/regions.htm>  
or via phone (see Manual page 29)

#### *Pollution Reporting Numbers*

NEWFOUNDLAND AND LABRADOR

1-800-563-9089

P.E.I., NOVA SCOTIA, NEW BRUNSWICK

1-800-565-1633

QUEBEC

1-800-363-4735

ONTARIO, MANITOBA,

SASKATCHEWAN, ALBERTA,

NORTHWEST TERRITORIES, NUNAVUT

1-800-265-0237

BRITISH COLUMBIA, YUKON

1-800-889-8852

## 6. Pollution Prevention

### Tips

- Don't put anything in the water
- Keep the bilge clean, don't pump oily water overboard
- Use absorbent materials in bilge when needed
- Use detergents sparingly
- When fuelling dot fill tanks to the top
- Bring garbage ashore
- Only use paints approved for marine use

## 7. Marine Weather and Forecasts



## 7. Marine Weather and Forecasts

### Forecast Sources and Local Knowledge

Get a forecast before departing

Sources of information:

- local knowledge
- Internet
- VHF radio (21B and 83B, WX)
- Others?



### Local Knowledge

- Weather moves from west to east
- Local wind direction and strength is an indicator
- Ask yourself ...
  - Are the clouds changing in color or shape?
  - Are they getting darker?
  - Are they higher and larger than they were?
  - Are they getting closer?

## 7. Marine Weather and Forecasts

### Weather watches and warnings

A warning is issued when a weather event is expected

A watch is issued when a weather event is a possibility (may occur)

### **Warnings** (see manual page 35 and 36)

- Strong wind (20-33 knots)
- Gale (34-47 knots)
- Storm (48-63 knots)
- Hurricane (above 64 knots)
- Squall
- Thunderstorm
  - Strong winds, lightening, heavy rain, tornados possible

## 7. Marine Weather and Forecasts

### Wind shifts and the Barometer

- Changes in barometric pressure indicate strong winds are on the way
- Rapid changes indicate more severe weather
- Large change and / or rapid change indicates strong wind
- Prevailing wind is from northwest
  - Wind shift to south or east may warn of bad weather approaching



## 7. Marine Weather and Forecasts

### Thunder Storms

- Get into shelter if possible
- Strongest winds usually precede the centre
- Lightening may travel far beyond the area of cloud and rain
- Heavy rain and reduced visibility under the cloud
- May be waterspouts with the thunderstorm



## 7. Marine Weather and Forecasts

### What to do in strong winds

- Head for dock
- Anchor in shallow water
- Head into waves, use a sea anchor

### On windy or rough days

- Wait for better conditions if there is doubt about your ability to complete the trip safely
- Don't load as much into the boat (passengers and gear) as on calm days.
- Load cargo and passengers as low as possible
- Avoid excessive speed to avoid damage to the vessel and cargo and taking on water

## 8. The Canadian Buoyage System

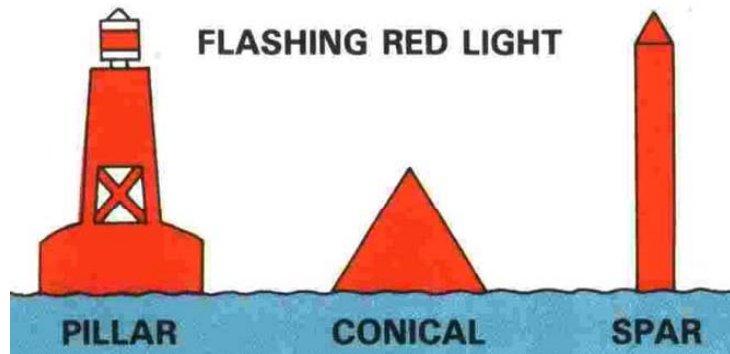
### Navigation Aids and Buoyage

- Navigation Aids Indicate where safe water is
- Systems:
  - Lateral (keep red to the right travelling upstream)
  - Cardinal (keep to the named side of the buoy)
  - Special (Varies)
- Not all hazards are marked
- Do not tie up to a buoy
- Report damaged or missing buoys to Canadian Coast Guard

# 8. The Canadian Buoyage System

## Lateral system

Starboard Hand Lateral



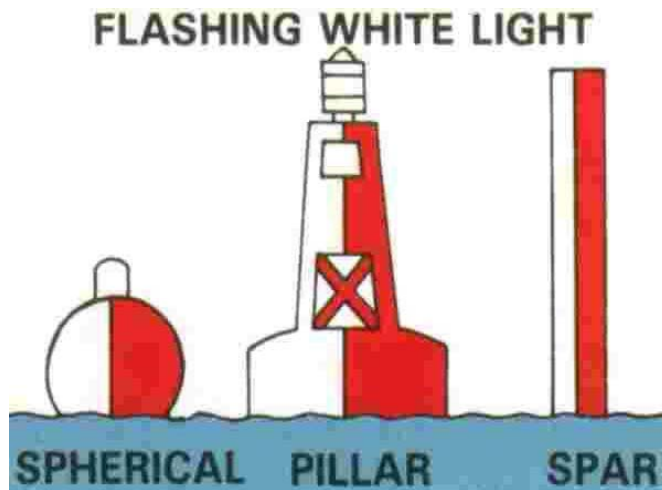
Port Hand Lateral



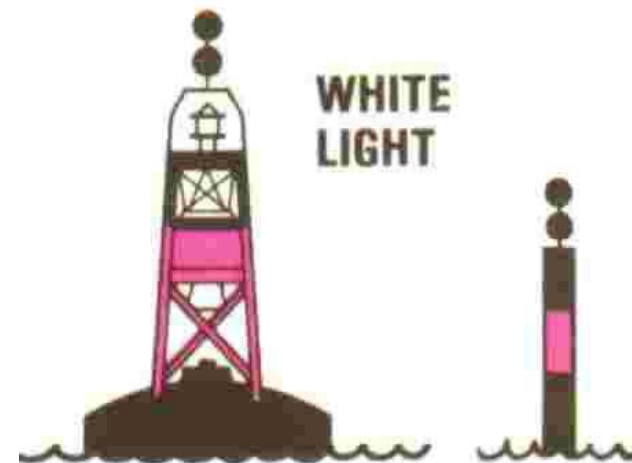
## 8. The Canadian Buoyage System

### Lateral system

Fairway or Safe Water



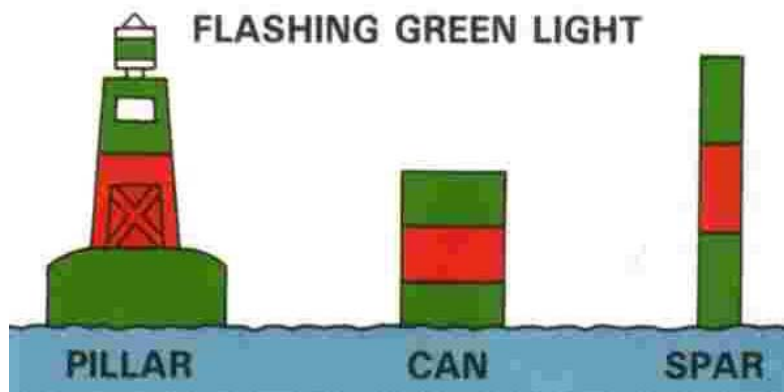
Isolated Danger



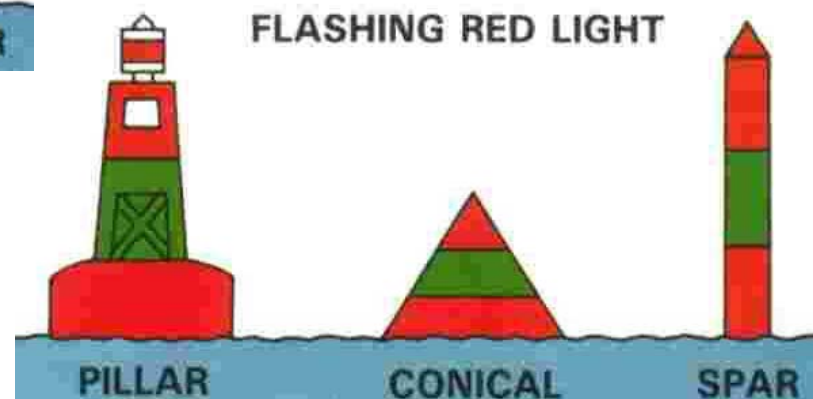
## 8. The Canadian Buoyage System

### Lateral system

Port Junction or  
Port Bifurcation

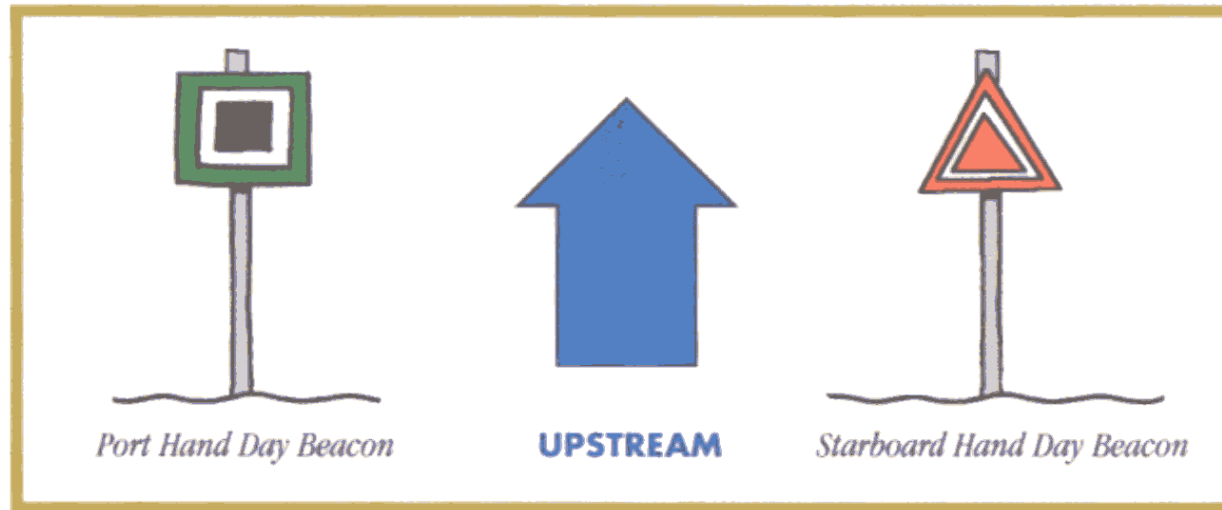


Starboard Junction or  
Starboard Bifurcation



## 8. The Canadian Buoyage System

### Lateral system

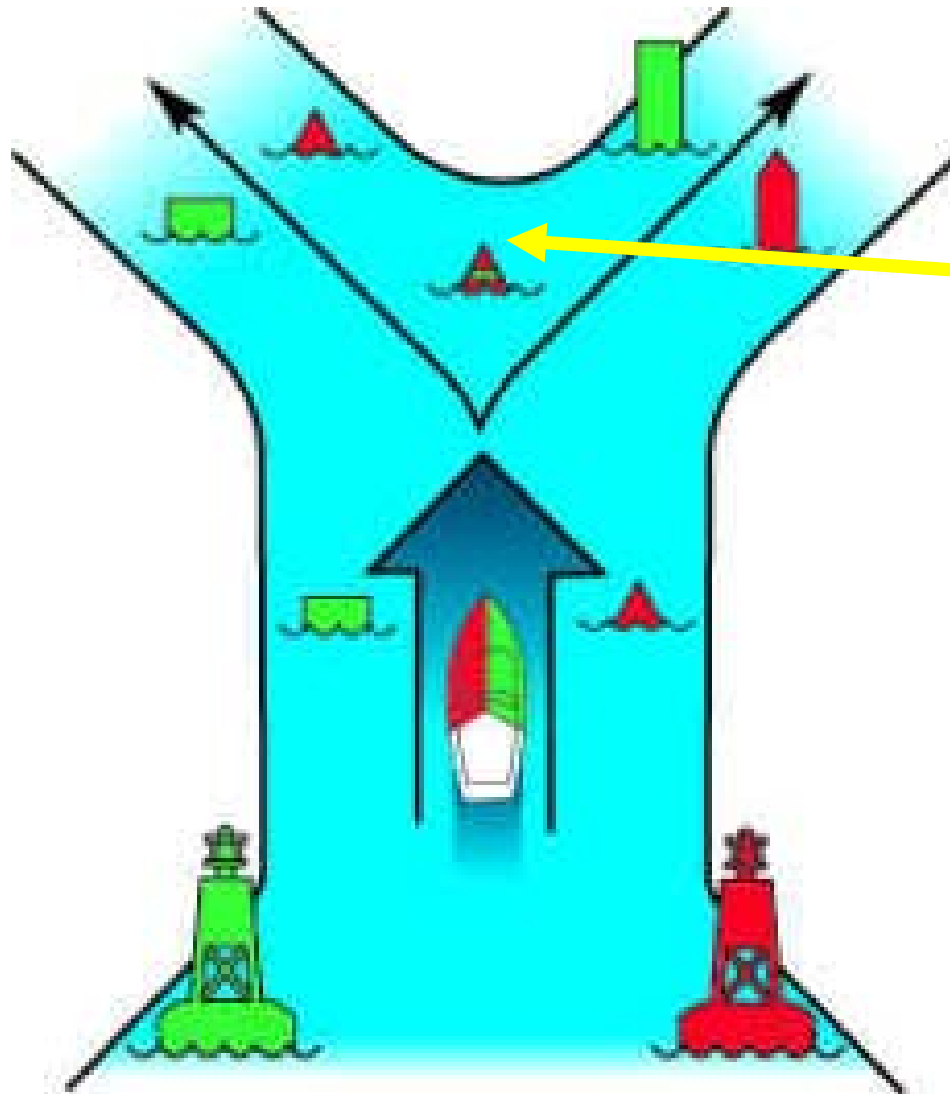


### DAY BEACONS

- Placed on Land, not light

## 8. The Canadian Buoyage System

### Lateral system



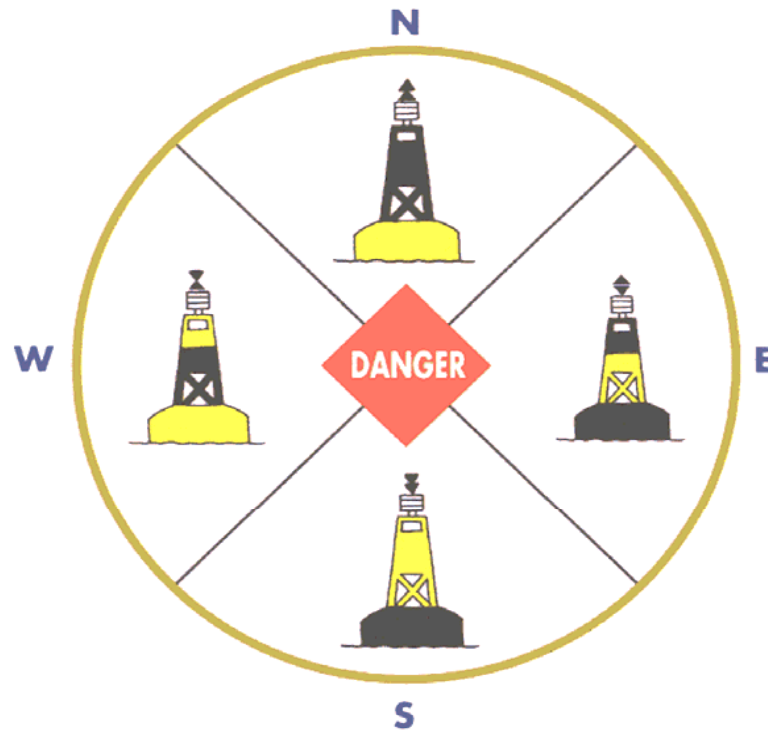
*Bifurcation buoy marks a split in a channel, and its top colour and buoy shape indicates the preferred route*

***Travelling upstream keep red buoys to your right***



# 8. The Canadian Buoyage System

## Cardinal System Buoys



Indicates general location of Hazard

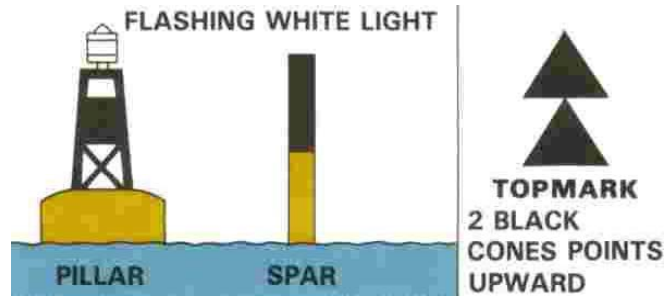
**Safe Water is in the direction indicated by the name of the buoy**



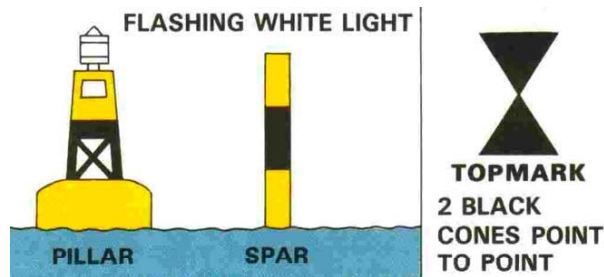
# 8. The Canadian Buoyage System

## Cardinal System Buoys

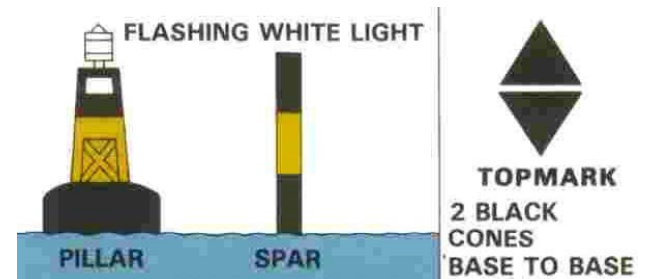
North



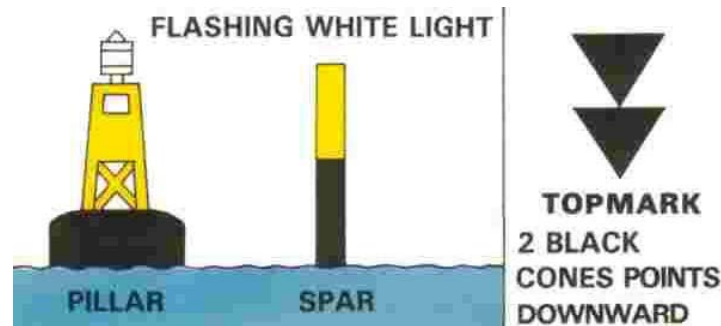
*The tops of the conical top shapes point to the black part of the buoy*



East

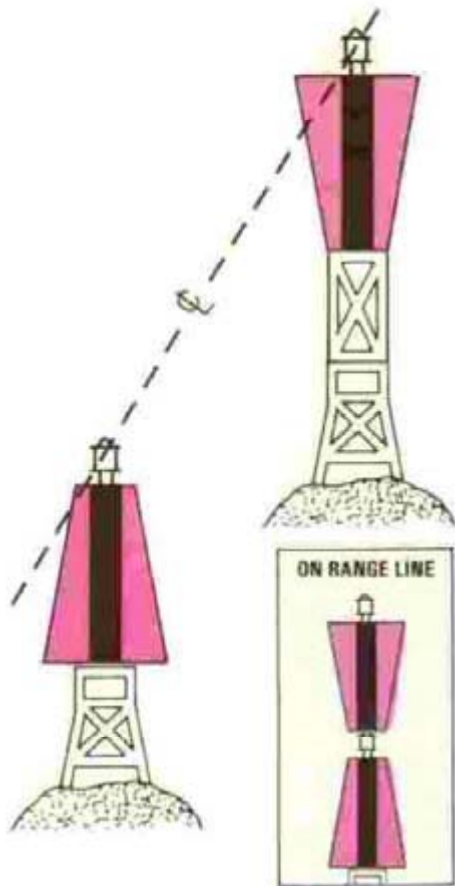


West



South

## 8. The Canadian Buoyage System



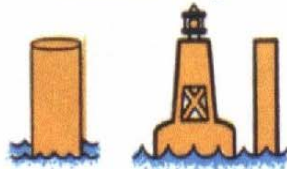
### Range or Leading Line

- Two lights or daymarks, one behind and higher than the other
- When lined up you are in the marked channel

# 8. The Canadian Buoyage System

## Special

Cautionary



Anchorage



Mooring



Information



Hazard



Control buoys



Keep out



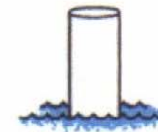
Scientific (ODAS)



Diving



Swimming



# 8. The Canadian Buoyage System

## Restriction / Control signage



## 8. The Canadian Buoyage System

### Diving Flag



*Keep away from  
swimmers and divers!*



Diver down  
Diving in progress



International blue and white  
Code Flag Alpha (on vessel)

## 9. Basic Seamanship

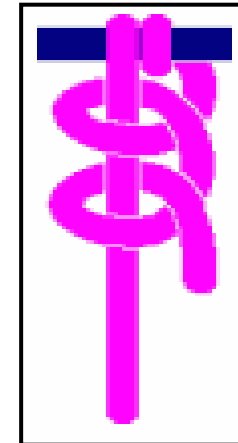
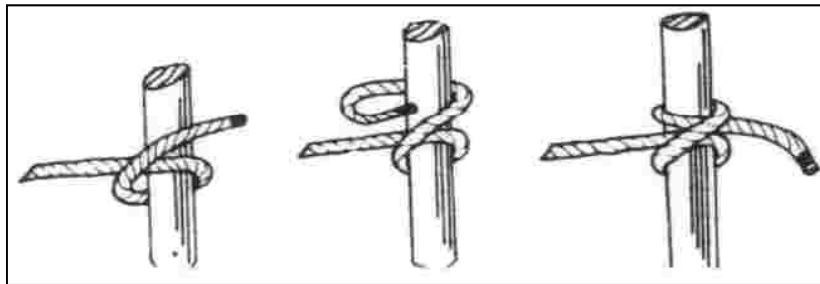
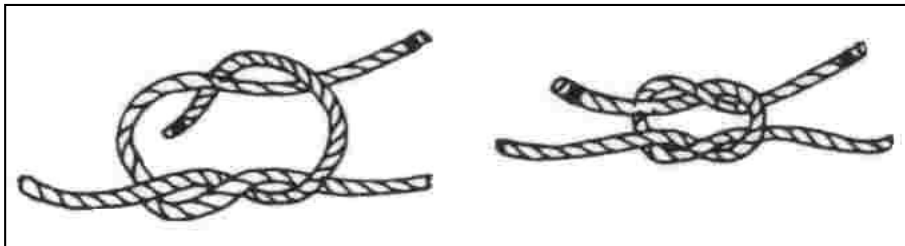
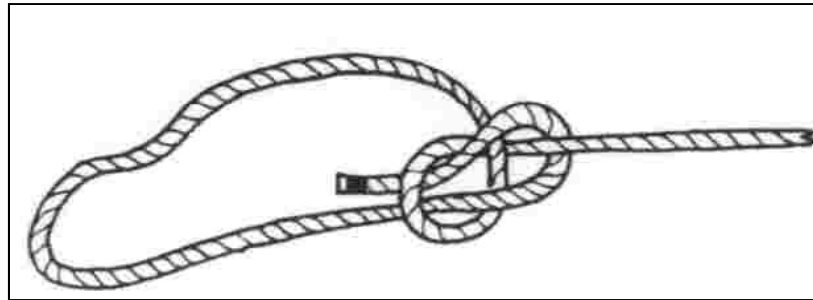
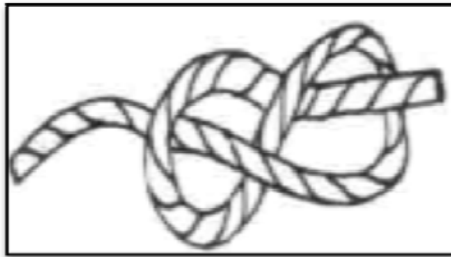
### Types of line

- Braid versus Laid
- **Nylon** – well suited for use as anchor rode, dock lines and tow rope. Does not float.
- **Dacron** – less stretchy than nylon. Often used for sailboat rigging. Does not float.
- **Polypropylene** - weakest synthetic of the three, degrades in sunlight, floats so is often used for buoyant lines and floating lines/tow lines
- **Blends** - (Spectra and Dyneema – High Molecular Density Polyethylene) strong and light braid with little stretch. Made for specific applications, tends to be more \$.



# 9. Basic Seamanship

## Basic Knots



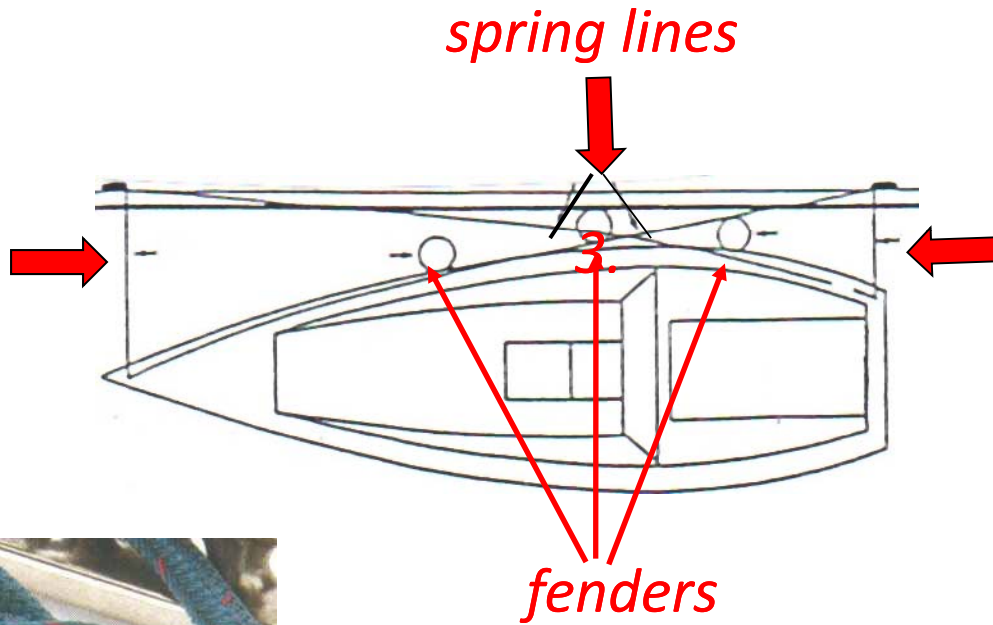


# 9. Basic Seamanship

## Securing to a dock

### Docking lines

Bow breast line or bow line



# 9. Basic Seamanship

## Anchors and Anchoring

Plough



Danforth



## 9. Basic Seamanship

### Anchors and Anchoring



- Scope in anchor rode = Rode length : Depth
- 3:1 for short stay, good shelter
- More for long stay, bad weather

## 10. Vessel Stability

### Basic Stability Principles

- Interaction of Centre of Buoyance and Centre of Gravity
- Free surface effect – impact of water flowing in the vessel or in partially filled tanks on the centre of gravity
- Importance of Freeboard



## 10. Vessel Stability

### Reduced Freeboard

Overloading reduces stability



## 10. Vessel Stability

High Centre of gravity reduces stability



## 10. Vessel Stability

### Weather Conditions

- Breaking waves and conditions beyond vessel design parameters



## 10. Vessel Stability

High Centre of gravity reduces stability





## 10. Vessel Stability

# Stability challenges

Not Unique to monohulls



## 10. Vessel Stability

### Basic Forces – Gravity and Buoyancy

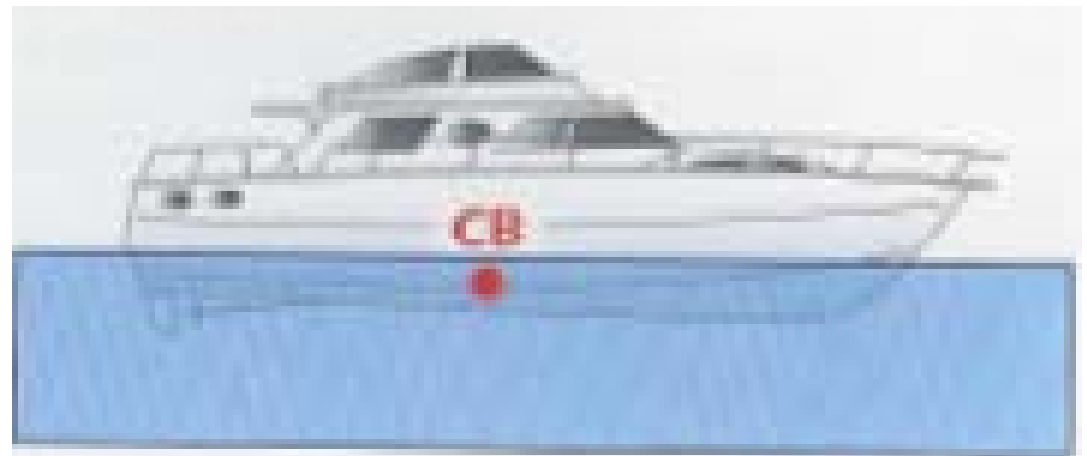


#### Centre of Gravity (CG)

The sum of all of the components of the vessel

#### Centre of Buoyancy (CB)

The position of the centre of the volume of water displaced to float the boat

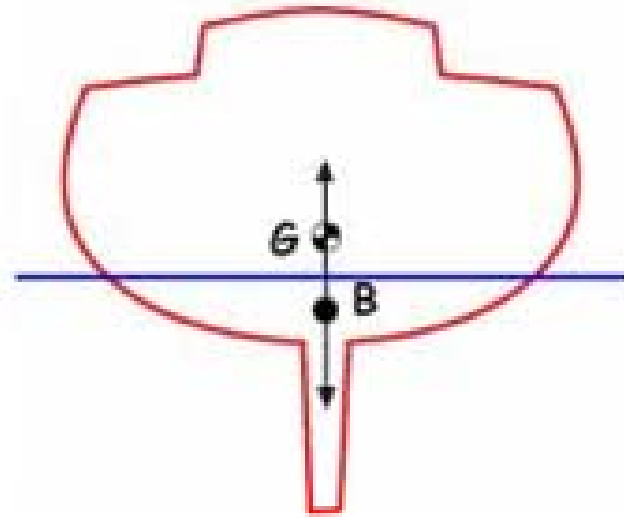


## 10. Vessel Stability

### Gravity and Buoyancy Interact

CG (G) and CB (B) interaction

The interaction of these forces is a key relationship in the discussion of vessel stability

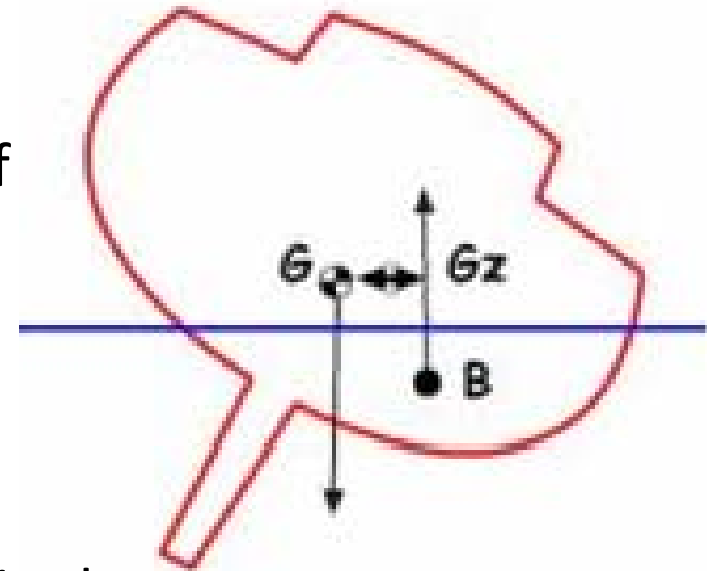
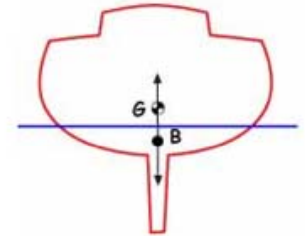


- Vessel at rest , Floating upright
- Note that CG and CB vertically aligned
- **B** upward thrust counteracts the effect of gravity acting through **G**

## 10. Vessel Stability

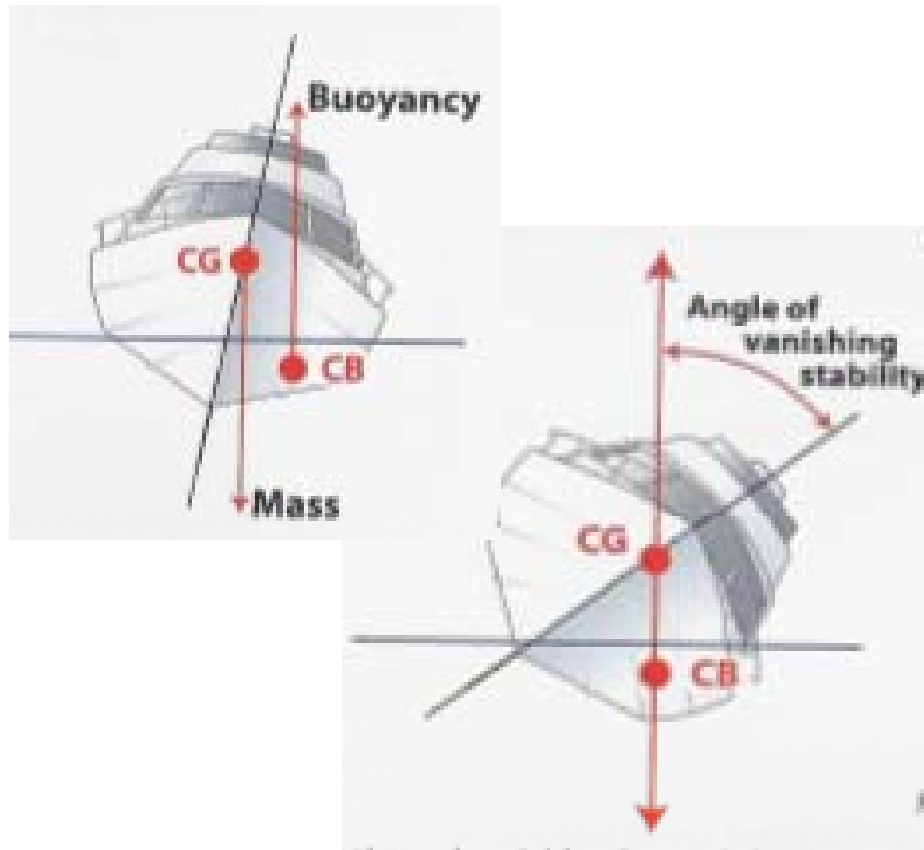
### Righting Moment - $Gz$

- Interaction of CG, CB and  $Gz$
- Righting moment is the force created by the lateral separation of CB and CG pushing the vessel back to its original stable position.
- Vessel heeling
- CB has moved due to the change in the submerged portion of the vessel
- The line  $Gz$  represents the “Righting moment”



## 10. Vessel Stability

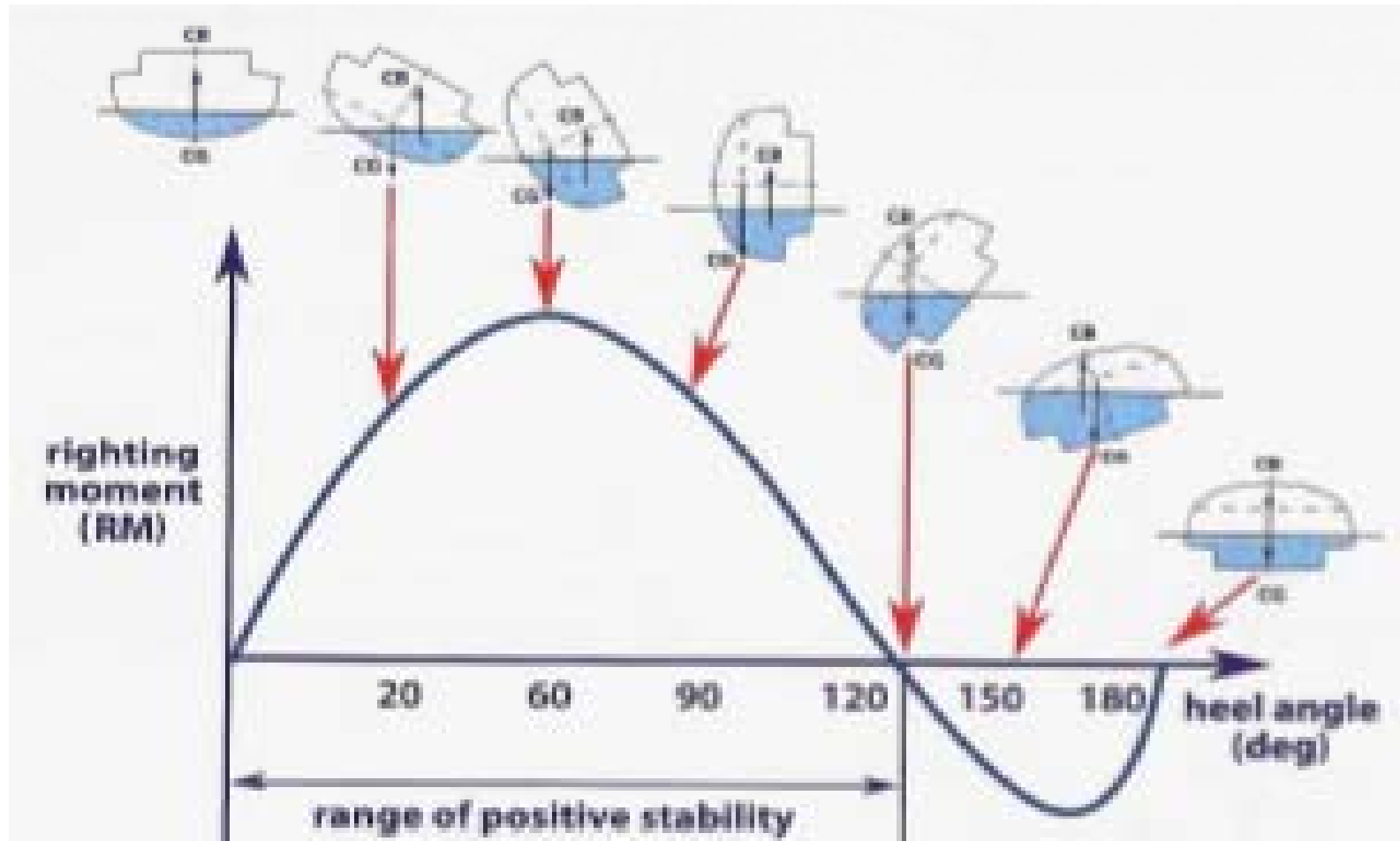
### Angle of Vanishing Stability (AVS)



- Position of CB and CG can be measured for a range of angles of heel
- Will reach position where vessel is balanced.....
- Increasing heel will cause capsize (negative righting moment or positive capsizing moment)
- Decreasing heel will cause a return of positive righting moment

# 10. Vessel Stability

## Righting Moment Curve

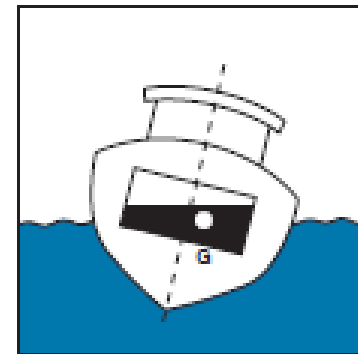
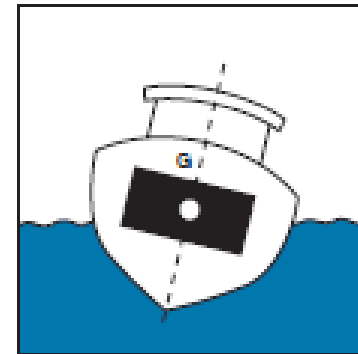
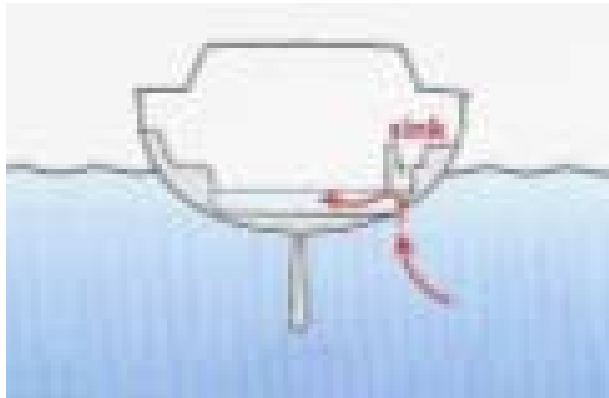


# 10. Vessel Stability

## Factors Impacting Stability

### Free Surface Effect

- Flooding in the vessel or partially filled tanks
- As the vessel heels the CG moves sideways, reducing righting moment
- When heeling, AVS happens sooner



# 10. Vessel Stability

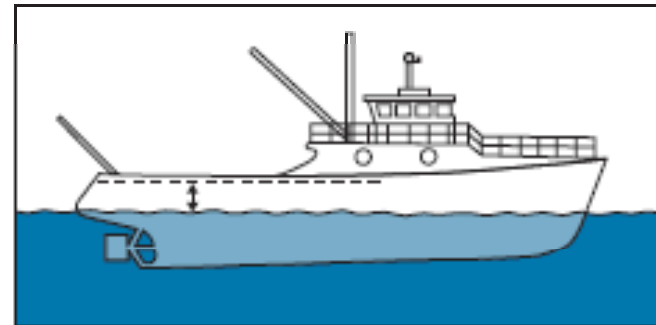
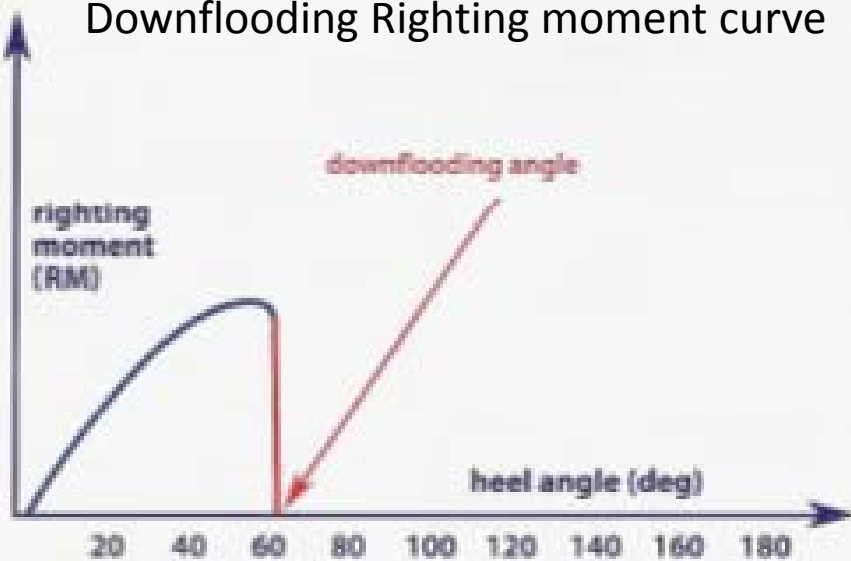
## Factors Impacting Stability

### Lack of Freeboard

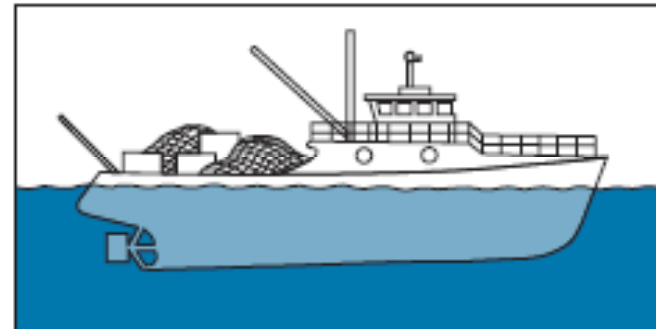
Down flooding due to

- Overloading
- Submersion of open hatches

Downflooding Righting moment curve



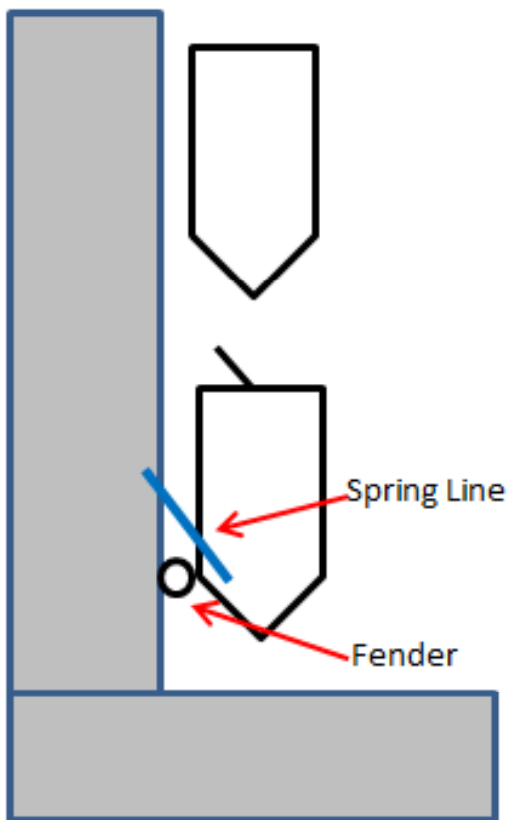
A proper freeboard is essential for stability. Freeboard is the distance between the water and the working deck of the vessel. If the deck edge goes under the water when the vessel heels, the danger of capsizing is great.





## 11. Manoeuvring a Vessel

### Departing a Dock



### Springing off a dock - Bow Spring

- Bow spring and forwards propulsion pivots stern away from the dock
- Wash off rudder accentuates the effect

Before stating:

- Protect the hull with fender(s), especially at the bow pivot point
- Set the spring up so you can pivot on it
- Belay the spring around a cleat (Crew cannot hold the spring)
- Helm hard over – turn bow into dock

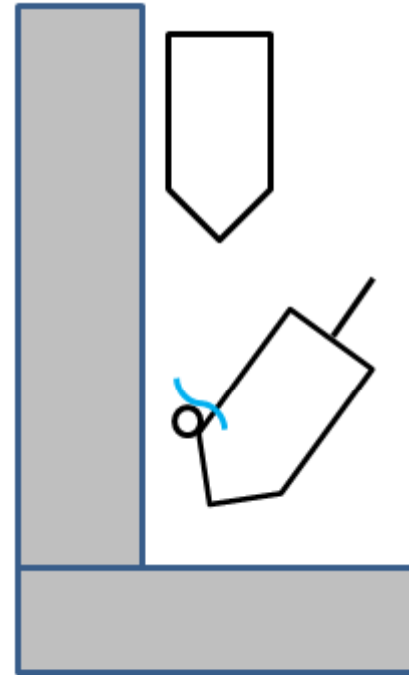
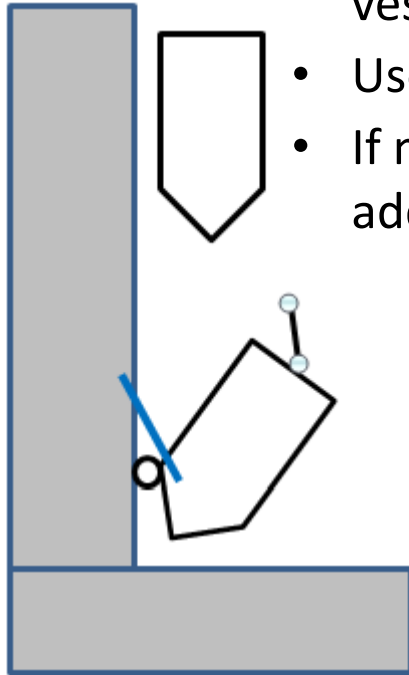
# 11. Manoeuvring a Vessel

## Departing a Dock

### Springing off a dock - Bow Spring

During process:

- Slow ahead to pivot vessel
- Use minimal power
- If more power needed add slowly

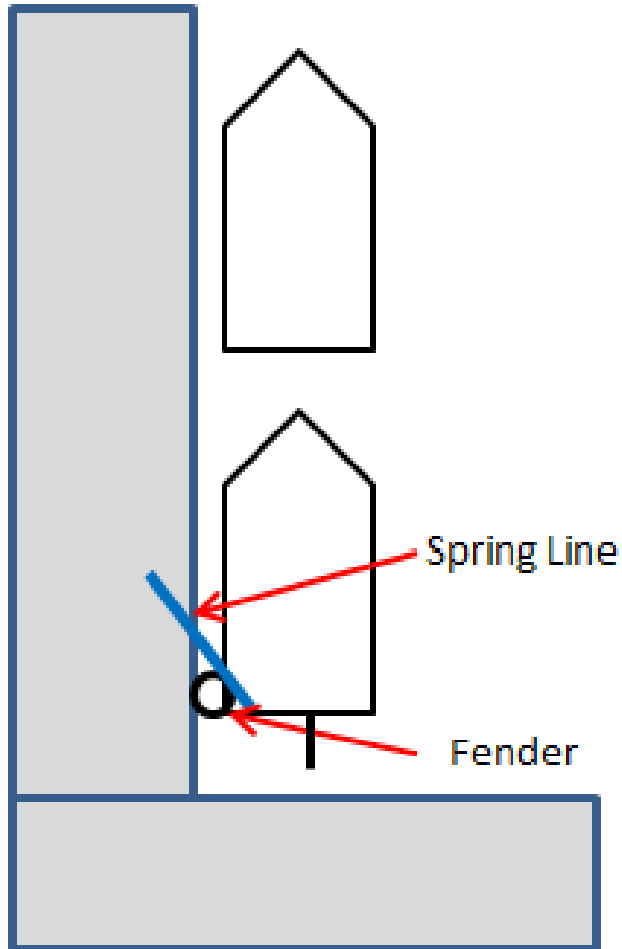


Once desired angle achieved:

- Into neutral, centre helm
- Crew casts off on command
- Slow astern to gain steerage way

# 11. Manoeuvring a Vessel

## Departing a Dock



## Springing off a dock - Stern Spring

- Stern spring and reverse propulsion pivots bow away from the dock

Before stating:

- Protect the hull with fender(s), especially at the bow pivot point
- Set the spring up so you can pivot on it
- Belay the spring around a cleat (Crew cannot hold the spring)
- Neutral helm – rudder turn has little or no impact

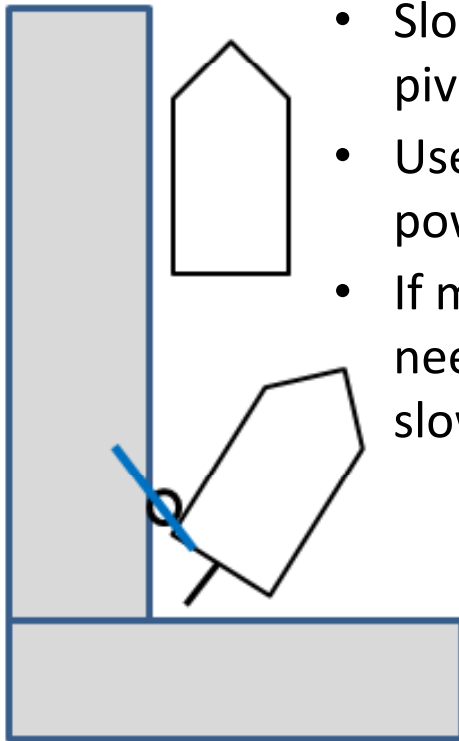
# 11. Manoeuvring a Vessel

## Departing a Dock

### Springing off a dock - Stern Spring

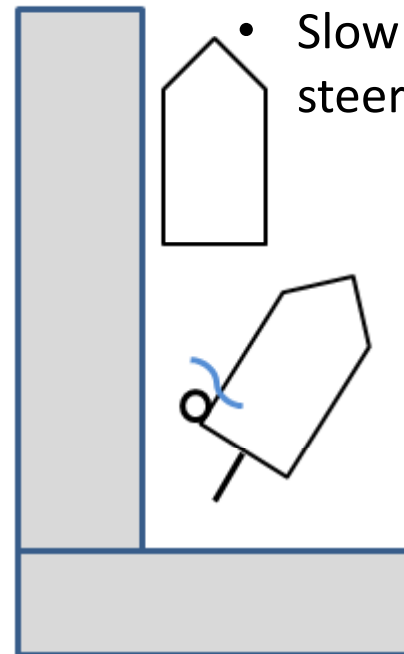
During process:

- Slow astern to pivot vessel
- Use minimal power
- If more power needed add slowly



Once desired angle is achieved:

- Into neutral, centre helm
- Crew casts off on command
- Slow ahead to gain steerage way



## 11. Manoeuvring a Vessel

### When Underway

- When leaving dock, secure lines and fenders
- Operate at slow speed near other vessels or near shore (no wake)
- Once clear, operate at a safe speed
- Keep lookout for other traffic
- Slow down when crossing other vessels wake
- When overtaking, cut across wake of other vessel at right angles to get into clear water
- Know the vessel turning circle, and the impact of turning at various speeds

# 11. Manoeuvring a Vessel

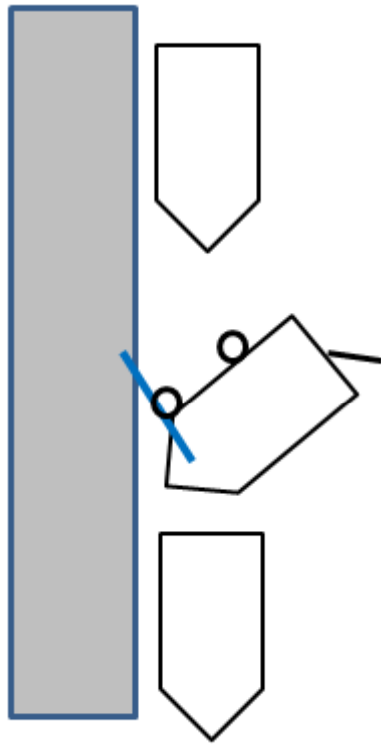
## Docking

- Position fenders to protect hull, prepare lines for arrival, assign roles to line handlers who will step ashore with dock lines
- Operate at slow speed
- Approach the dock at an angle – 20°-30°, aim bow for where you want your stern
- Keep speed low, just enough to retain steerage
- Warn passengers to keep hands in
- When bow is near dock, slowly turn stern into dock
- Slow and then stop the vessel with the engine
- Line handlers step ashore and control vessel by wrapping line around a cleat
- Shut down engine

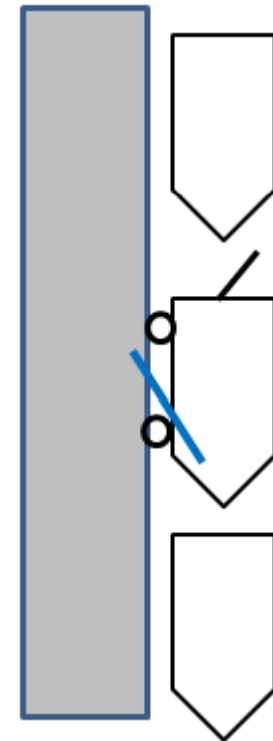
# 11. Manoeuvring a Vessel

## Docking Skills

### Returning to a dock - Docking with a spring



- Use a spring line tied to the bow or amidships
- Tie a loop in the end of the spring that can be dropped over cleat or bollard
- Slowly approach dock, one crew member drops spring onto dock cleat
- Power slow ahead with rudder set to turn stern towards and bow away from dock
- Vessel will settle parallel to dock allowing crew to attach breast lines
- Once breast lines attached then engine into neutral



## 11. Manoeuvring a vessel

### Mooring Pickup

- Always pick up mooring against (heading into) current
  - If no current then into wind
- Motor slow ahead and recover mooring pennant with boat hook
- Secure your mooring line(s) to the ring on the top of the mooring buoy





# 11. Manoeuvring a vessel

## Mooring Pickup

Capture and Secure to Mooring



Lasso the mooring ball

- Secure the ends of a line to the two bow cleats
- Gather the line in loops in each hand
- Throw the loops forward, throwing line around the mooring



Securing to the Mooring Ball

- One or more round turns around the ring on the mooring ball will reduce the likelihood of chafe
- Lead the line back to your vessel to allow for easy departure

## 11. Manoeuvring a vessel

### Setting the Anchor

- Select location
  - good bottom of sand or mud
  - Room to swing
  - Shelter
  - Adequate depth
- Position vessel where you want the anchor to set
- Lower anchor (hand over hand) into water and to the bottom (do not throw)
- Back away from the anchor, veering out rode until desired scope reached
- Cleat anchor rode and back up at 1/4 to 1/3 throttle to set the anchor (you should be able to feel it dig in)

## 11. Manoeuvring a vessel

### Weighing Anchor

- Pull the vessel up the location of the anchor (you can use the engine to assist if needed)
- When the rode is straight down, pull up on the anchor to break it out of the bottom
- If the anchor will not break out b hand, secure the anchor rode to a bow cleat and motor slowly ahead or around the anchor
- Pull the anchor up onto the boat, taking care to keep the anchor clear of the hull
- Wash the anchor when at water level to remove weeds and mud
- Once the anchor is on deck, coil the rode and stow the anchor and rode

## 12. Departure Preparation

### Activities Before Departure

- Plan the trip
- Understand the hazards that might be encountered
- Get a weather forecast / check the weather
- Check the vessel and the safety equipment
  - See checklists in course manual and checklists in use at specific schools
- Ensure enough fuel (1/3 out, 1/3 back, 1/3 reserve)
- File sail plan and advise shore of passenger list

## 12. Departure Preparation

### Check The Vessel

Vessel and the safety equipment Checks

- See checklists in course manual and checklists in use at specific schools
- Checks should include:
  - Physical - Hull (walk around and inspect the boat)
    - Engine visual check of condition
    - Bilge
  - Radio Check (ensure send and receive work)
  - Bilge pump working
  - Steering, shift and throttle controls
  - Required Safety equipment

## 12. Departure Preparation

### Brief Crew and Passengers

- Perform pre-departure crew briefing
  - Discuss plans for the day and trips with crew
  - Identify any changes in routine
- Perform pre-departure passenger briefing
  - Requirement to wear and how to use life jackets
  - Expected behaviour aboard the vessel (hands and arms in, keep low, remain seated)
  - Location and use of safety equipment
  - Effect of the environment – boat motion, waves, wind, sun
  - Expected action in case of emergency or if someone goes overboard

## 12. Departure Preparation

### Use Checklists and Standard Procedures

- Review the checklists pages 69 – 73
- These may be modified to better fit the local environment
- Discuss and review procedures in use at the training location