Ships & Shipping Around Canada

Capt. Saleem Ahmad

Topics of this presentation

- **Subject matter – The Vessel**
  - Ship's Dimensions & Parts and Ship's Stability
  - Ship's Movement in Water & Stresses
- **Waters around Canada**
  - Canadian East Coast including Bay of Fundy
  - Canadian West Coast
  - Canadian Northern Coast
- **St. Lawrence Seaway**
- **Great Lake vessels**
  - Unique characteristics of Lakers
- **Fishing**
  - Fishing techniques & Fishing vessels
- **Types of vessels found in and around Canada**
  - Tugs & Towing
  - Barges, & other vessels
- **Weather Influence & Shipping Hazards**
  - Tides, Tidal Bores, Sea and Swell
  - Seiche (*pronounced as* Say-SH)

What type of vessel is this?

Shipping – Statistics – Year 2020

Data below taken from Transport Canada statistics

No of vessels in Canada	1,307
1000 GRT or over	662
Ferries	65
Cargo vessels	77
Barges	440
Workboats	63

No of Fishing vessels in Canada	17,061
Pacific	2,311
Inland	150
Atlantic	14,600
Total	17,061

Shipping Accident by Type	
Capsize	8
Collision	72
Fire/Explosion	32
Grounding	51
Sank	18
Sustains damage render unseaworthy/Unfit for purpose	26
Other shipping accident types	0

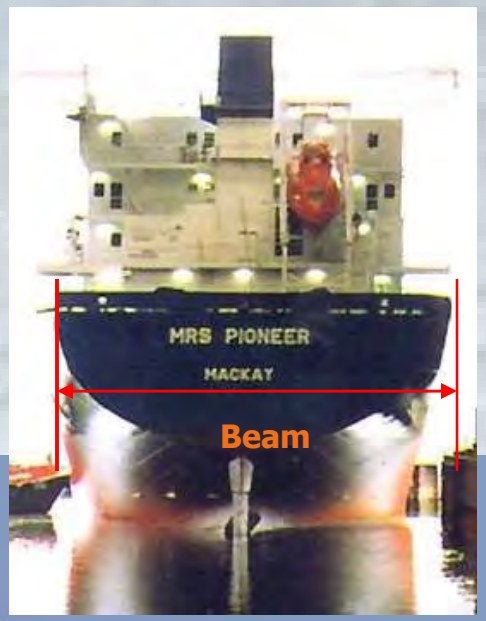
Vessels involved in Accident by Type of vessel	Pacific region	Central region	Atlantic region	Foreign waters	Totals
Barge/Tug	16	7	2	0	25
Cargo / Tanker	13	38	6	7	64
Ferry/Passenger	16	17	5	0	38
Fishing	23	1	35	0	59
Other vessel types	22	12	10	0	44
Vessels lost	2	0	6	0	8

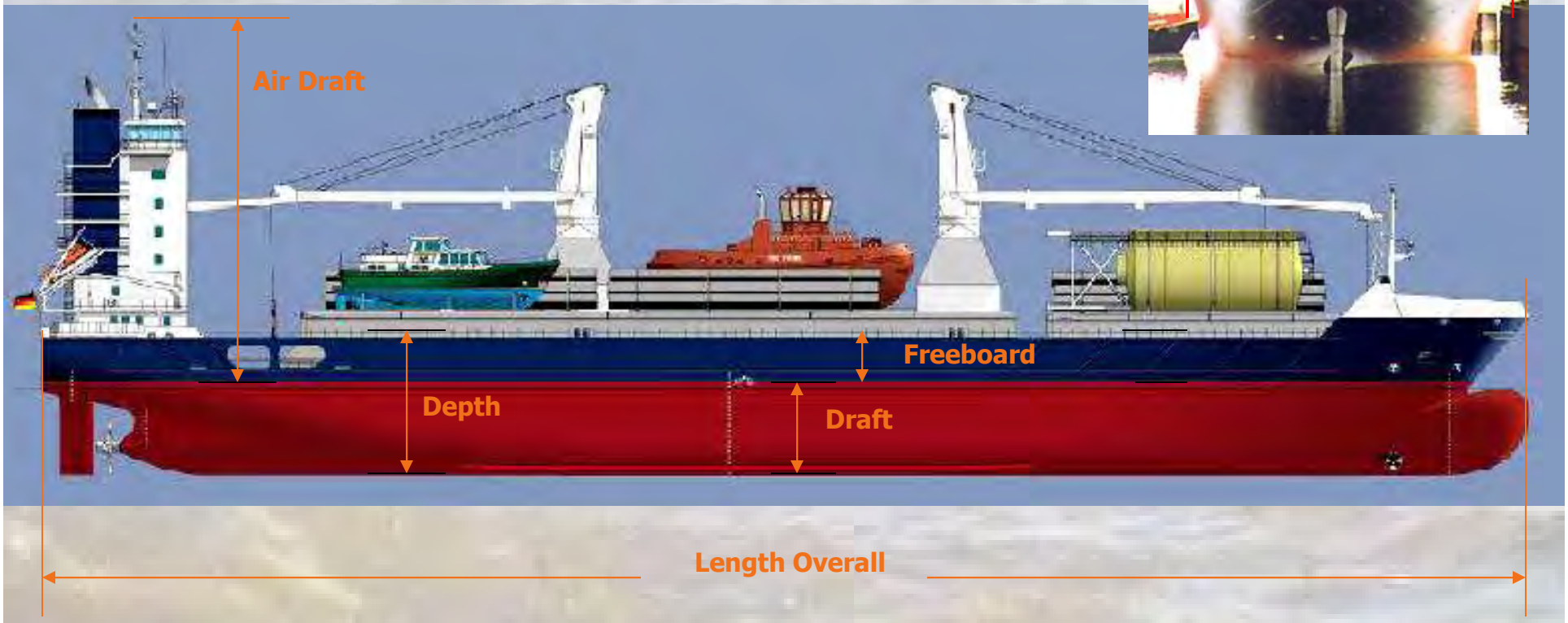
Subject matter – The Vessel

Ship's Dimensions & Parts and Ship's Stability


Ship's Sides
Stern
Starboard side
Port Side
Bow
LEE A. TREGURTHA, Lake Huron, 6 / 1/ /2003
Don Coles, Great Lakes Aerial Photos

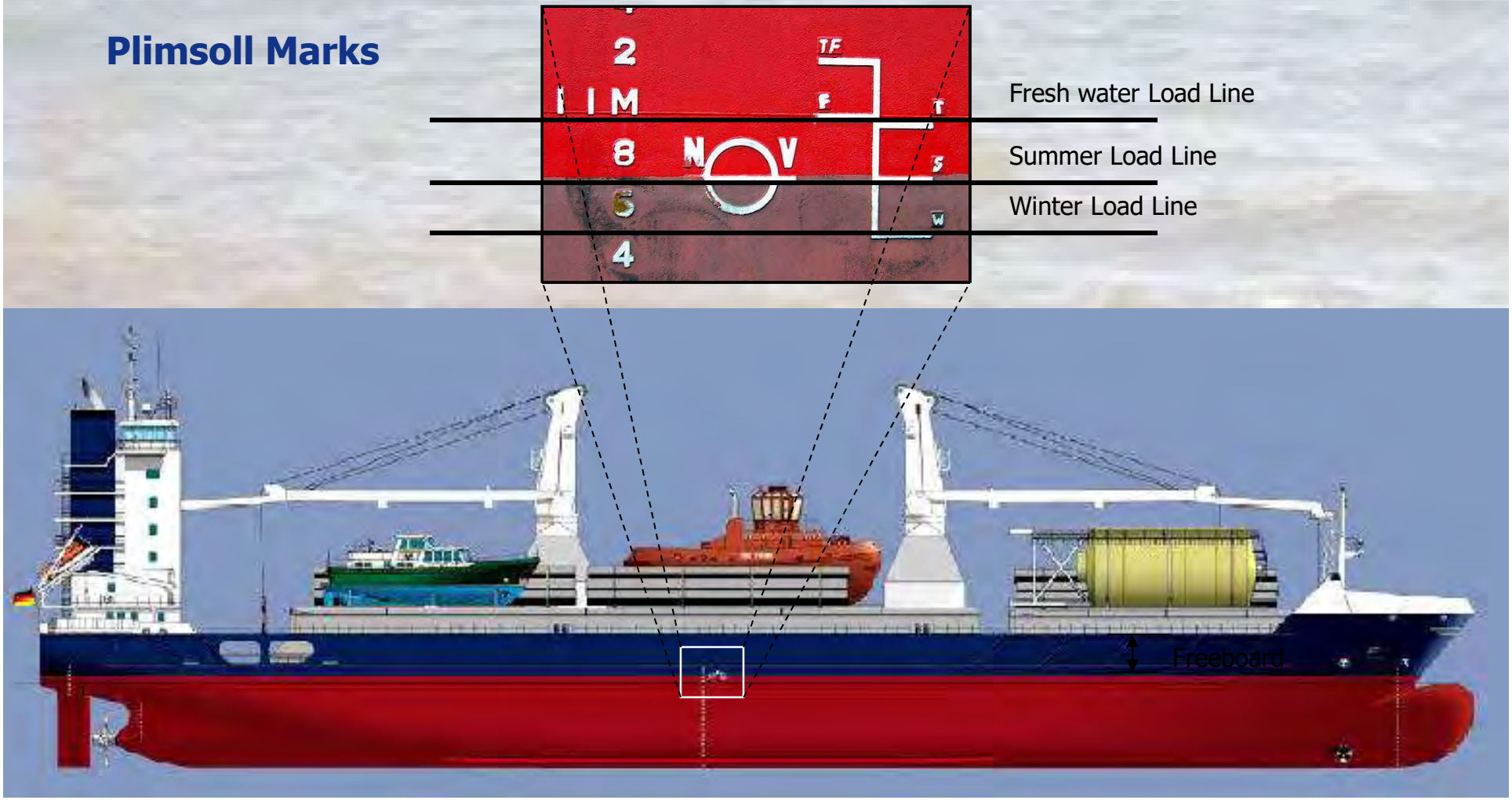
Ship's Dimensions





Ship's Loadlines

Plimsoll Marks



Ship's Classification

Ship's Classification is necessary to demonstrate that she is maintained to the highest standards BUT it is not mandatory.

Statutory certificates such as Load line, Safety Equipment, Minimum safe manning Certificates as per IMO rules issued by flag state are **Mandatory**. Ship would be detained by Port state controls if not in compliance.

International Association of Classification Societies [IACS]

- BV – Bureau Veritas
- ABS – American Bureau of Shipping
- CCS – China Classification Soceity
- DNV - Det Norske Veritas
- GL – Germanischer Lloyds
- KR – Korean Register
- LR – Lloyds Register
- NKK – Nippon Kaiji Kyokai
- RINA - Registro Italiano Navale
- RS - Russian Maritime Register of Shipping

Other Classification Societies [non IACS]

- INSB – International Naval Surveys Bureau
- CRS – Croatian Register of Shipping
- IRS – Indian Register of Shipping

Ship's Tonnage

Gross Registered Tonnage (G.R.T.)

The measure of the overall size of vessel. It is obtained from a formula based on the volume of all enclosed spaces in the ship divided by 100

Net Registered Tonnage (N.R.T.)

The measure of useful capacity of the ship obtained from a formula.

Light Displacement Tonnage (L.D.T.)

Is the weight of the hull & machinery of the ship.

Load Displacement Tonnage

Is the weight of the ship and everything on board when loaded at summer draft.

Deadweight

Is the difference between Light and Loaded displacement. Basically, it is carrying capacity of the ship.

Ship's Parts

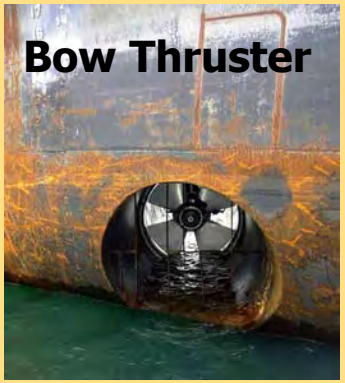
LEE A. TREGURTHA, Lake St. Clair, 7 / 22 / 2001
Great Lakes Aerial Photos, Don Coles

Monkey Island

Bridge

Captain's Deck

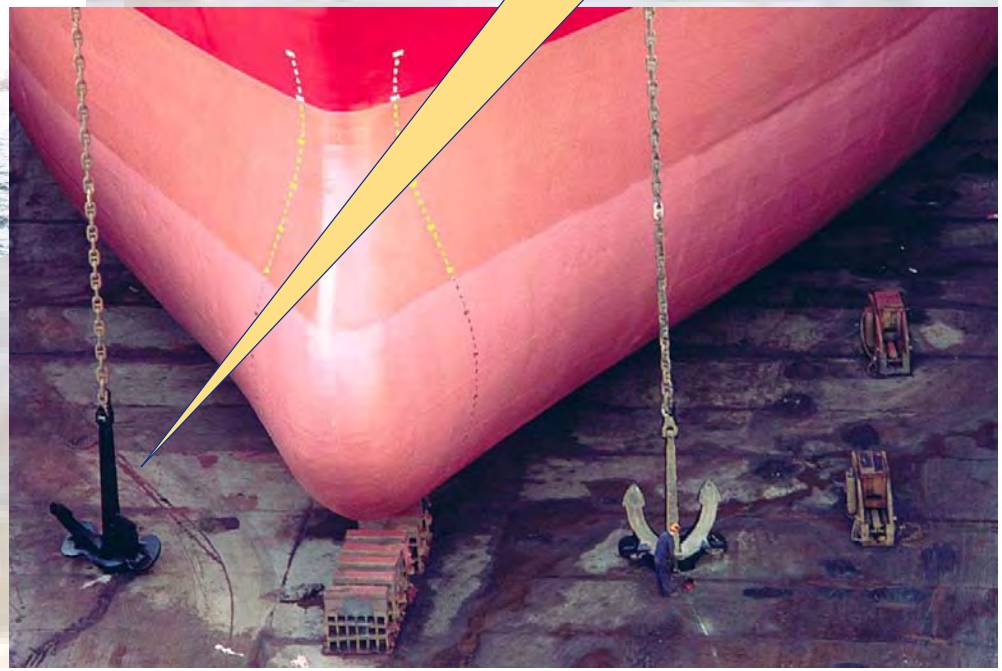
Fo'c'sle Deck



Ship's Parts

Bulbous Bow

Stockless Anchor



Ship's Parts

Ship's Hold

Self unloading gear

Hatches

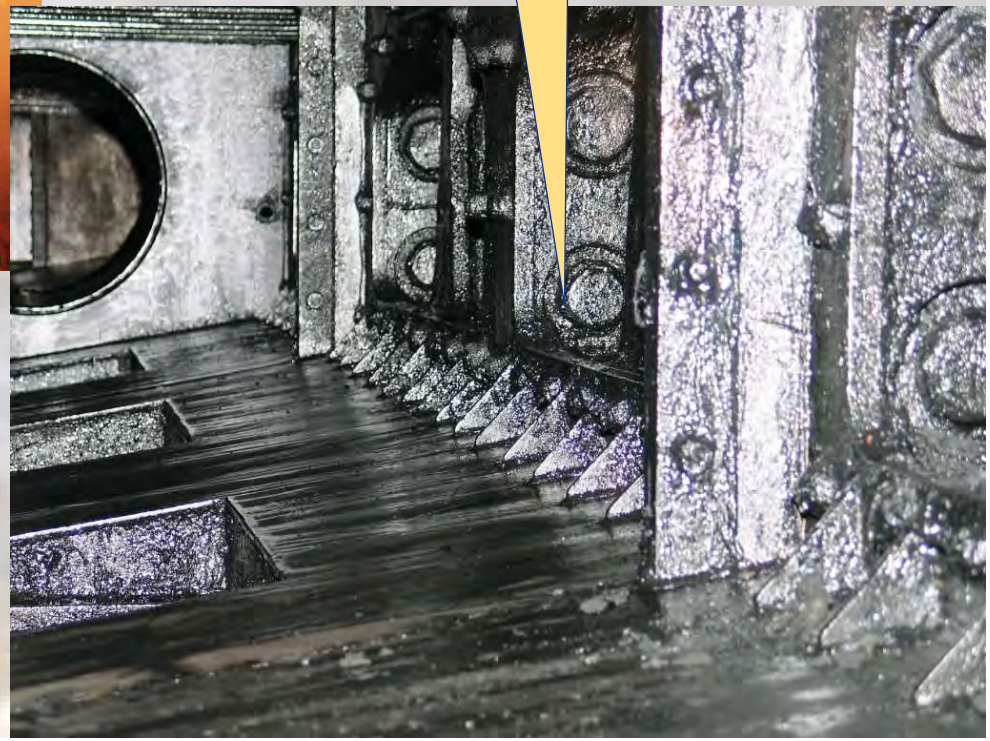
Ship's Parts

Ship's Hold

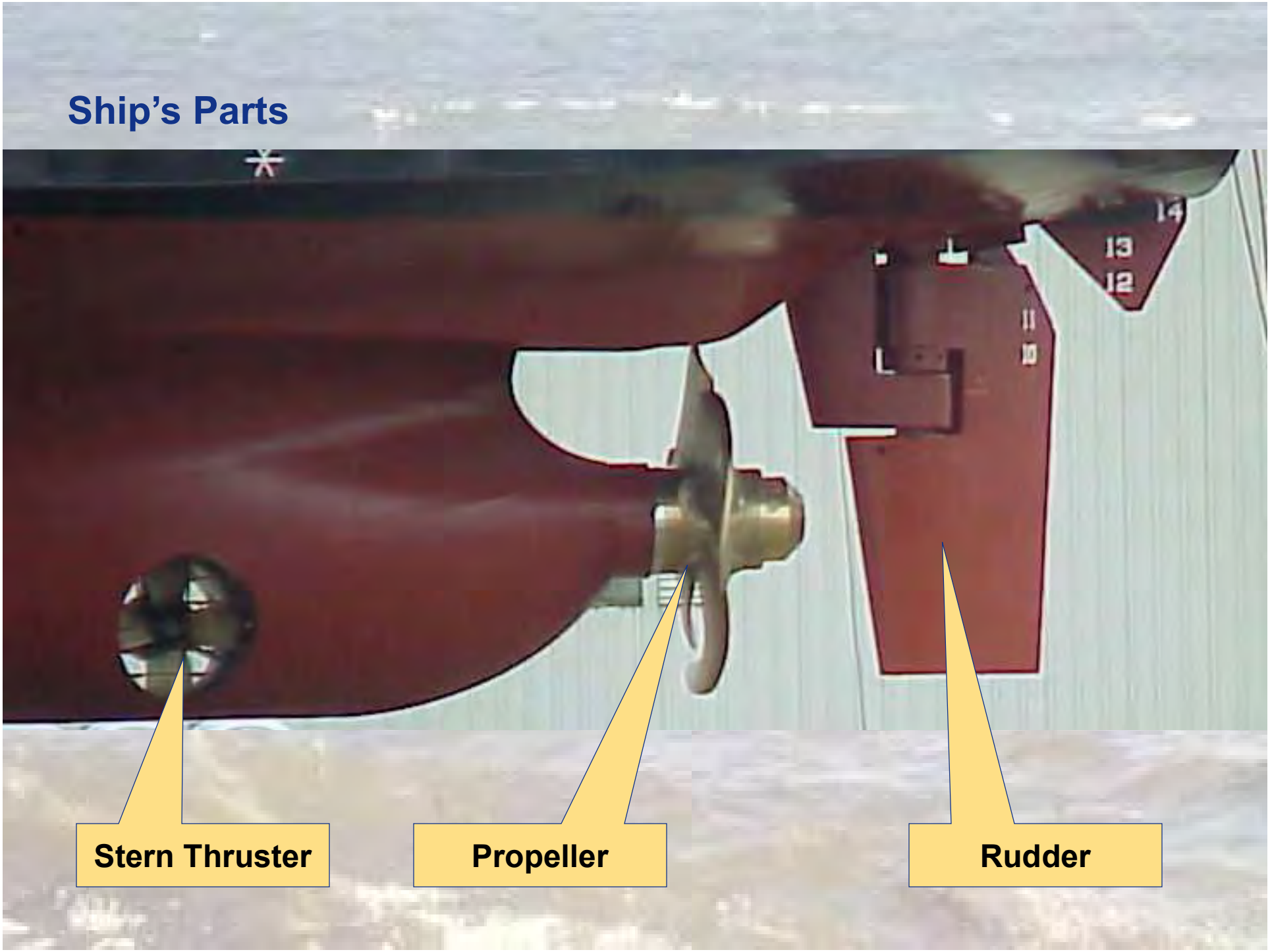
Ship's Parts

Ballast Tank

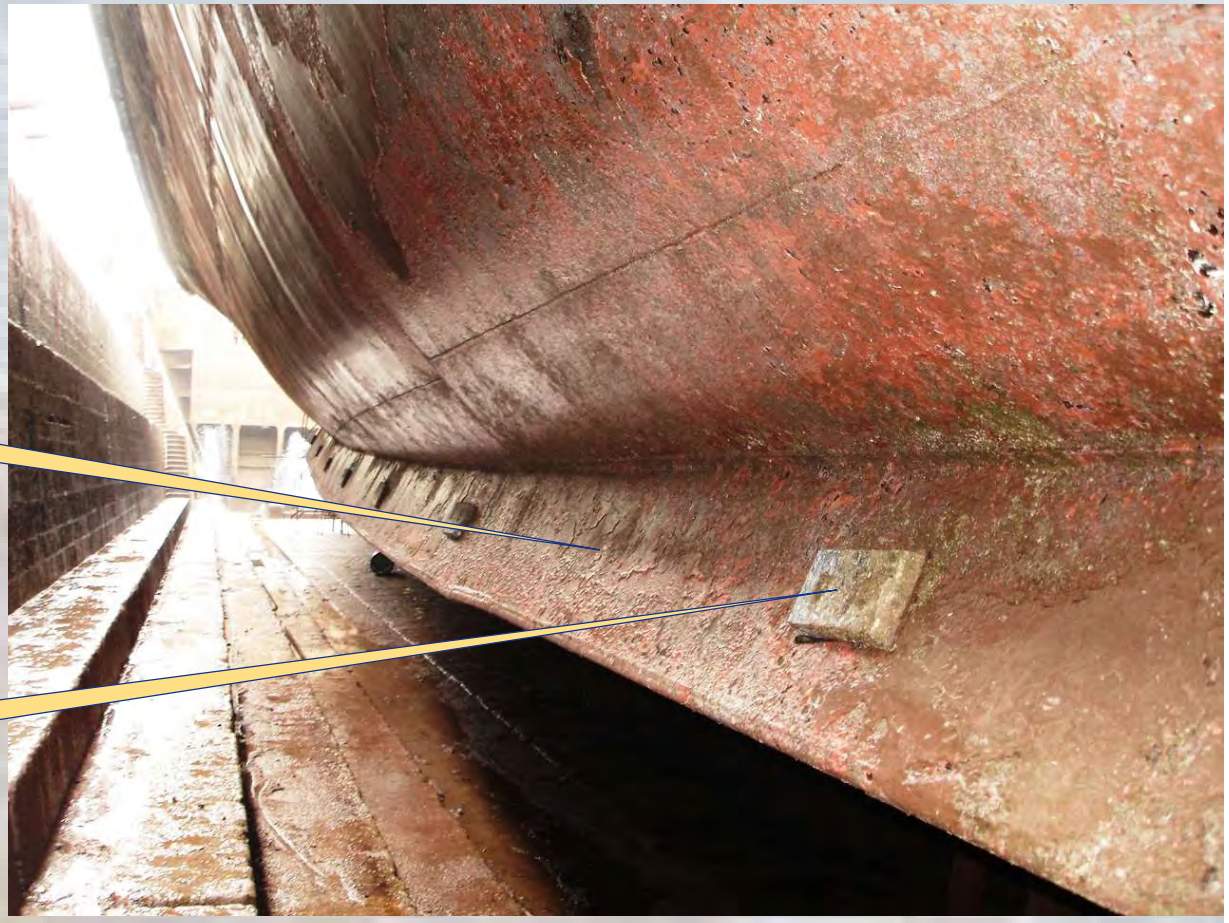
Oil Tank



Ship's Parts



Ship's Parts



Control rooms

Bridge

Navigation Control Room

Engine Control Room

Ship's Engine

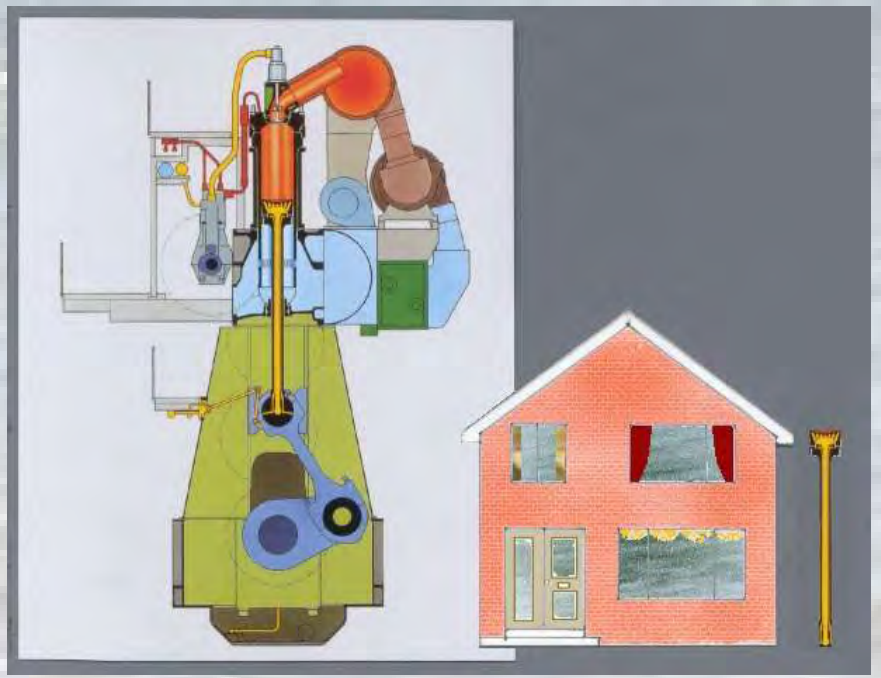
Types of Propulsion

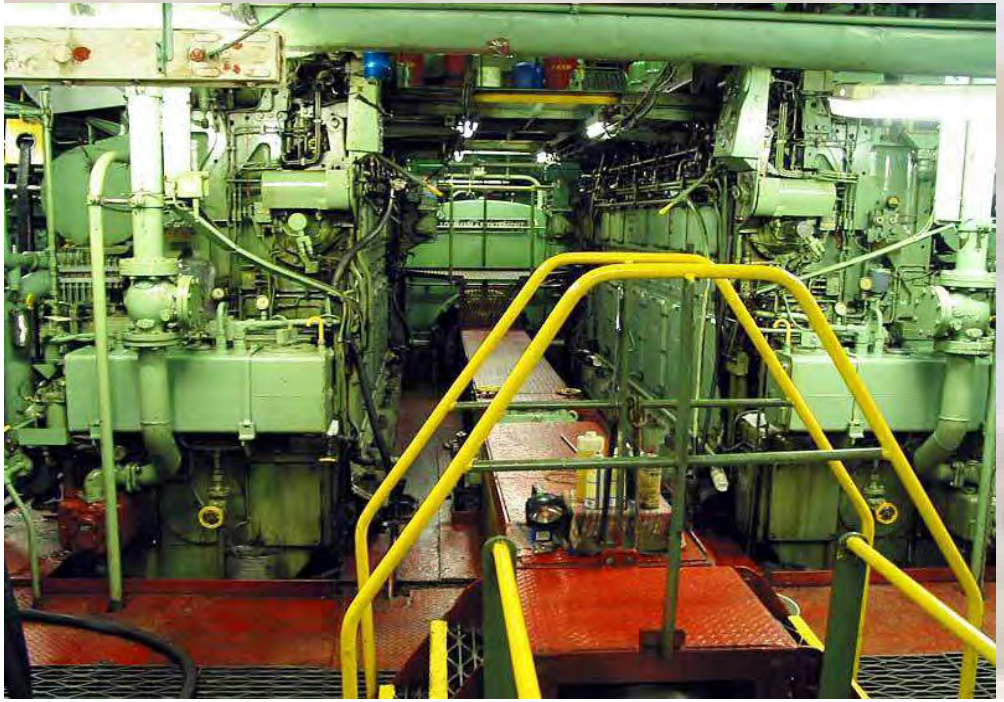
Diesel Engine

- Mostly two stroke slow speed engines.

Turbine Engine

- Mostly high-speed rotary engines driven by steam.



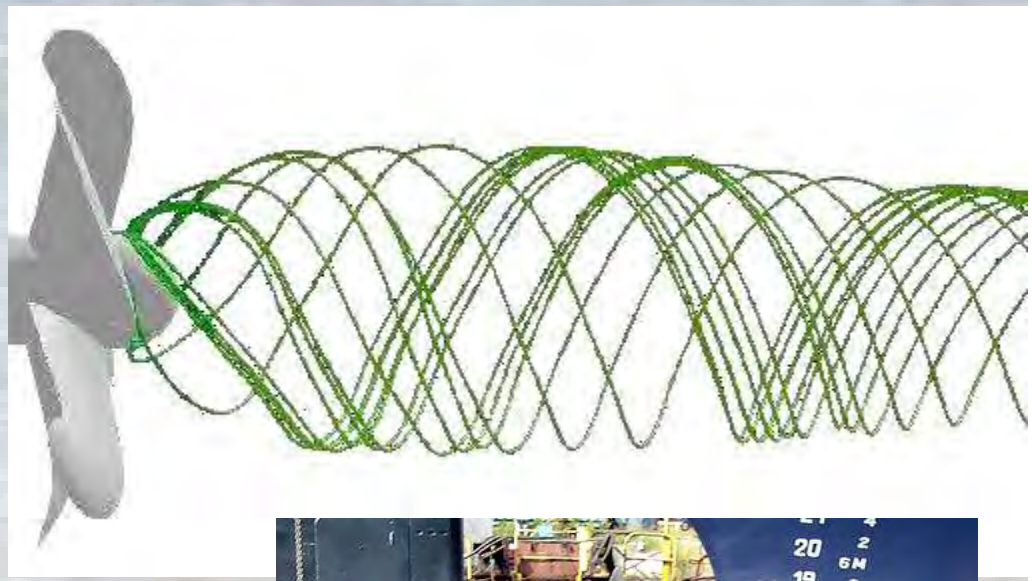


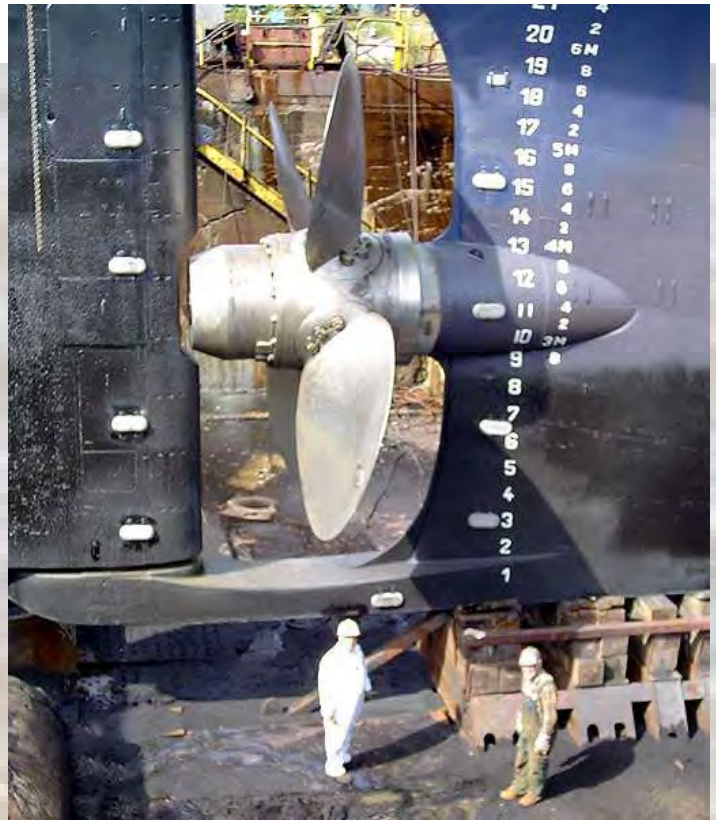
Ship's Propeller

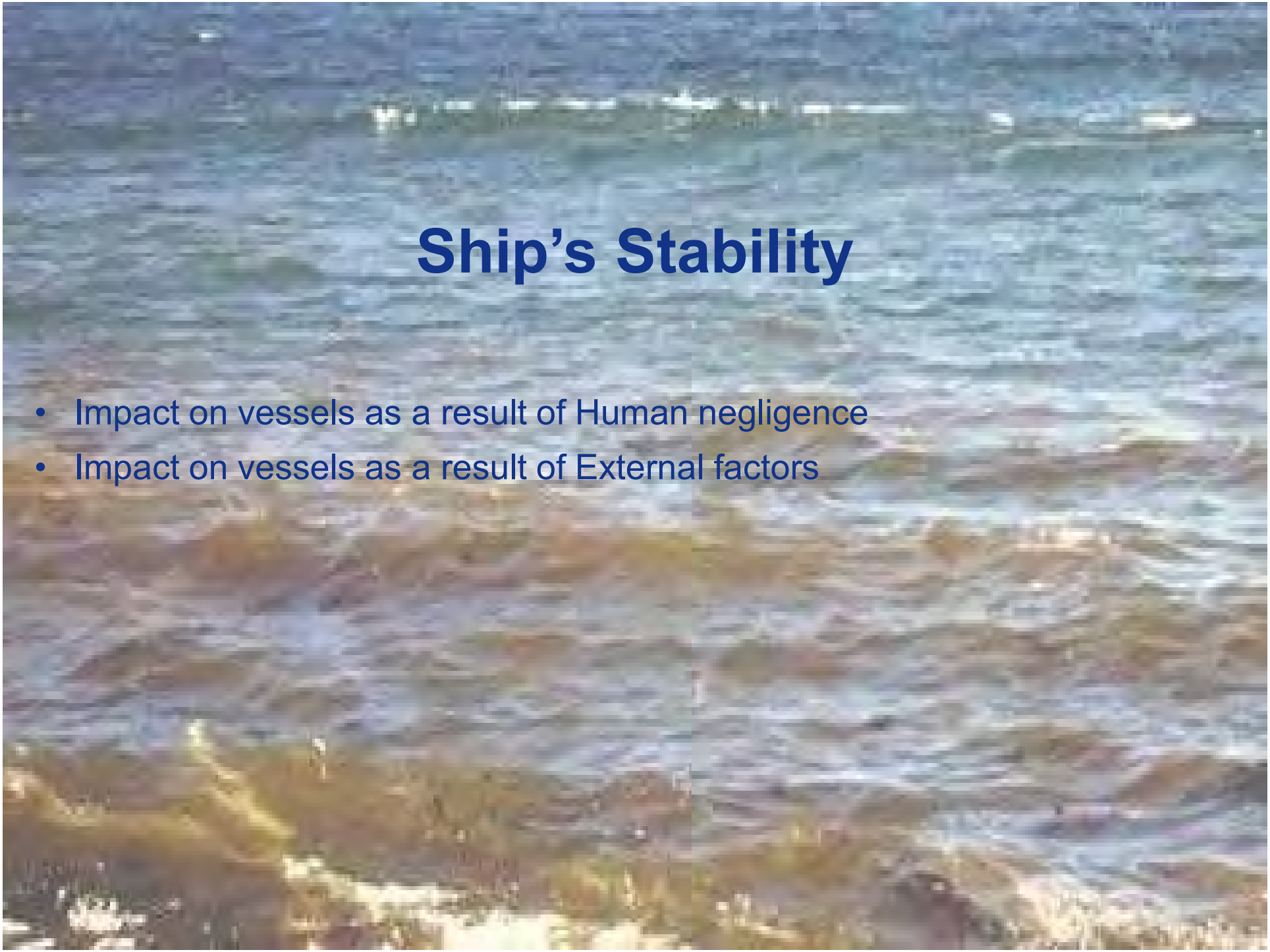
Types of Propellers

- Fixed pitch
- Mostly right-handed turning clockwise.

  Variable pitch
- Mostly right hand turning clockwise with ability to change pitch of blades.







Ship's Stability

- Impact on vessels as a result of Human negligence
- Impact on vessels as a result of External factors

Trim - Difference between Forward and Aft draft

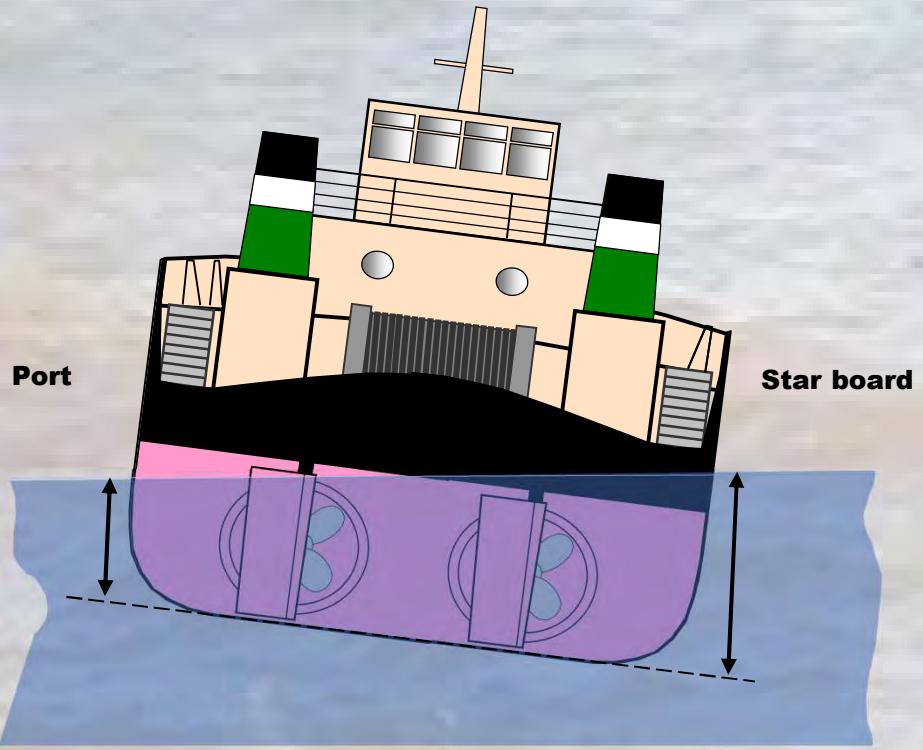
Trim By the Stern

When Aft draft is more than the forward draft

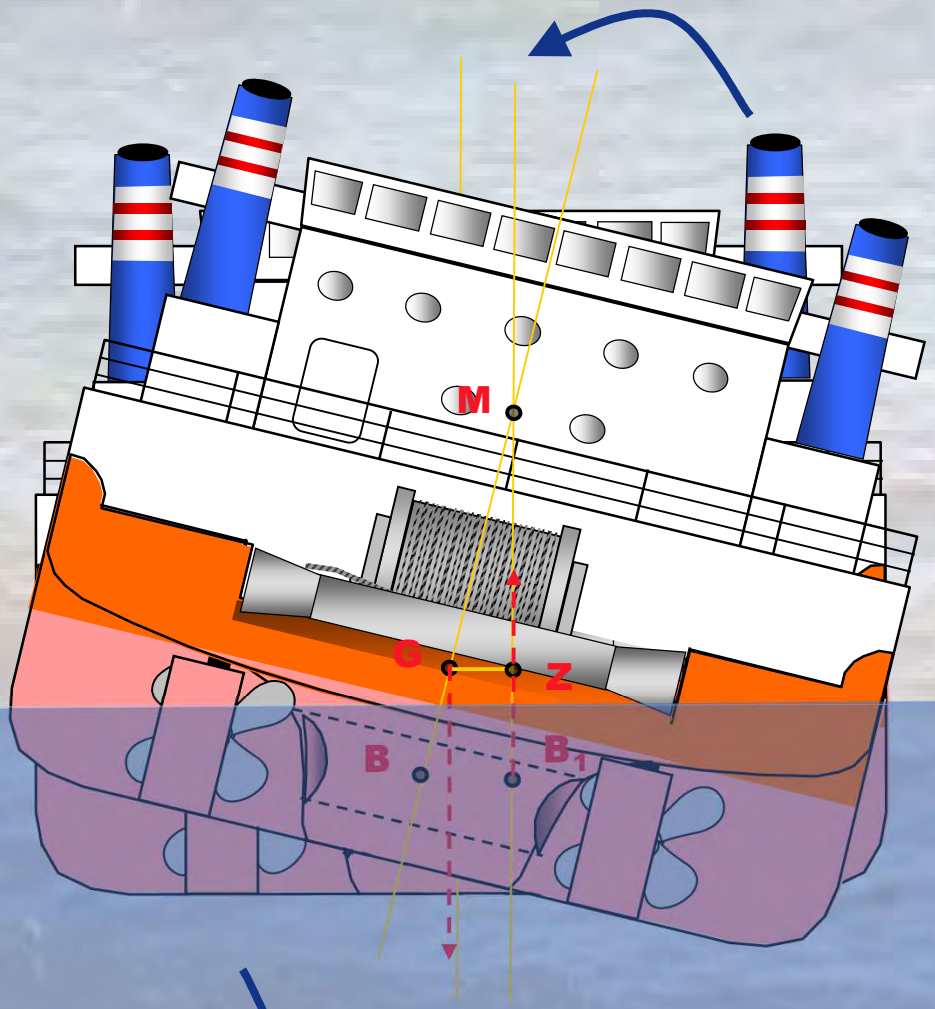
Trim - Difference between Forward and Aft draft

Trim - Difference between Forward and Aft draft

List - Difference between Port and Starboard draft



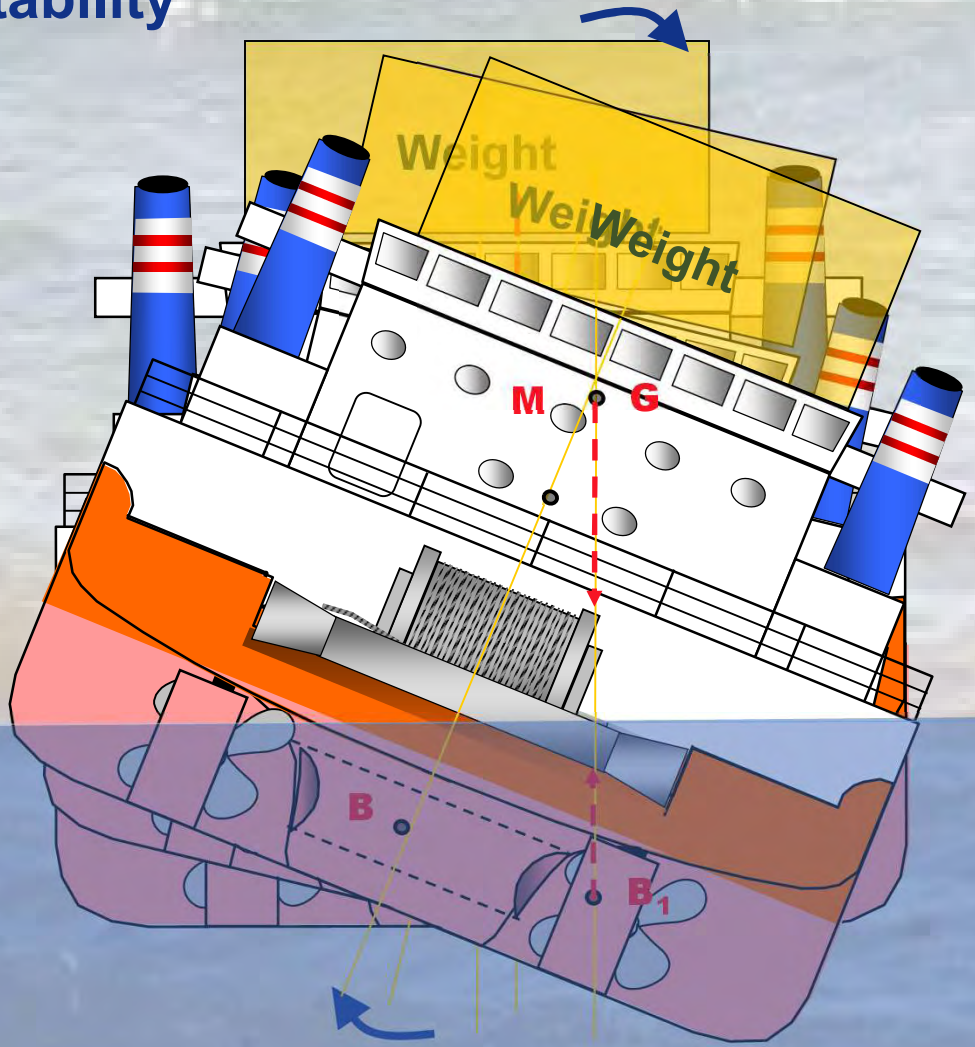
Positive Stability



Stiff **-** the metacentric height is high, such ships resist roll. If they do roll, they right quickly

Tender **-** the metacentric height is short, such ships roll slowly.

Negative Stability



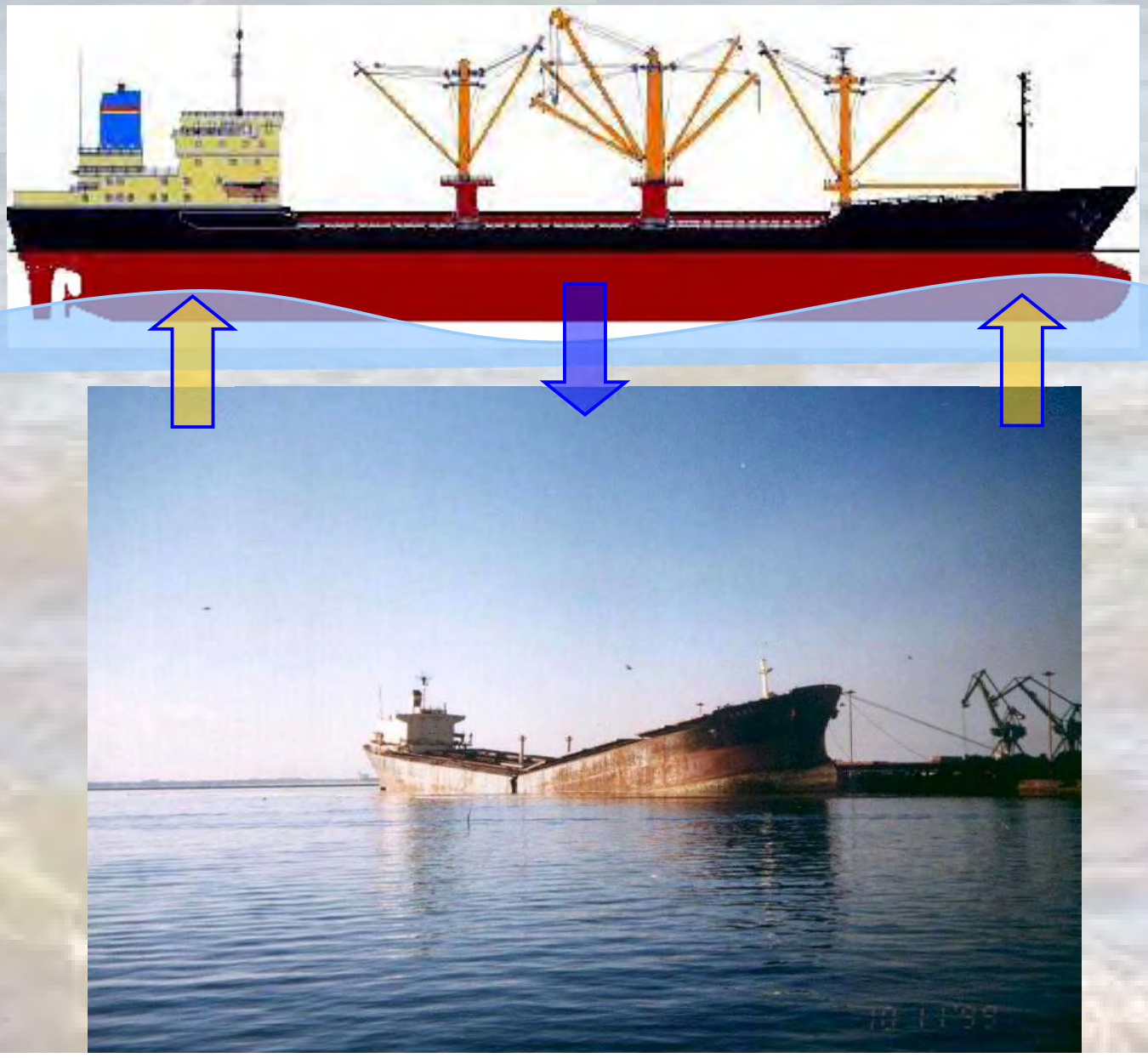
Neutral Stability
At
Angle of Loll

Negative Stability


Ship’s Movement & Stresses

Hogging

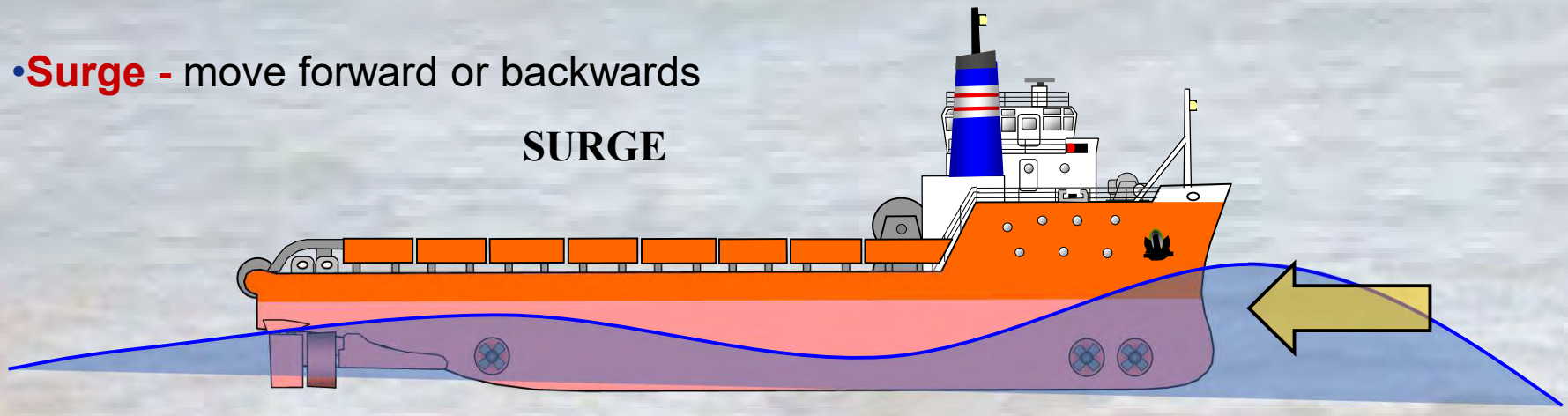
Sagging



Algoport broke into Two in rough seas
7th September 2009

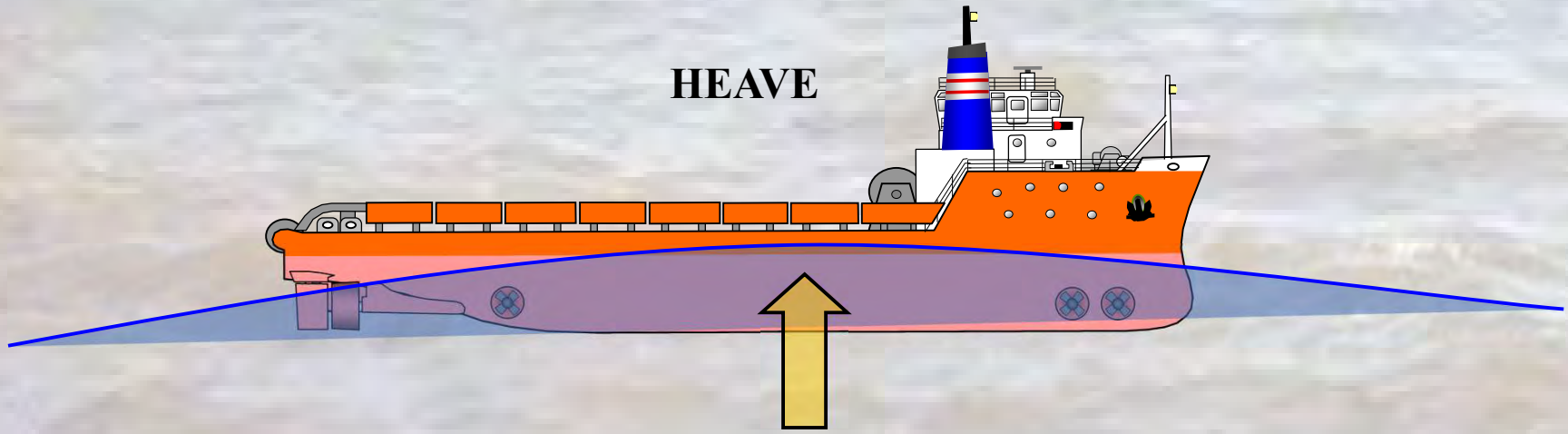
Ship's Movement

- **Surge -** move forward or backwards



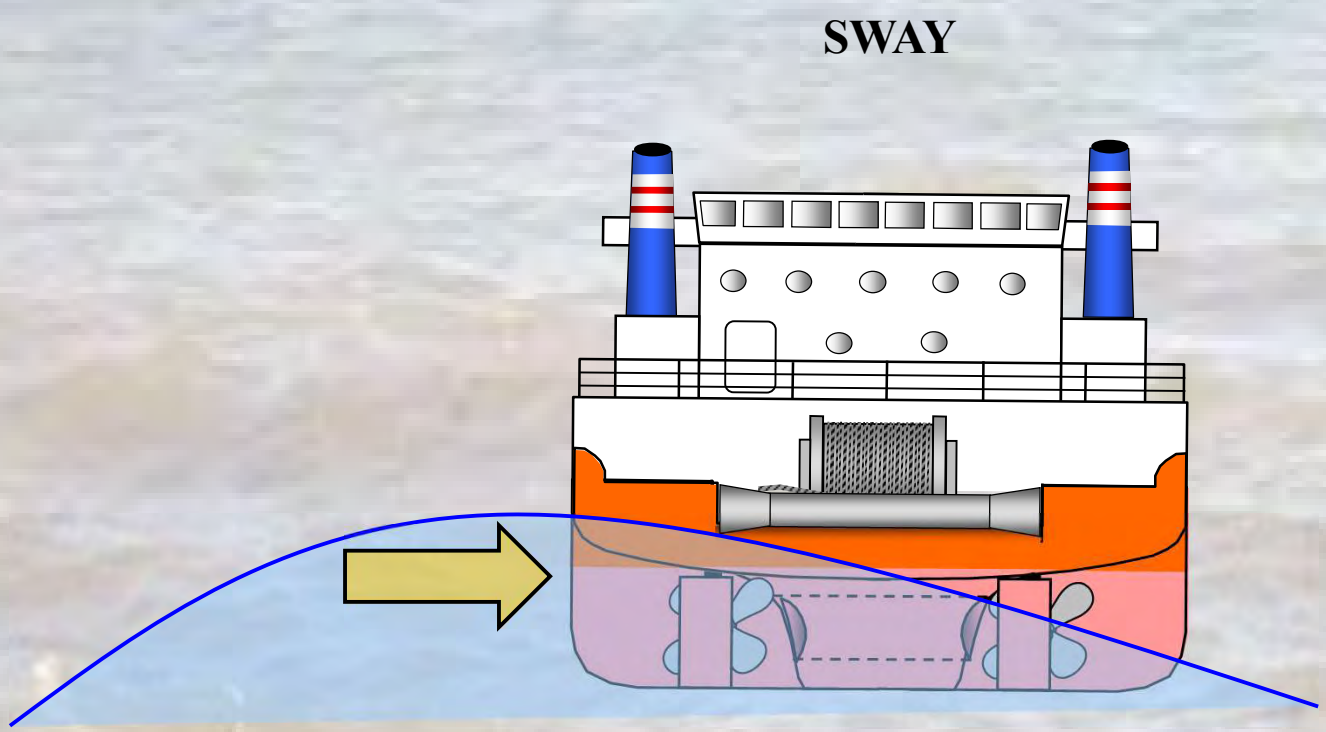
Ship's Movement

- **Heave -** move up and down in a bobbing motion



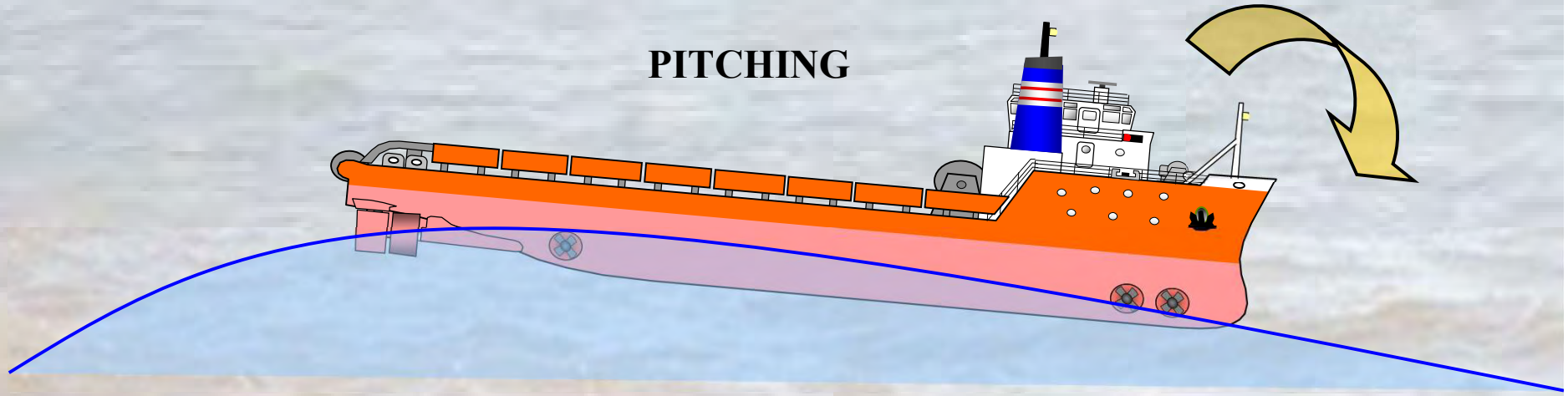
Ship's Movement

•**Sway -** a sliding motion from side to side across the surface of the water



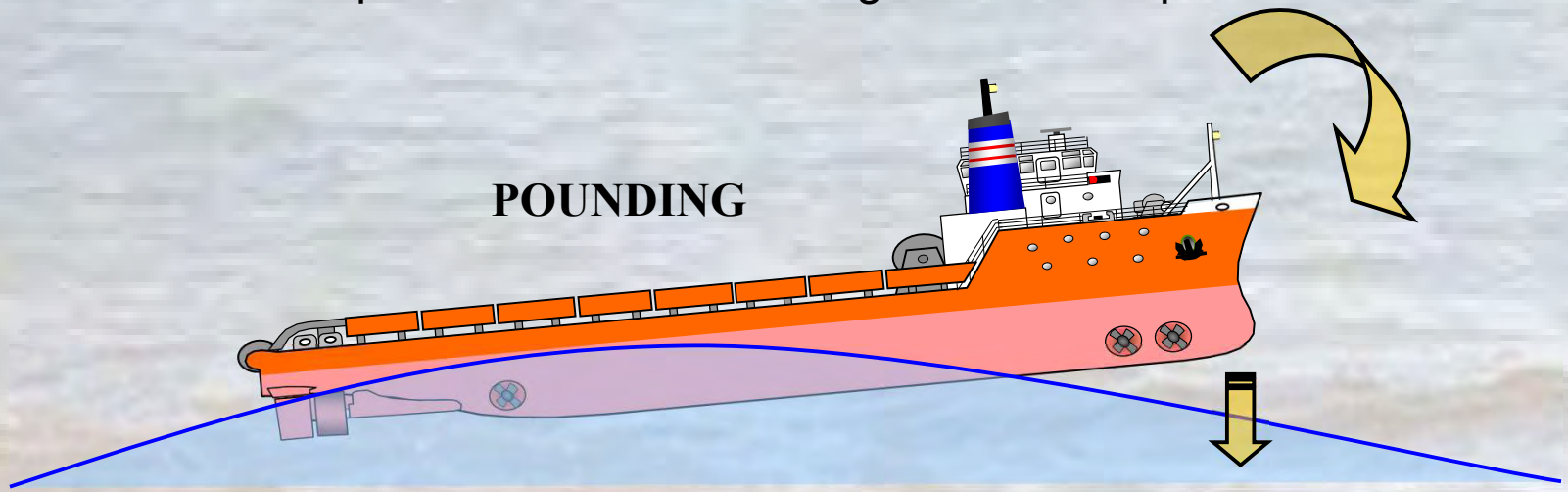
Ship's Movement

Pitch - the rocking movement where the ship rocks the bow and stern



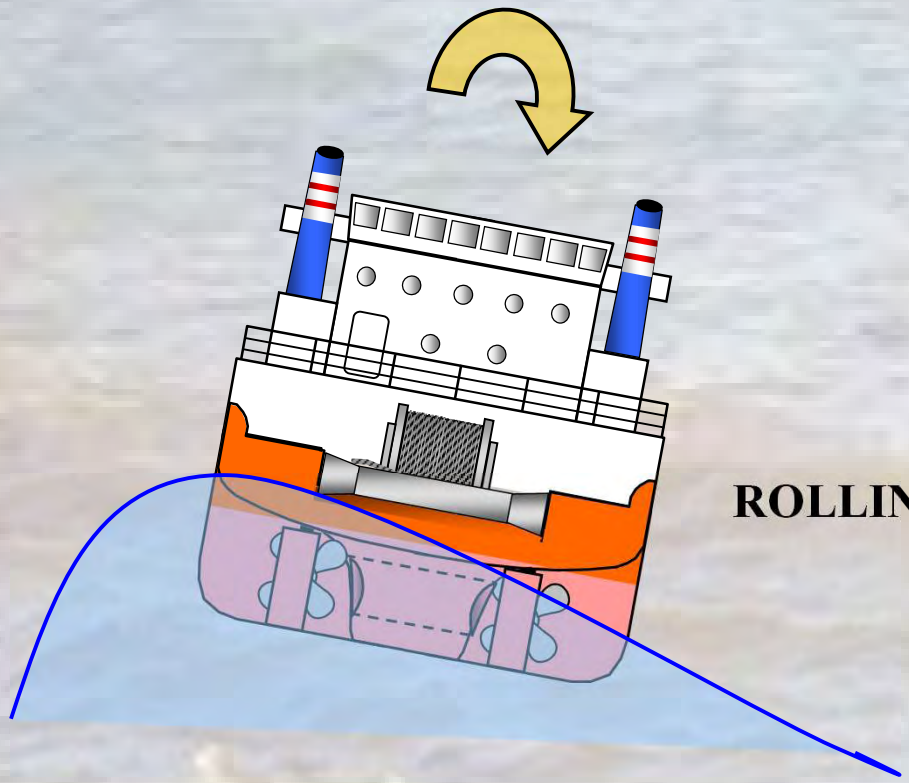
Ship's Movement

Pound – Voilent drop of bow when wave height exceed ship's draft



Ship's Movement

- **Roll -** a rotational movement from side to side

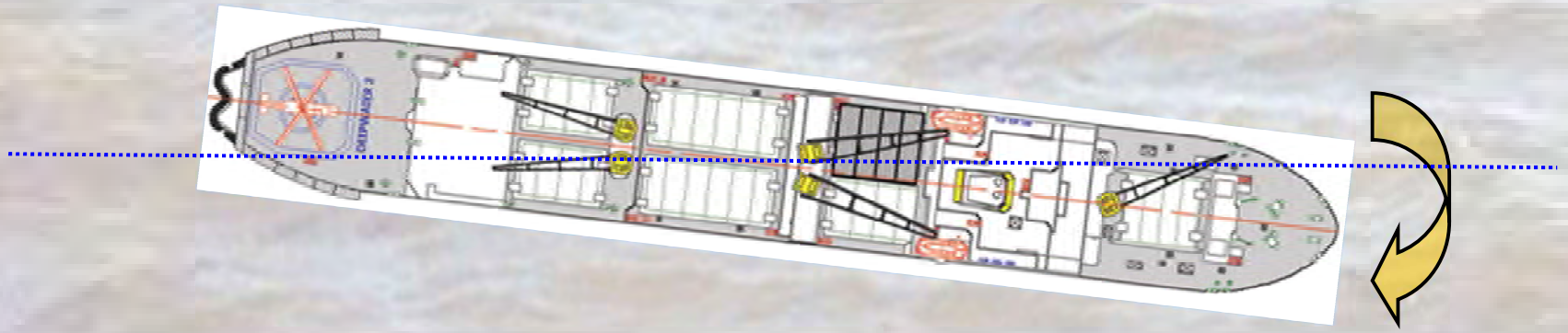


ROLLING

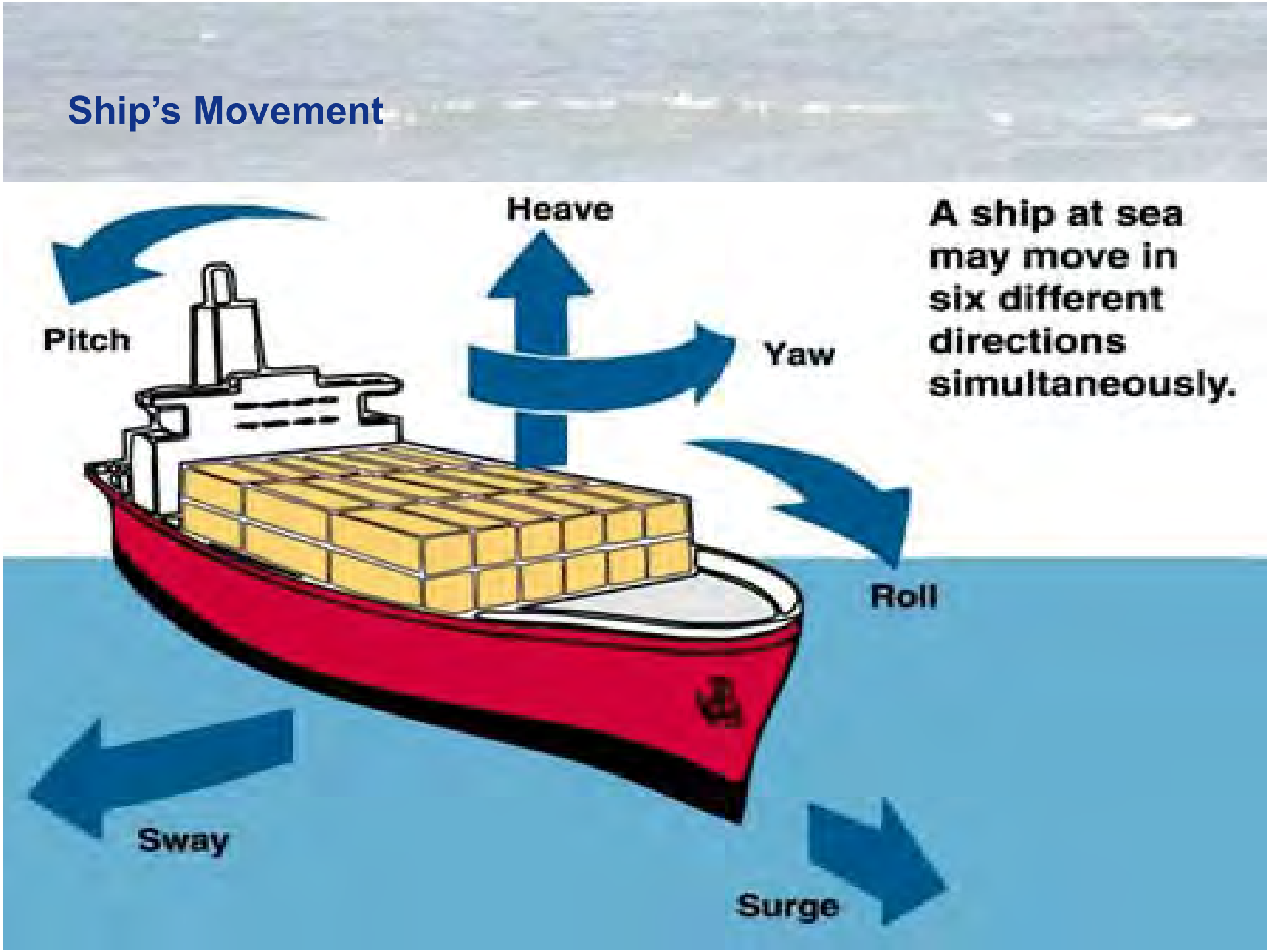
Ship's Movement

•Yaw - the rotational type movement when you can't quite keep the ship on course

YAWING



Ship's Movement



Ship's Movement – How it feels like to be at Sea

All vessels behave the same way – Either BIG or SMALL


Waters Around Canada


Canadian East Coast
Labrador
Pack Ice
December to March
Quebec
Lots of Fishing Vessels

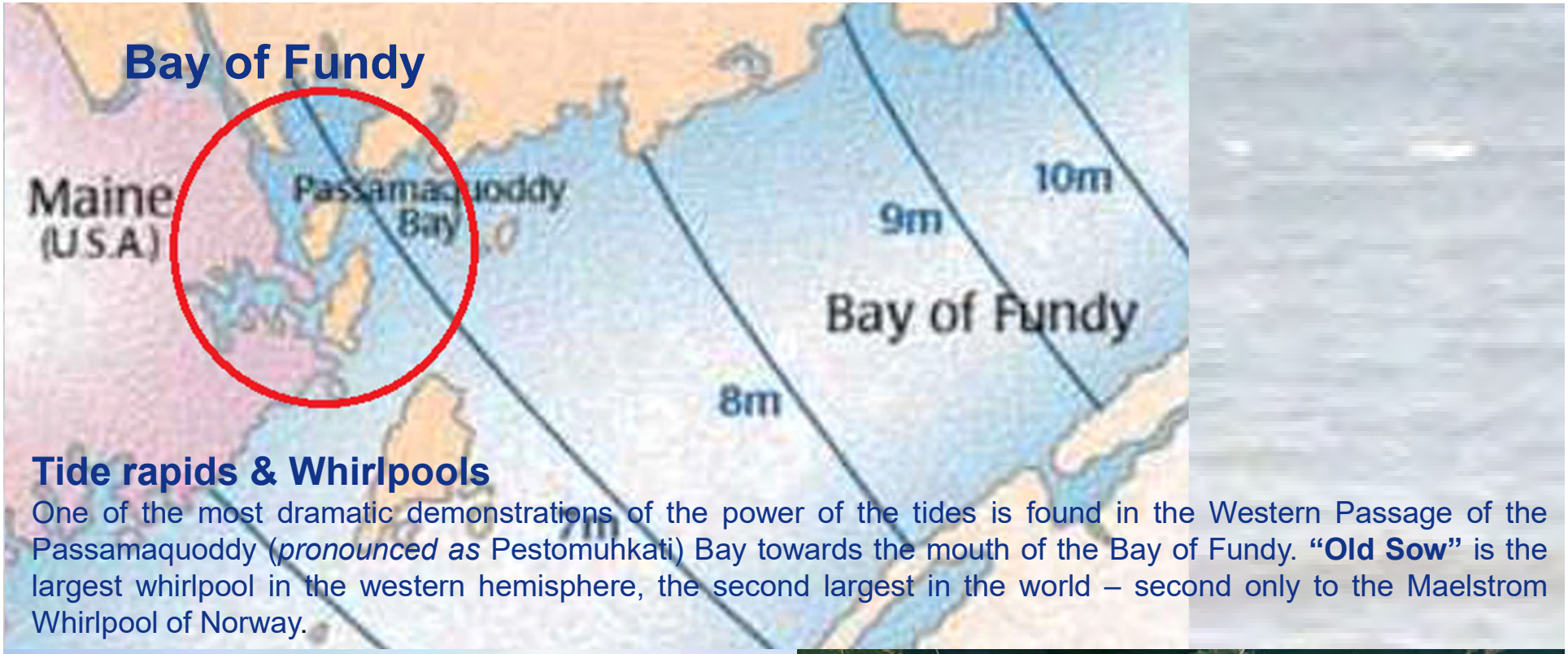
Bay of Fundy

- Highest tidal Range in the World
- At the head 16 m (53 ft) tidal Range
- 100 billion tons of water flow in and out every six hours
- Generate strong TIDAL BORE

- The extreme tidal range is the result of Resonance.
- The size of bay is just right to match the natural gravitational pushing cycle of the moon to cause the tides.

Bay of Fundy

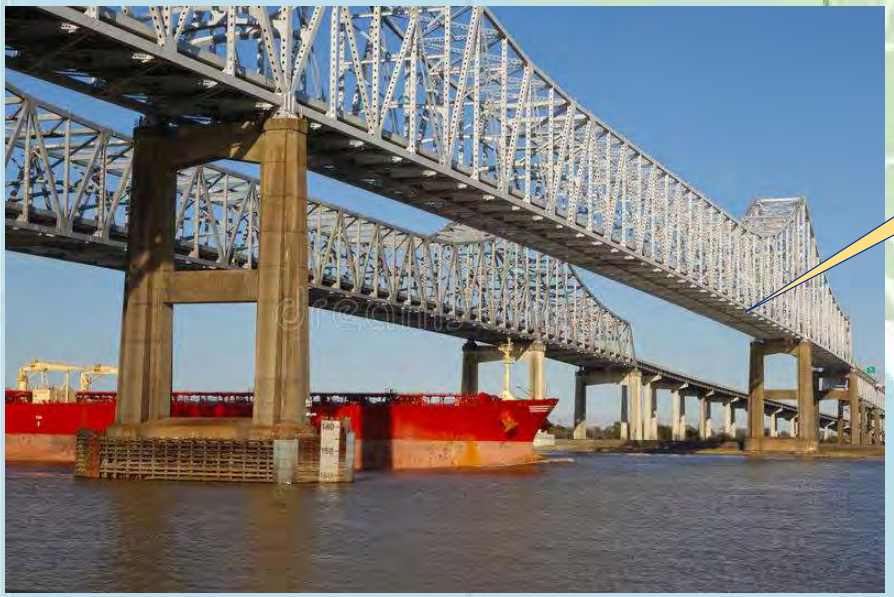
Tidal Flow during the span of SIX hours



Tide rapids & Whirlpools

One of the most dramatic demonstrations of the power of the tides is found in the Western Passage of the Passamaquoddy (*pronounced as* Pestomuhkati) Bay towards the mouth of the Bay of Fundy. **"Old Sow"** is the largest whirlpool in the western hemisphere, the second largest in the world – second only to the Maelstrom Whirlpool of Norway.

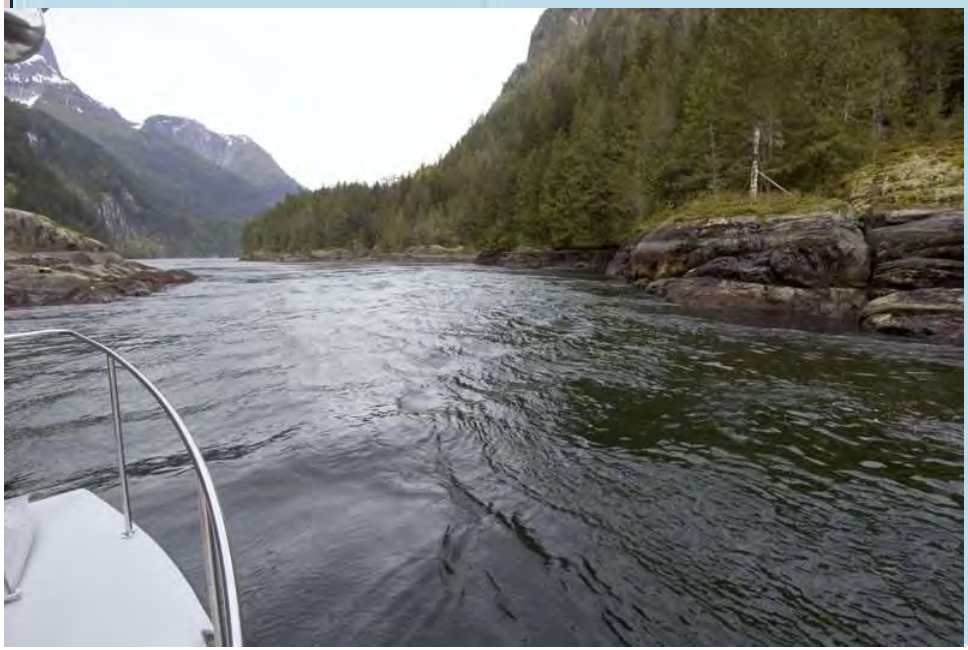
Canadian West Coast



Bridges

Strong Tidal Flow

Dead Head




Canadian West Coast
What it is like navigating through Sechelt Rapids

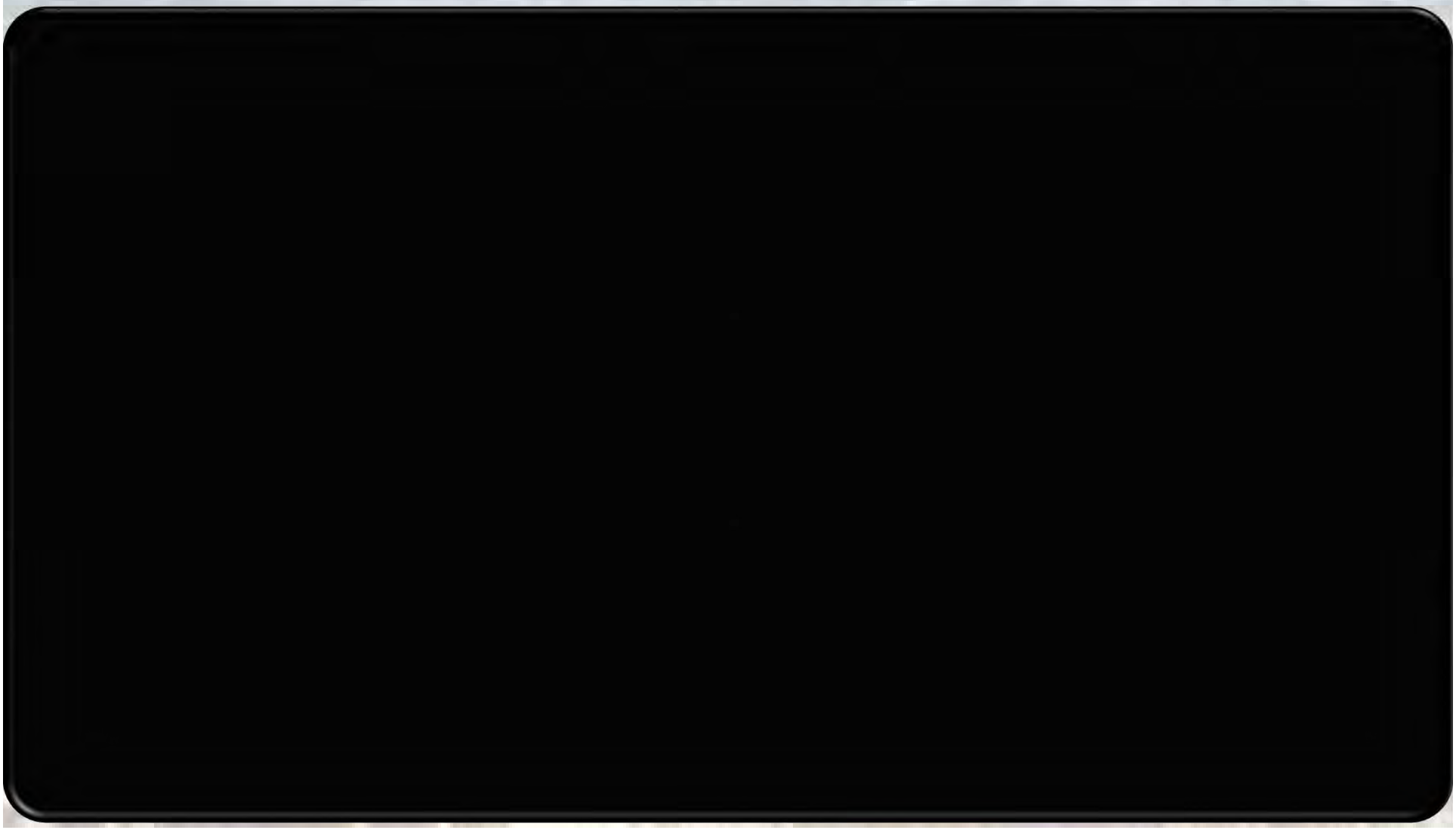
Canadian Northern Coast

Navigation
June to September

Montréal
Halifax
Sanikiluaq
Churchill
Winnipeg
Arviat
HUDSON BAY
Whale Cove
Rankin Inlet
Baker Lake
Chesterfield Inlet
Coral Harbour
Repulse Bay
Iqaluit
Becancour to Baker Lake
Edmonton
Fort McMurray
Lutsel K'e
Yellowknife
Hay River
Vancouver
From Vancouver
Whitehorse
Bathurst Inlet
Umingmaktok
Taloyoak
Gjoa Haven
Cambridge Bay
Kugluktuk
Tulita
Norman Wells
K'asho Got'ine
Paulatuk
Ulukhaktok
Aklavik
Inuvik
Sachs Harbour
Tuktoyaktuk
Herschel Island
Demarcation Bay
Kaktovik
Prudhoe Bay
Beechey Point
Colville River
Barrow
From Vancouver

Canadian Northern Coast

Canadian Northern Coast
How the communities up North get Supplies

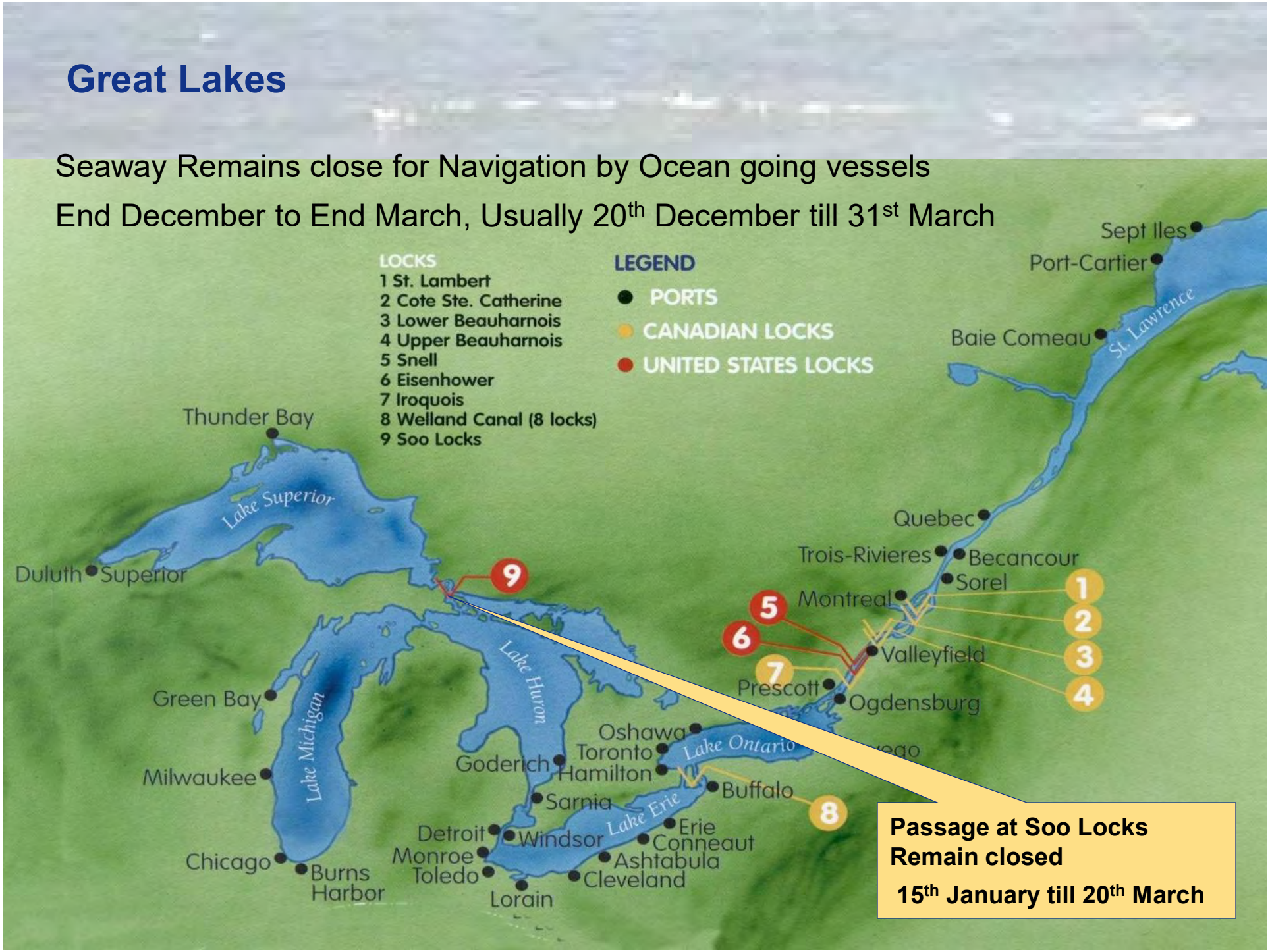



St. Lawrence Seaway

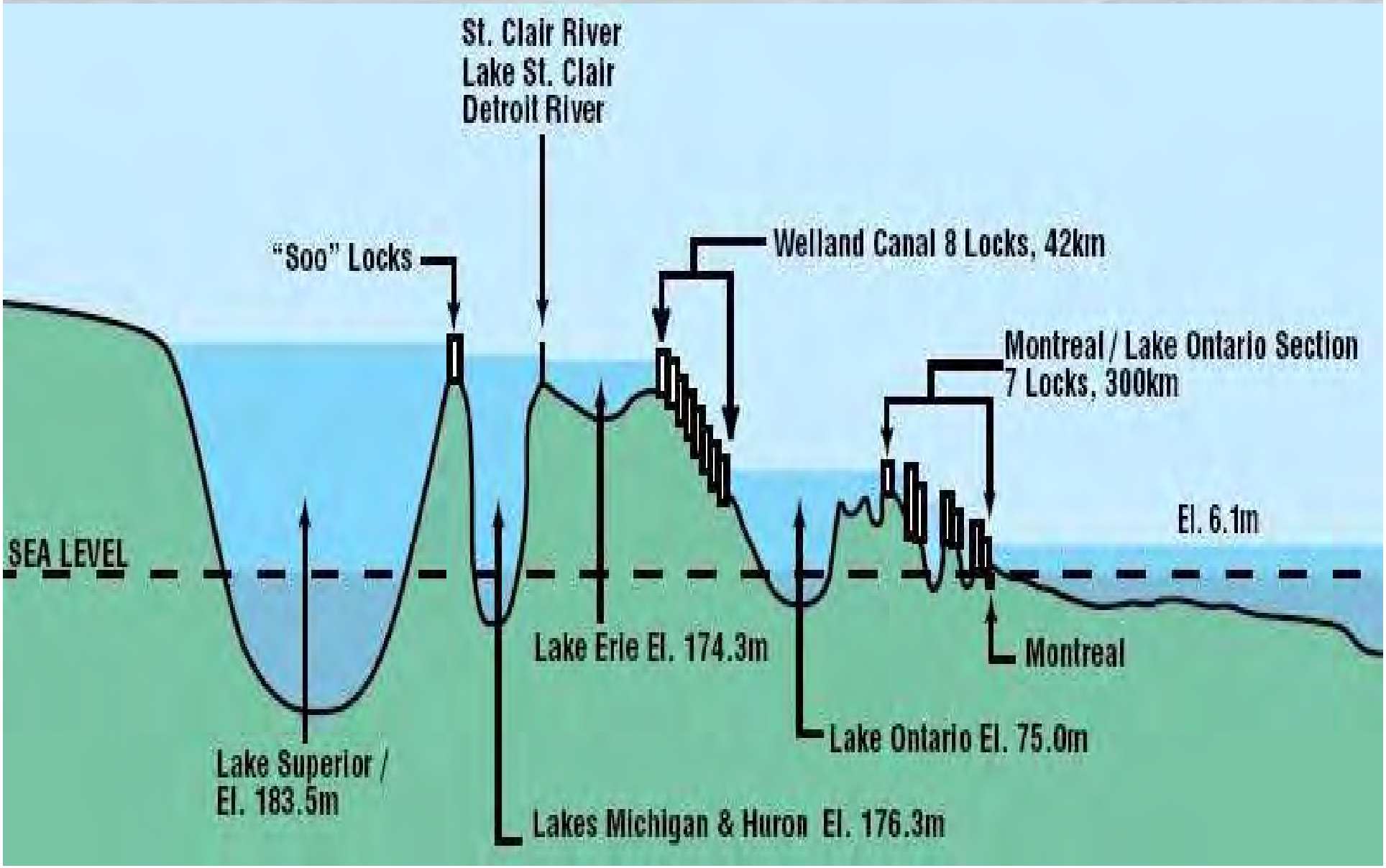
Great Lakes

Seaway Remains close for Navigation by Ocean going vessels

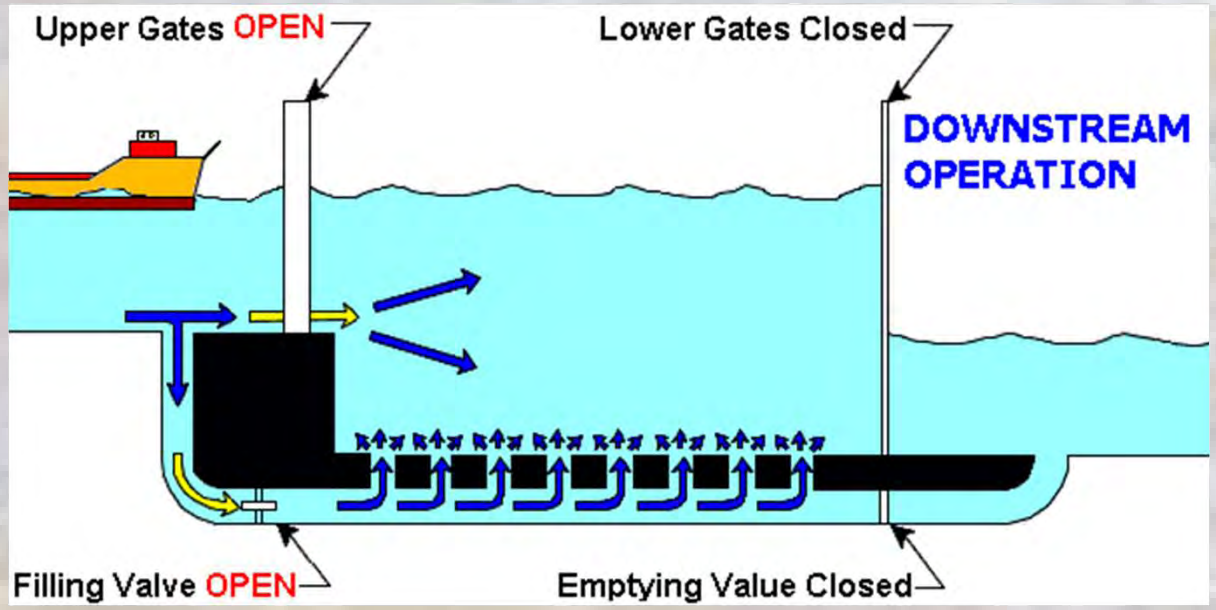
End December to End March, Usually 20th December till 31st March



Seaway Lock System



Operation of Locks



Seaway Lock System
It is how it feels to be on the bridge of vessel transiting Locks

Relationship between Seaway Lock & Lake Boat Dimensions

LOCK Dimensions

St. Lawrence & Welland Canal

Length: 766 feet (233.5 m)

Width: 78 feet (23.8 m)

Depth: 26 feet (7.9 m)

Soo Lock

Length: 1,200 feet (357 m)

Width: 110 feet (33.5 m)

Depth: 32 feet (9.8 m)

SHIP Dimensions

Lower Great Lakes

Length: 730 feet (222.5 m)

Width: 75 feet (22.8 m)

Depth: 48 feet (14.6 m)

DWT: Around 40,000 Tons

Upper Great Lakes

Length: 1,000 feet (305 m)

Width: 105 feet (32 m)

Depth: 56 feet (17 m)

DWT: Around 70,000 Tons


Great Lake Vessels

Lakers

Interesting Facts about Lakers

Lake boat

- There are about 140 active lakers in service. (58 US 80 Canadian)
- There are only 12 vessels between 1000 and 1013.5 feet long all built between 1972 and 1981. All are in service.
- 1000-footer can remain only in upper lakes in Lake Huron, Lake Michigan and Lake Superior. All belongs to US owners.

1,000 footer

Salties

Lakers
Interesting Facts

- The largest vessel on the lakes “Paul R. Tregurtha”
- LOA: 1013.5 ft, Breadth: 105 ft, Depth: 56 ft

Lakers
Interesting Facts

Stewart J. Cort is the first 1000 footer built in 1972 and the only one with traditional wheelhouse forward Great lake style.

Lakers
Interesting Facts

- The oldest Laker until 2013.
- St. Mary's Challenger – was Built in 1906

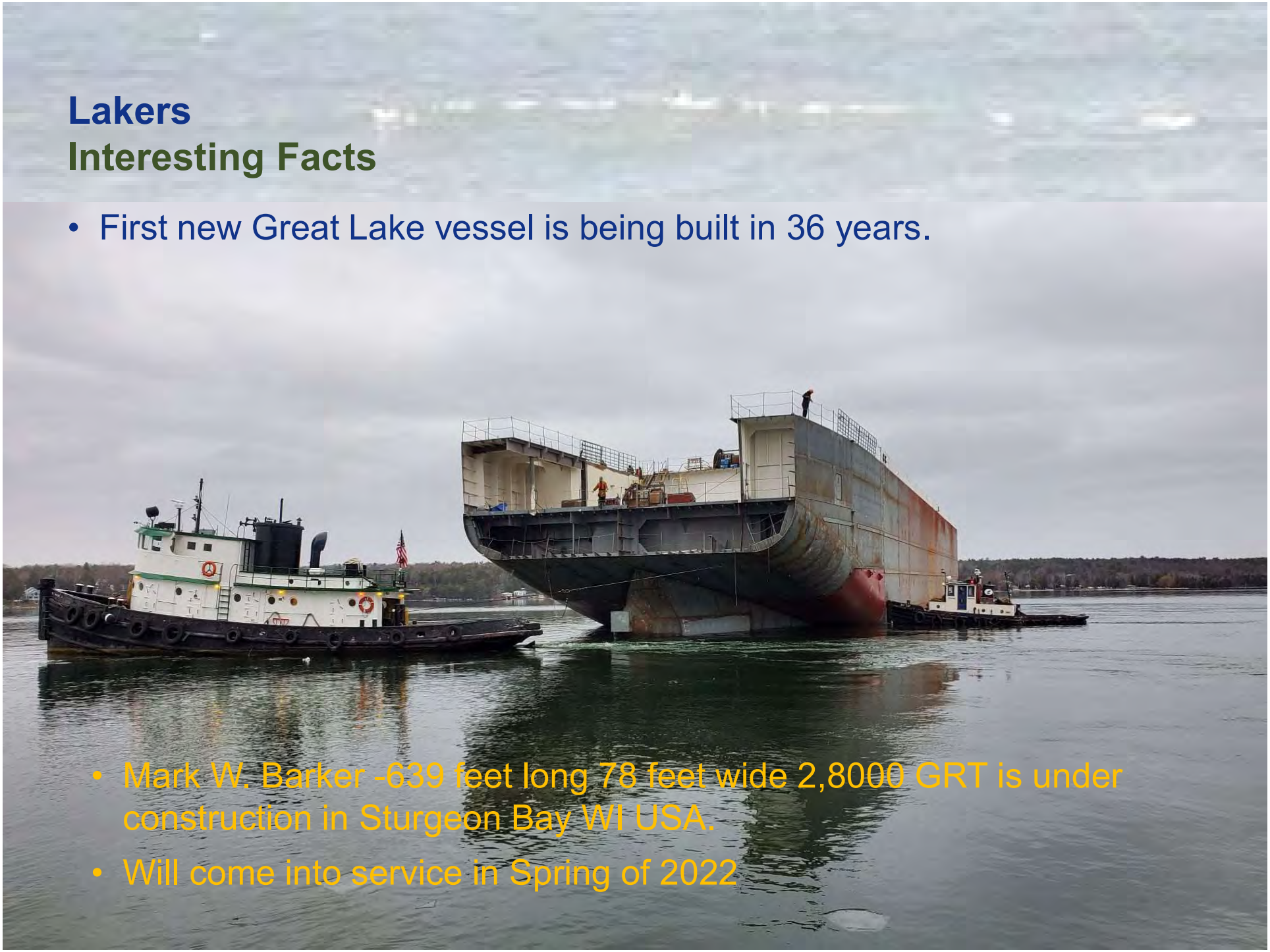
- Steamer "Alpena" now holds the title of being the oldest vessel – Built in 1942

Lakers
Interesting Facts

Captain Henry Jackman is the newest vessel in great lakes – Came into service in June 2021.

Lakers
Interesting Facts

- First new Great Lake vessel is being built in 36 years.



- Mark W. Barker -639 feet long 78 feet wide 2,8000 GRT is under construction in Sturgeon Bay WI USA.
- Will come into service in Spring of 2022

Lakers
Interesting Facts

- Presque Isle is the only integrated tug and barge combination plying in Upper Lakes.
- It is the largest tug/barge composite in the world. Built in 1973 LOA 1,000 feet

Lakers
Interesting Facts

Latest vessel built in great lake Samuel De Champlain/ Innovation tug barge combination built in 2006

Lakers
Interesting Facts

Most powerful lake boat Edwin H. Gott with 19,500 BHP twin engine with twin propeller.

Difference between Lakers & Oceangoing Vessels

Lakers
Difference between Lake boat and Salties

Lakers

Difference between Lake boat and Salties

Bluff Bow

Racked Bow

Many Hatches 24ft apart

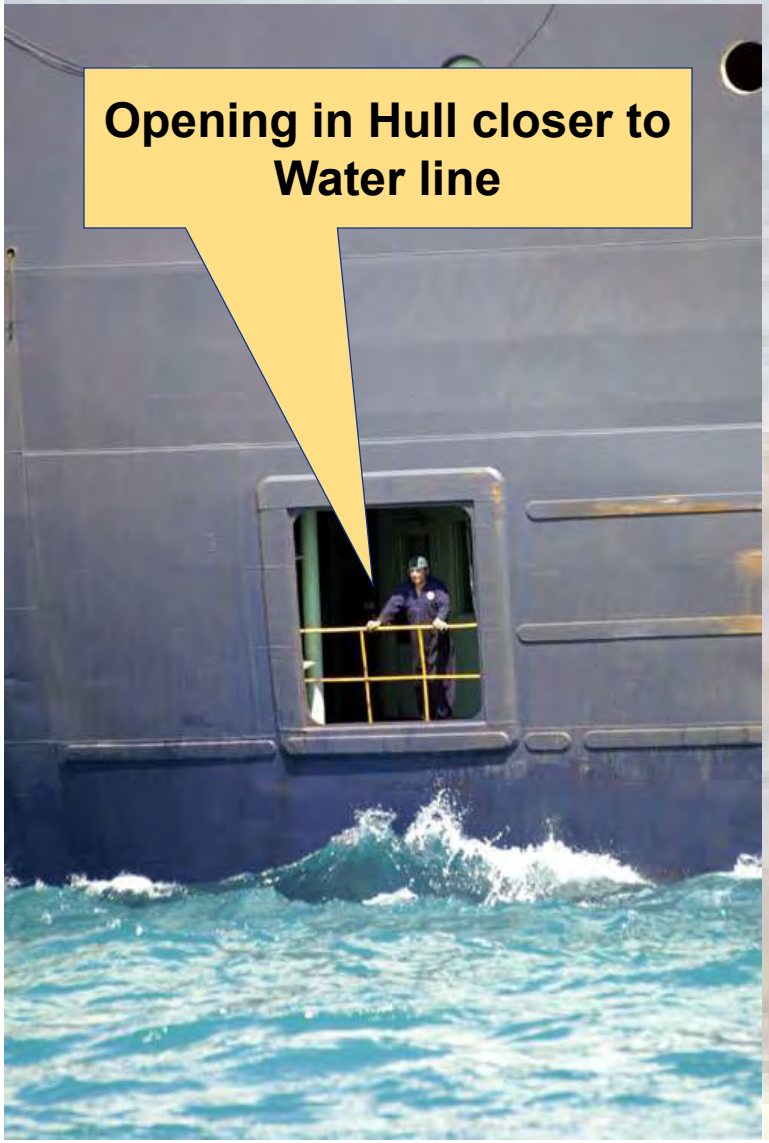
Fewer Hatches

L:B Ratio 10:1

L:B Ratio 7:1

Lakers

Difference between Lake boat and Salties



Lakers

Difference between Lake boat and Salties

Hogging is a term used when a vessel is bent up in the middle due to any number of factors. On the Great Lakes this happens to vessels in hot weather where the upper part is heated more than the submerged part. That's why you see boats with sprinkler systems spraying cool water over the decks to reduce this hogging. It can also happen with the uneven distribution of the cargo during loading or discharge (sometimes to catastrophic results) where the major portion of the cargo is at the ends of the boat i.e., forward or after holds".

Deck Sprinklers in action

Lakers

Difference between Lake boat and Salties

Self Unloading Gear

Shipping Hazards in Great Lakes

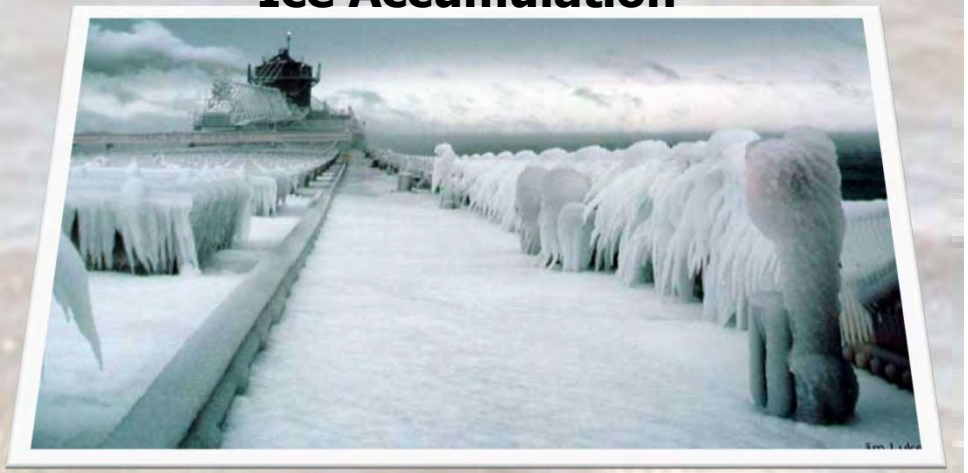
Shipping Hazards in Great Lakes

Sea Smoke

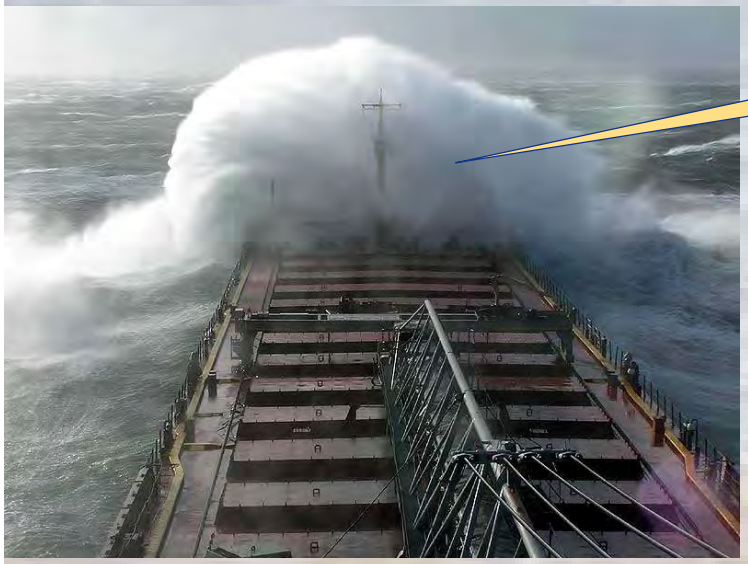
Fog

Pack Ice

Ice Accumulation



Shipping Hazards



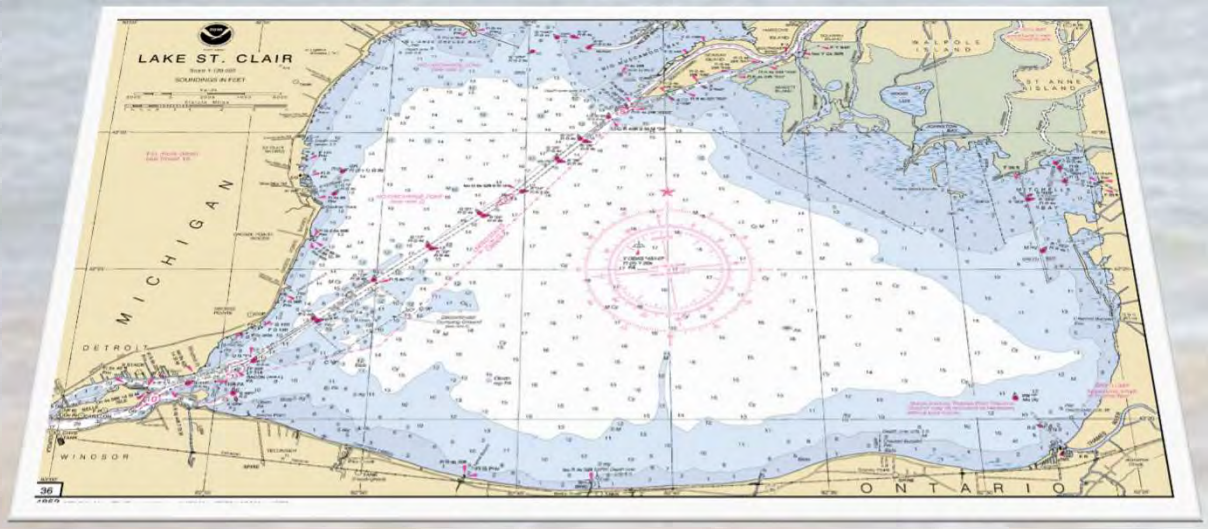
Rough Seas

Contact

Grounding

Tidal Stream

Shipping Hazards



Lake St. Clair is the shallowest lake within Great Lakes.

Buoyed channel within the lake is maintained by Dredgers.

3 metres water level difference between Lake Michigan & Lake Erie

Grounding

Strong Currents

Shipping Hazards

Contact with Locks / jetties

Stranding in Frozen Lake

Shipping Hazards in Great Lakes
Rough weather on Lake Superior

Hogging & Sagging effect on large 1000 feet lakes in Lake Superior

SS Edmund Fitzgerald sank 10th November 1975 in Lake Superior in stormy weather. It is believed that the large waves caused the ship to hog and sag thus breaking into two.

Shipping Hazards

November

November , the worst month for shipping in Great Lakes.

One third of all vessels lost between 1900-1950 in November

One half of all stranding in November.

Fishing & Fishing Vessels

Fishing

- ACTIVE FISHING
  - Trawling
  - Trolling
  - Seining
  - Dragging
  - Suction Dredging
- PASSIVE FISHING
  - Gill Nets
  - Bottom Pots
  - Traps Nets
  - Longline

Active Fishing
Beam Trawling

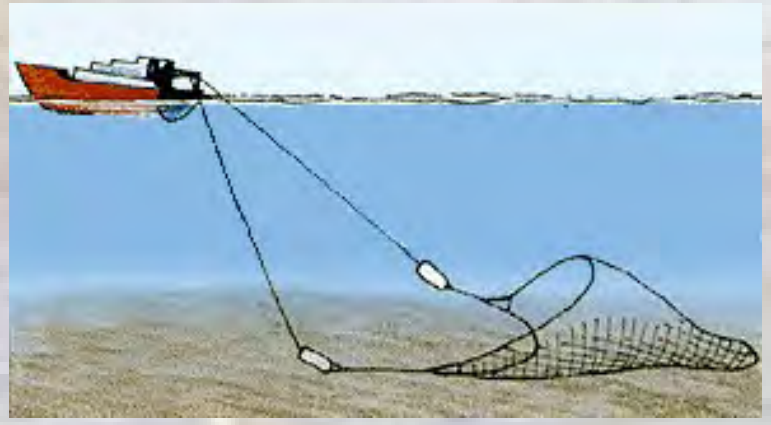
Nets with long 12m steel beam to keep mouth of the net open and dragged at the bottom. The net may weigh as much as 10 tons

Active Fishsing
Pelagic Trawling

Nets dragged at mid level or below surface of water

Active Fishing
Bottom Trawling

Nets dragged closer to bottom few meters above the sea bed

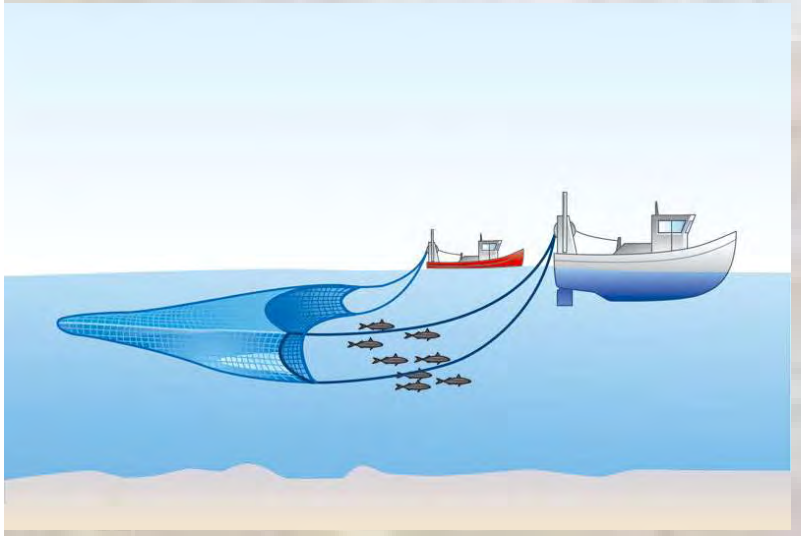


Active Fishing
Line Trawling

A long line with many hooks attached supported by floats is towed at varying depth. Hooks are usually baited.

Active Fishing
Pair Trawling

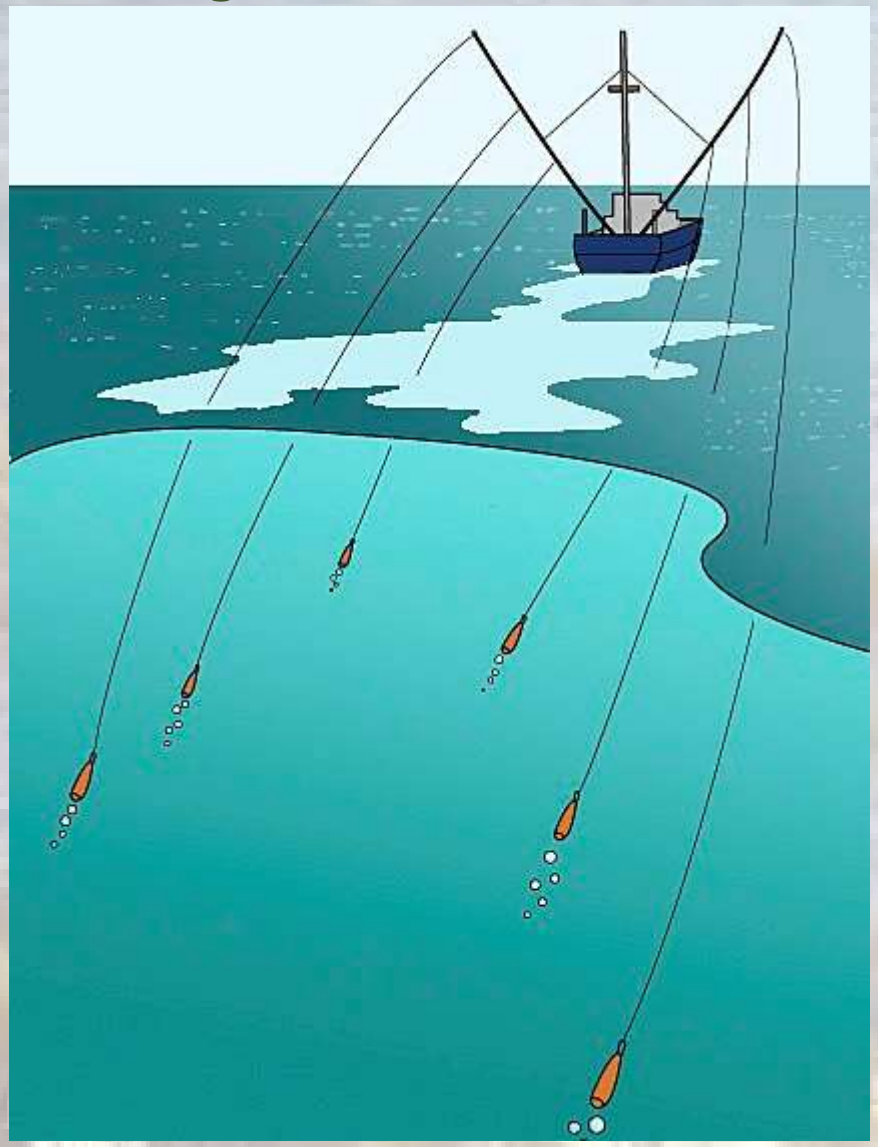
Long heavy Nets are towed by two trawlers working in tandem. Each end of the net is tied on each trawler



Active Fishing
Stern Trawling

Heavy and long nets are usually towed from stern of the big trawlers usually factory ships. The nets may be as long as a mile sweeping at varying depth

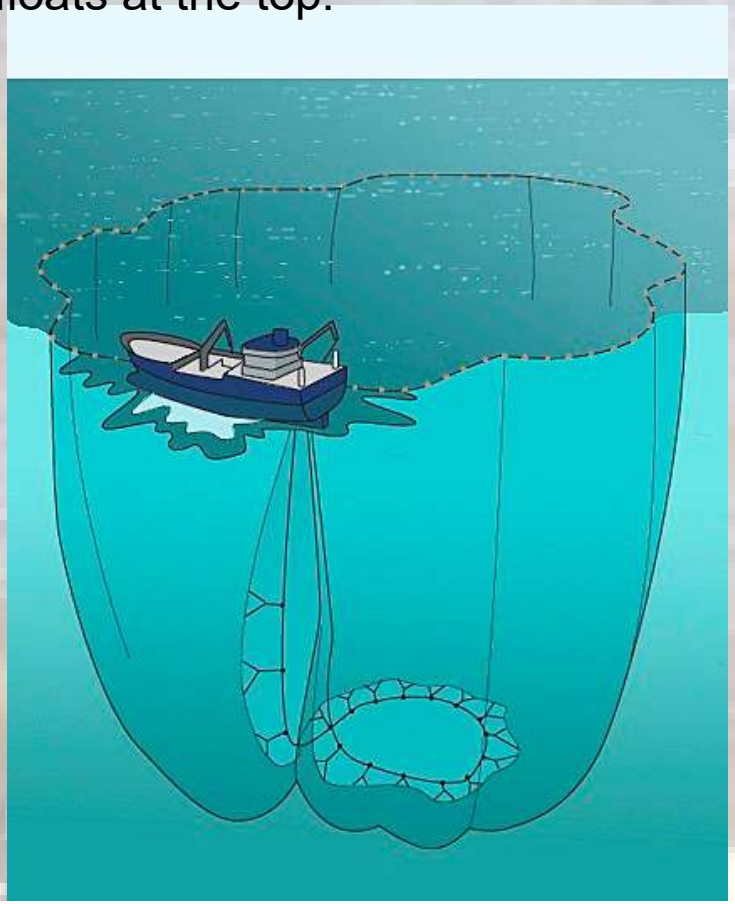
Active Fishing
Trolling



Catching fish by trailing lines with hooks and bait from a moving boat.

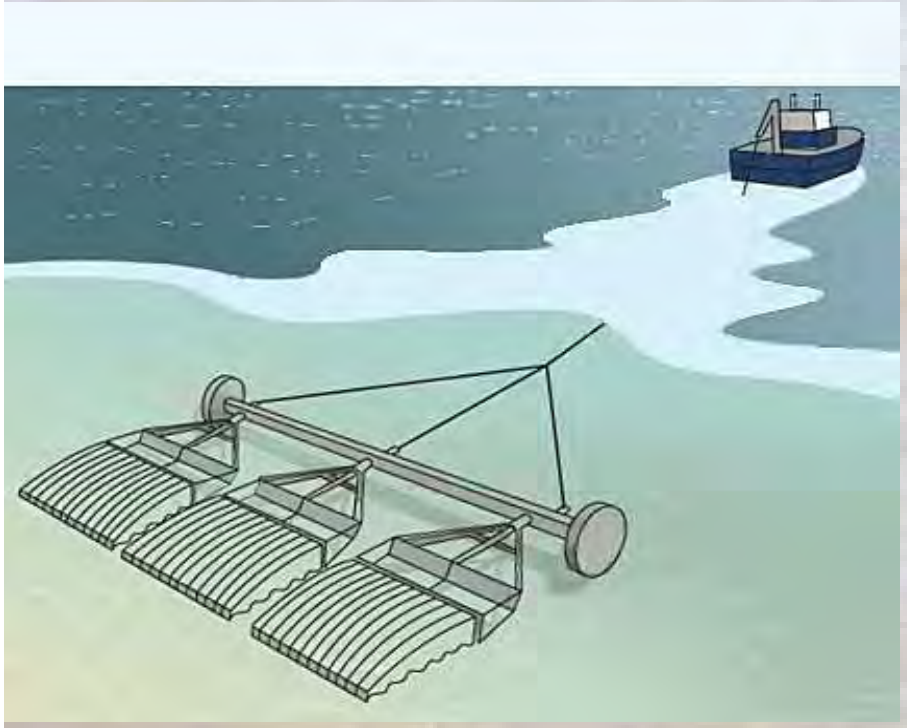
Active Fishing
Seining

A large fishing net made to hang vertically in the water by weights at the lower edge and floats at the top.

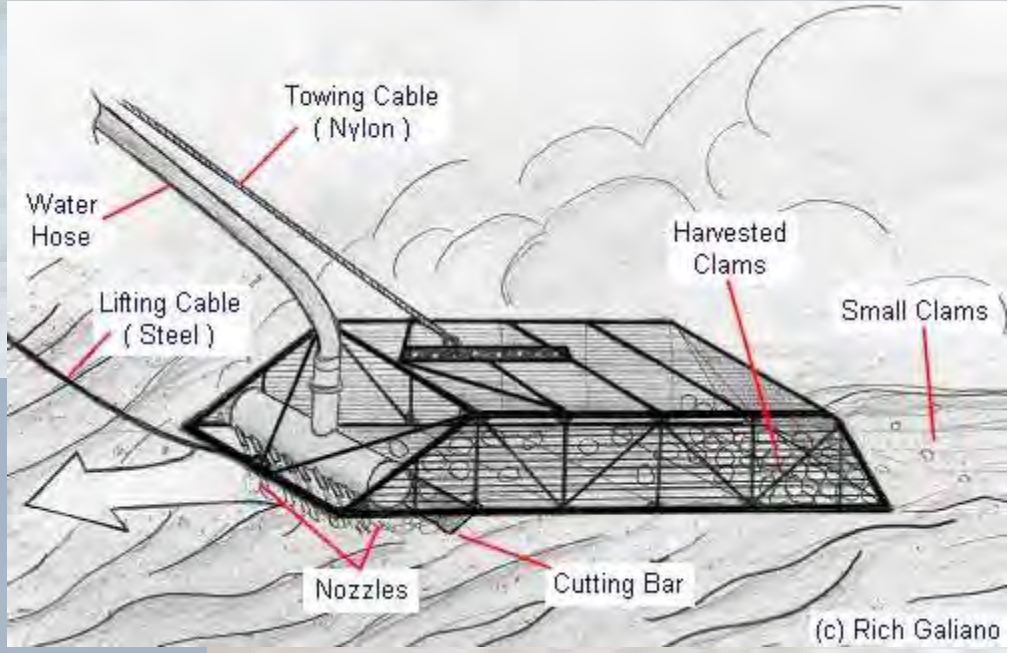


Active Fishing
Dragging

Dragging nets at the bottom to scoop up oysters and clams



Active Fishing
Suction dredging



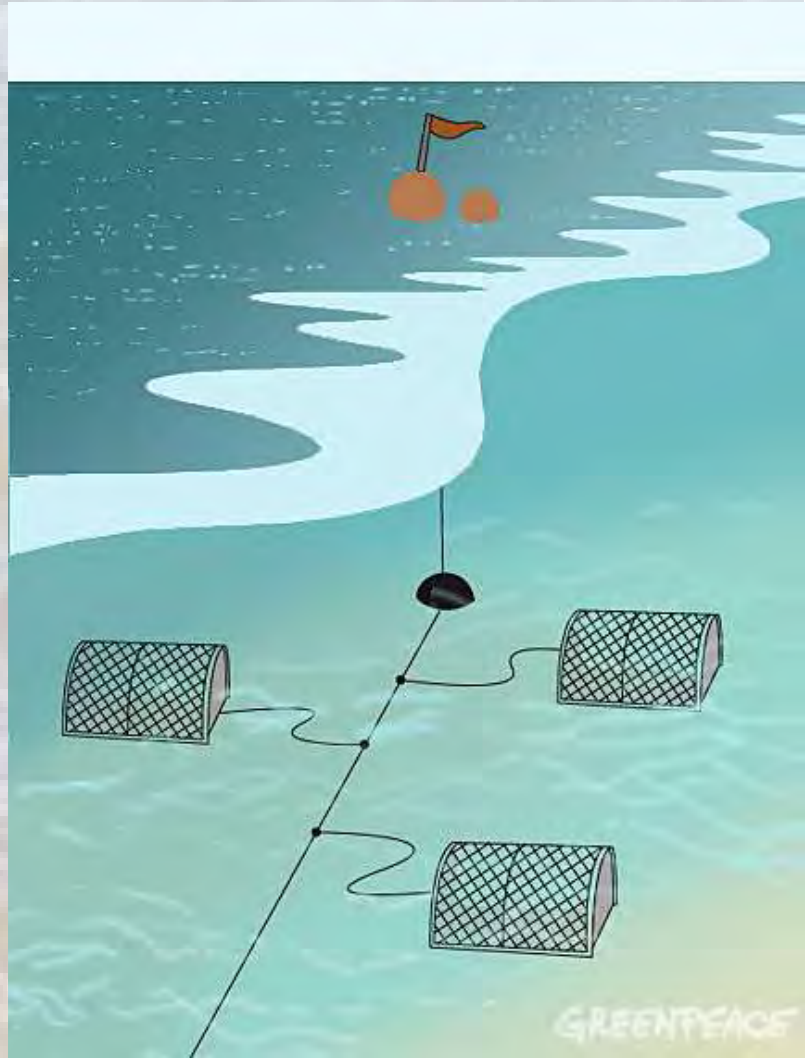
To catch Oysters / Clams from seabed using suction machines

Passive Fishing
Gill nets

A flat fishnet suspended vertically in the water to entangle fish by their gills.

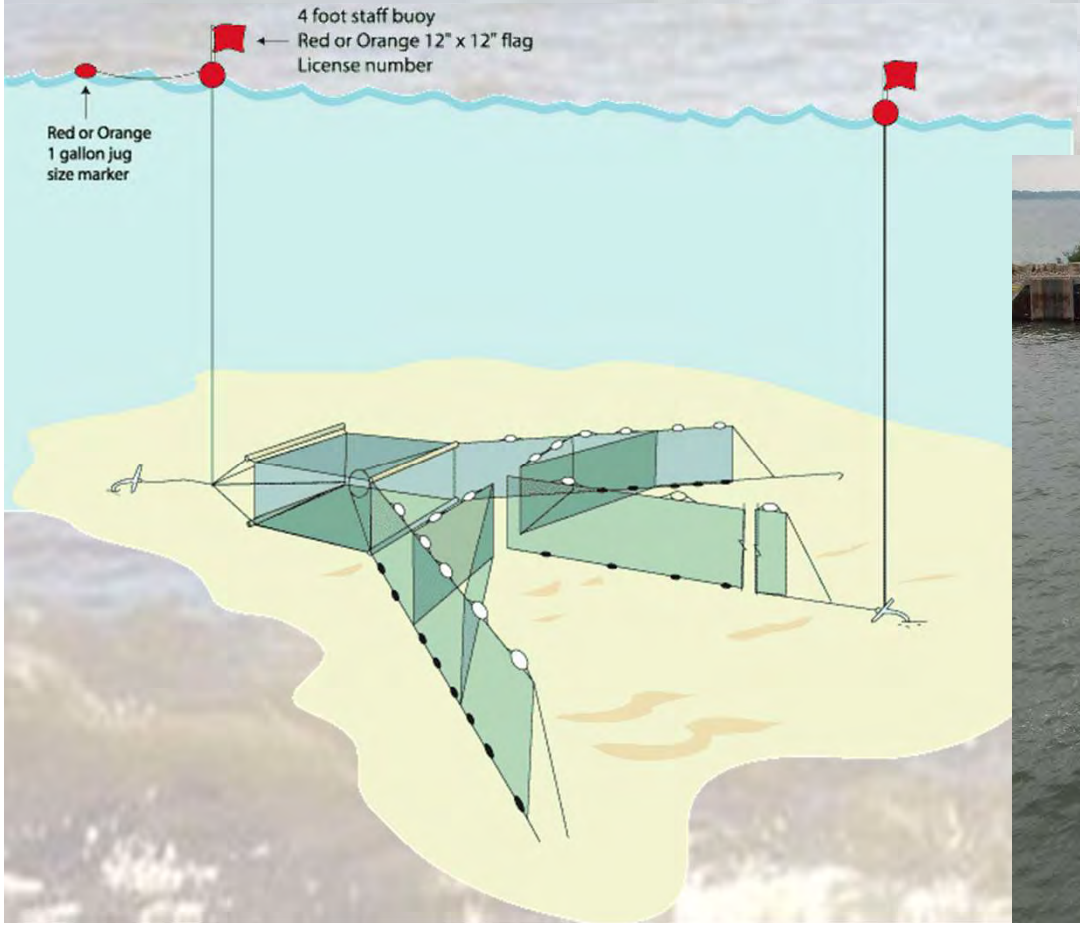
Passive Fishing
Bottom Pots

Cages and baskets laid on seabed with or without bait to lore fish

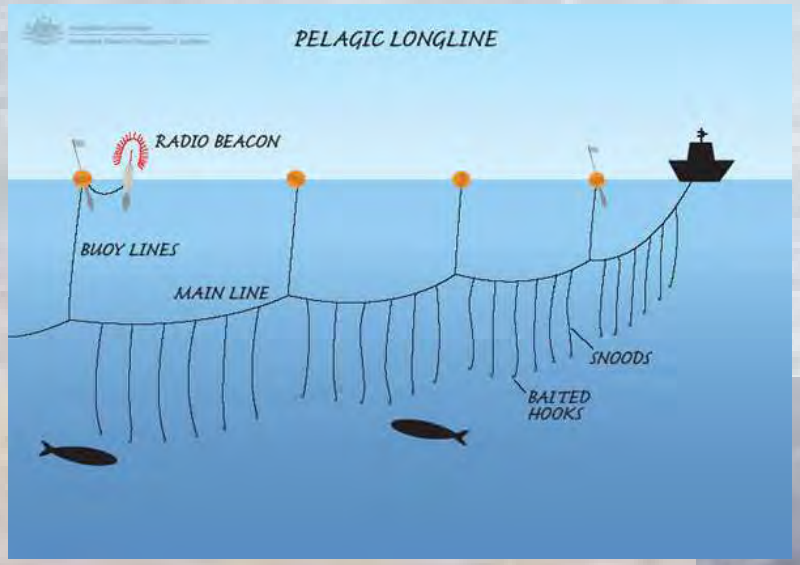


Passive Fishing
Trap Nets

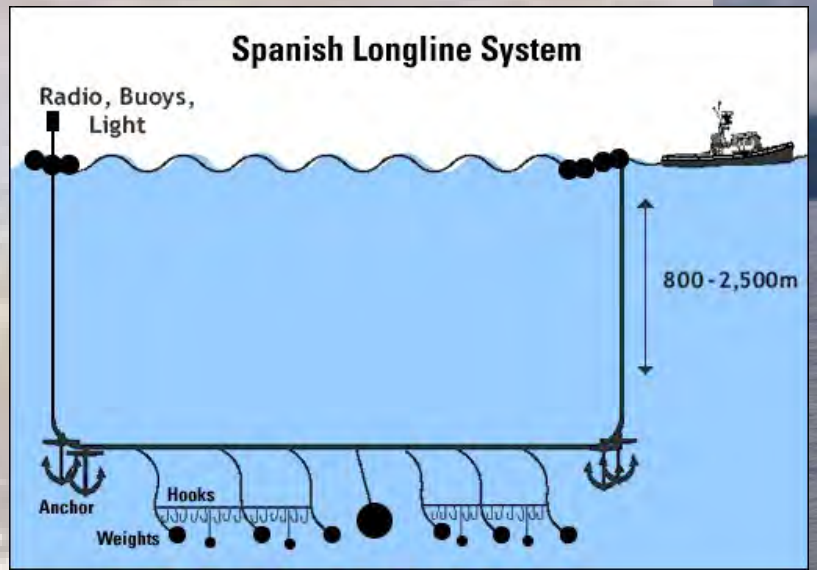
Trap nets have long leads and sections of nets arranged at the bottom. The net system can be as long as over 1000 feet and the net can be as high as 45 feet.



Passive Fishing
Longline



Similar to line trawling, a long line is laid either close to bottom supported by weights and floats. Attached to the line are baited hooks.



Great Lake Fish Tug


Tugs Barges and Towing

Tugs

Harbour Tugs

Tugs

Offshore Supply Tug

Tugs

Deep Sea Tug

Tugs

Pusher Tugs

Barges

Dumb Barge

Self Propelled Barge

Flat Top Barges

Tank Barges

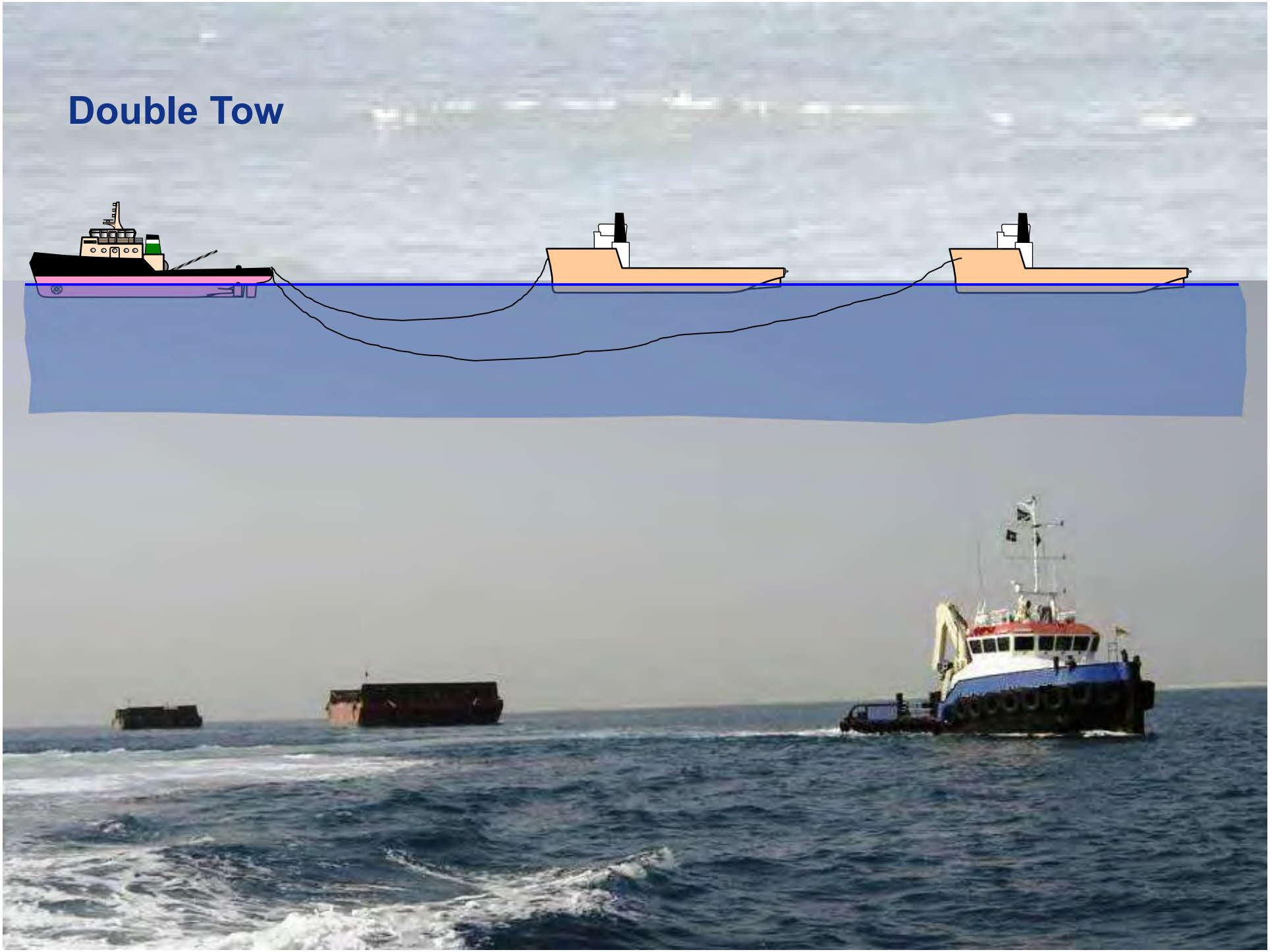
Barges

Container Barge

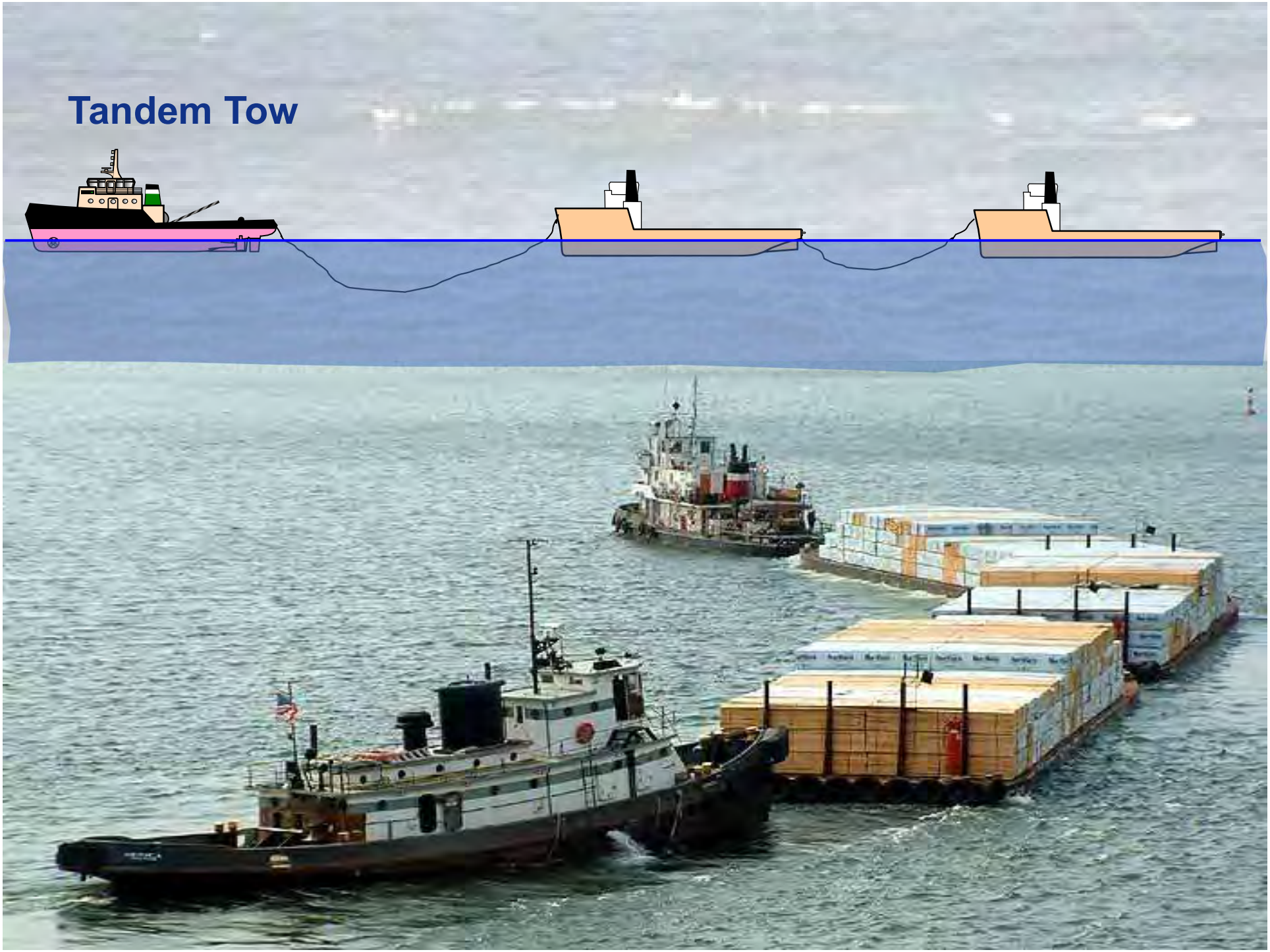
Log Barge

Single Tow

Double Tow



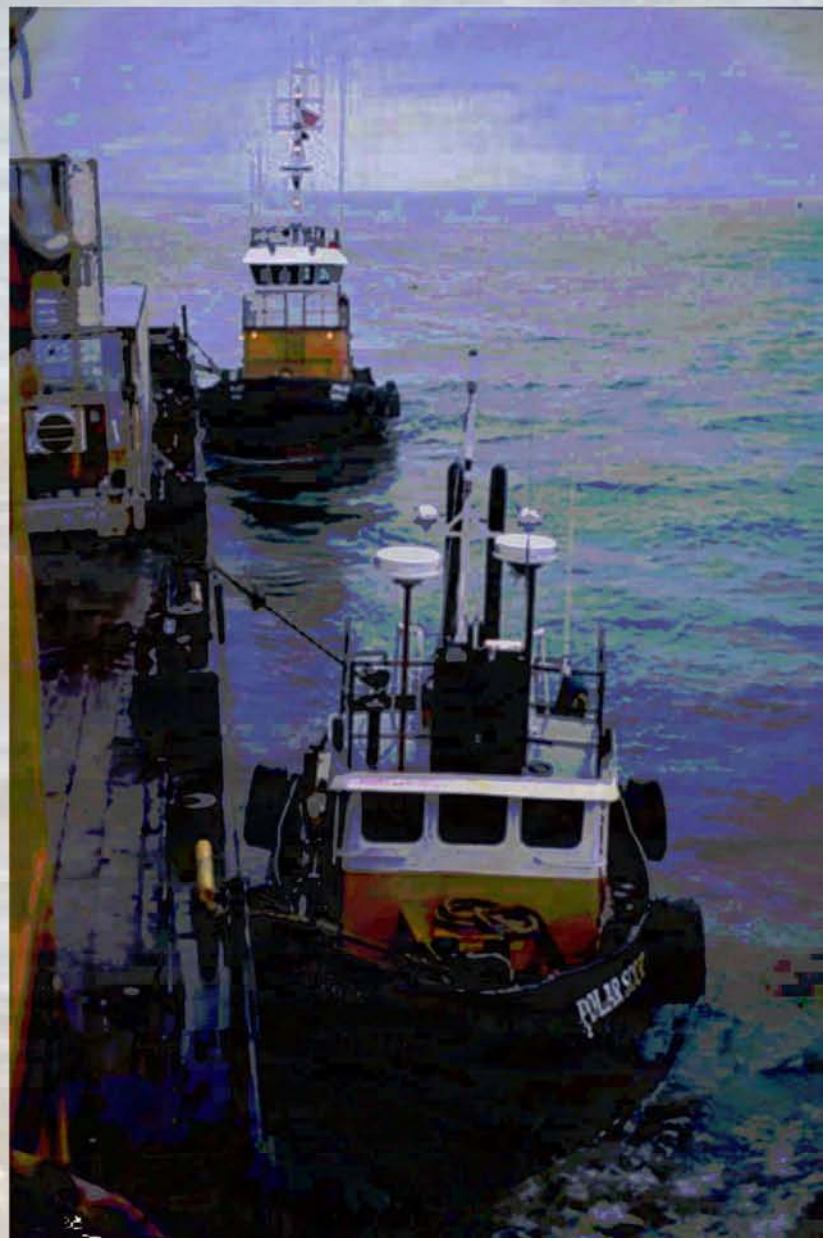
Tandem Tow



Pusher Tug

Pusher Tug

Side Towing



Tug Girding

Transportation Safety Board of Canada
Bureau de la sécurité des transports du Canada

Tug Girding

Canada


Other Vessels

Ferries


BCFerries
British Columbia


GROUPE C.T.M.A.

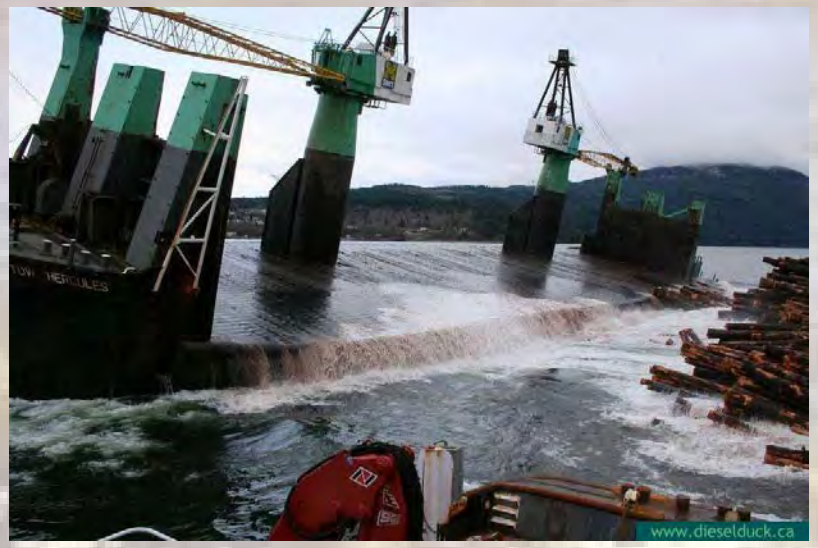

ARCADIA, Lake Huron, 6 / 17 / 01
Great Lakes Aerial Photos, Don Coles

Log barge

Log barge


www.dieselduck.ca


www.dieselduck.ca

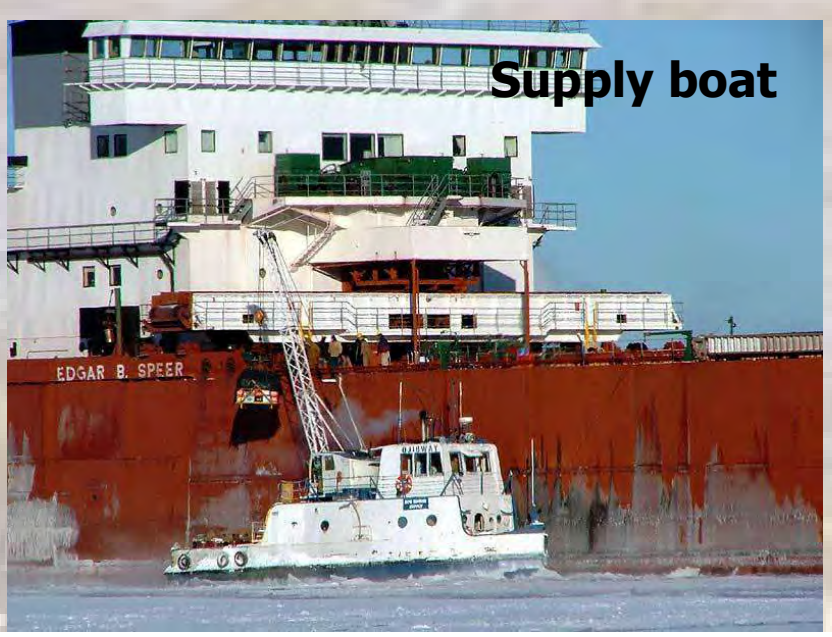

www.dieselduck.ca


www.dieselduck.ca

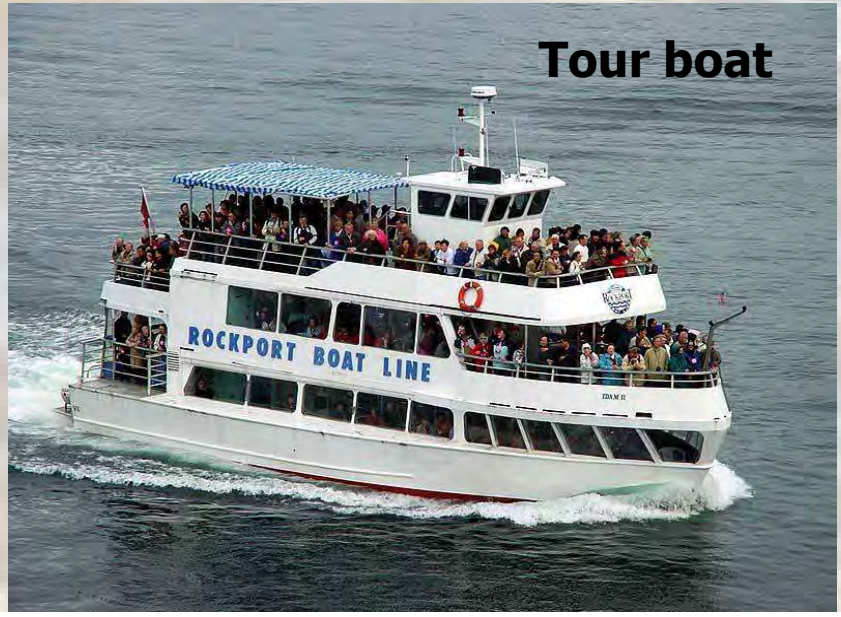
Miscellaneous Ships

Pilot boat

Ice breaker

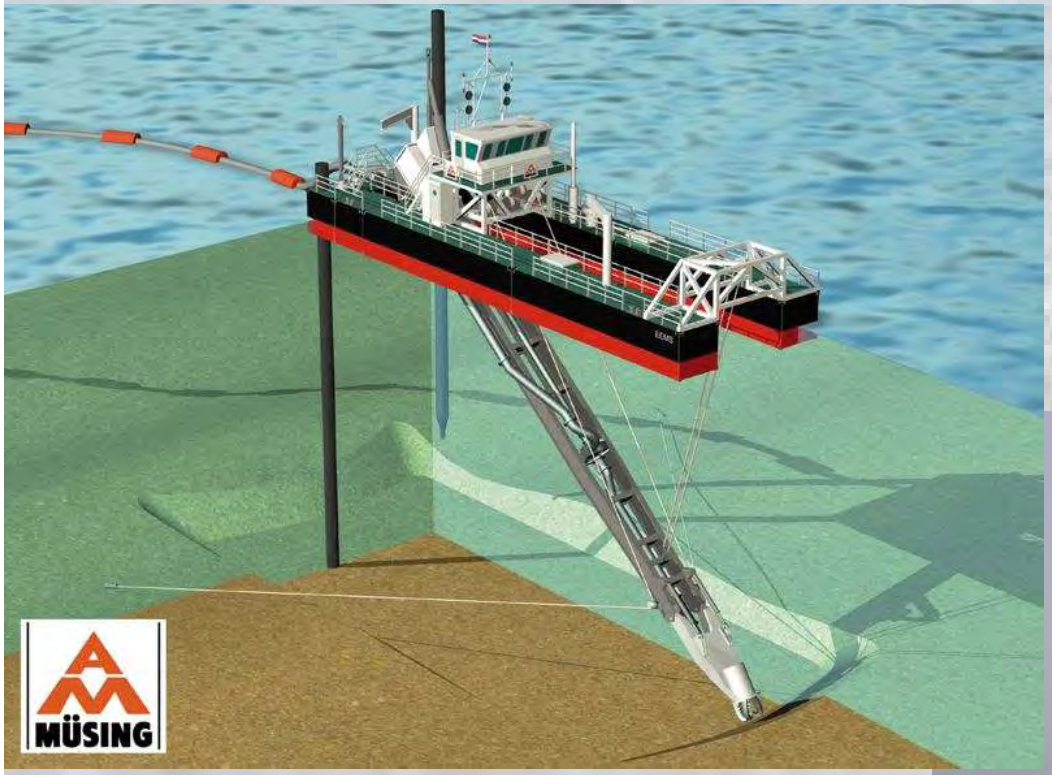


Supply boat

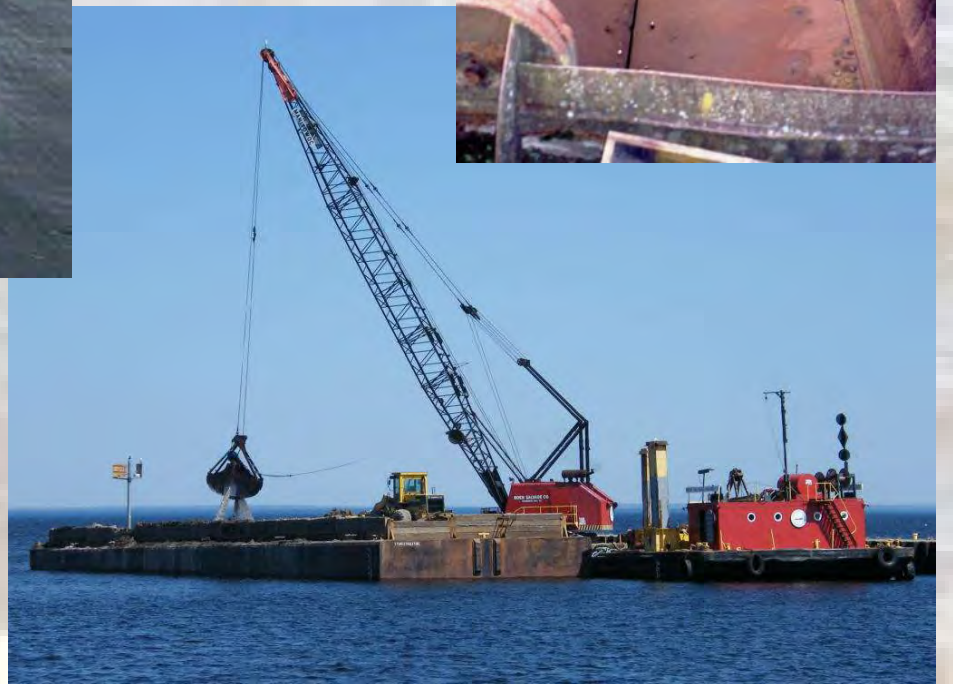


Tour boat

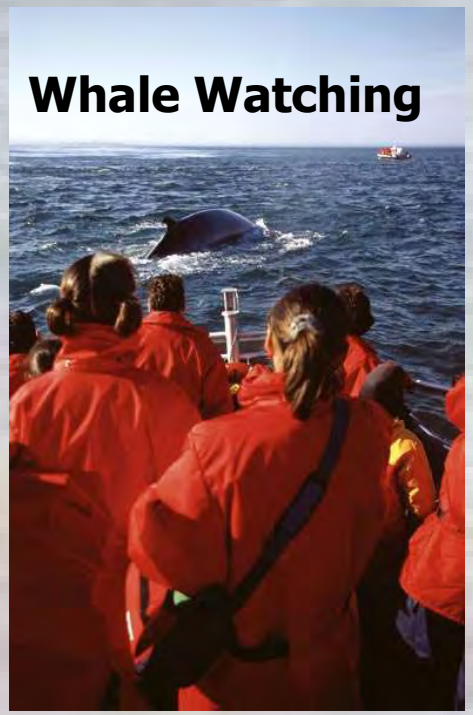
Suction Dredger



Bucket Dredger & Hopper Barge



Adventure Tourism

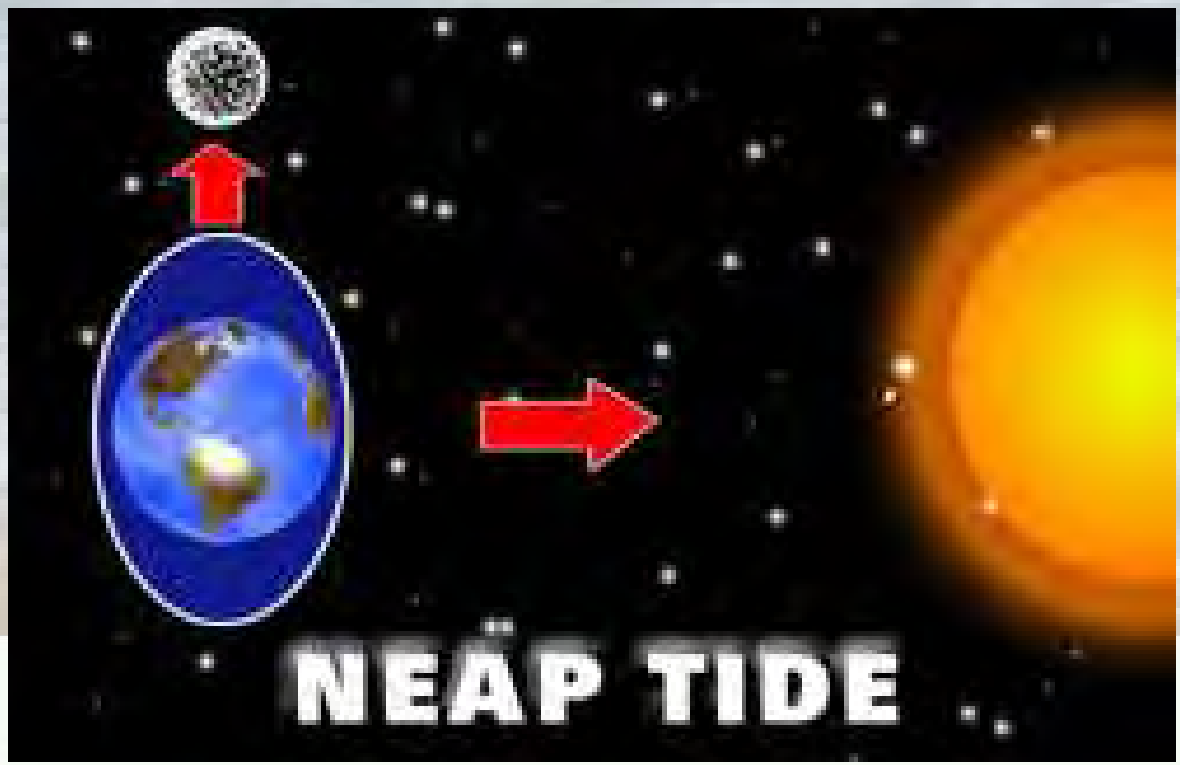


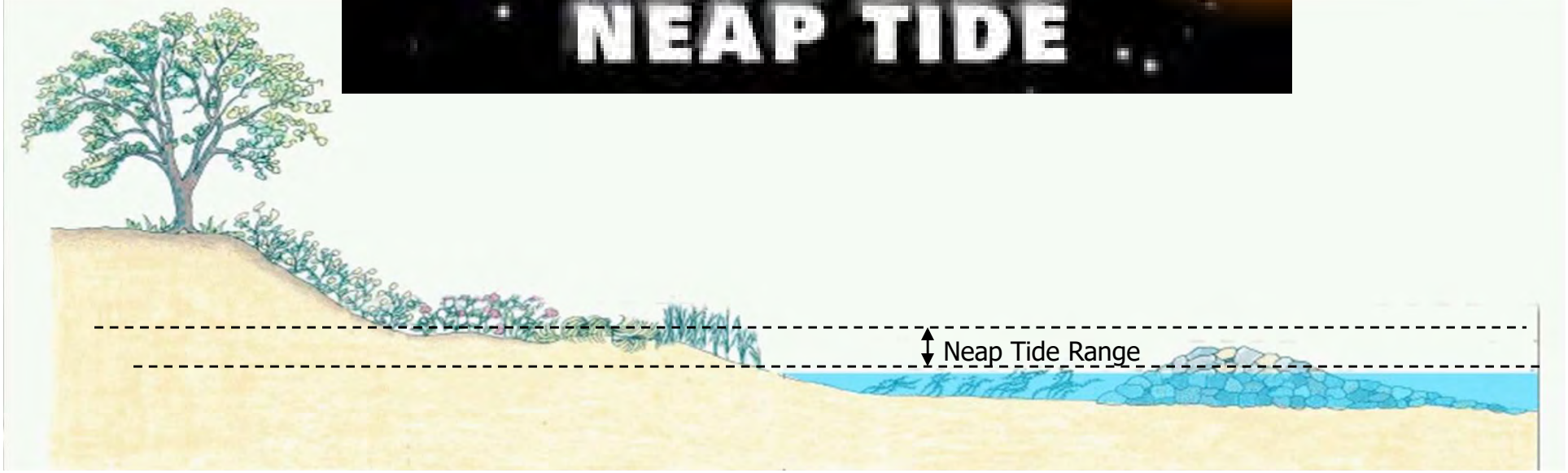

Weather Influences

Tides & Tidal Bores

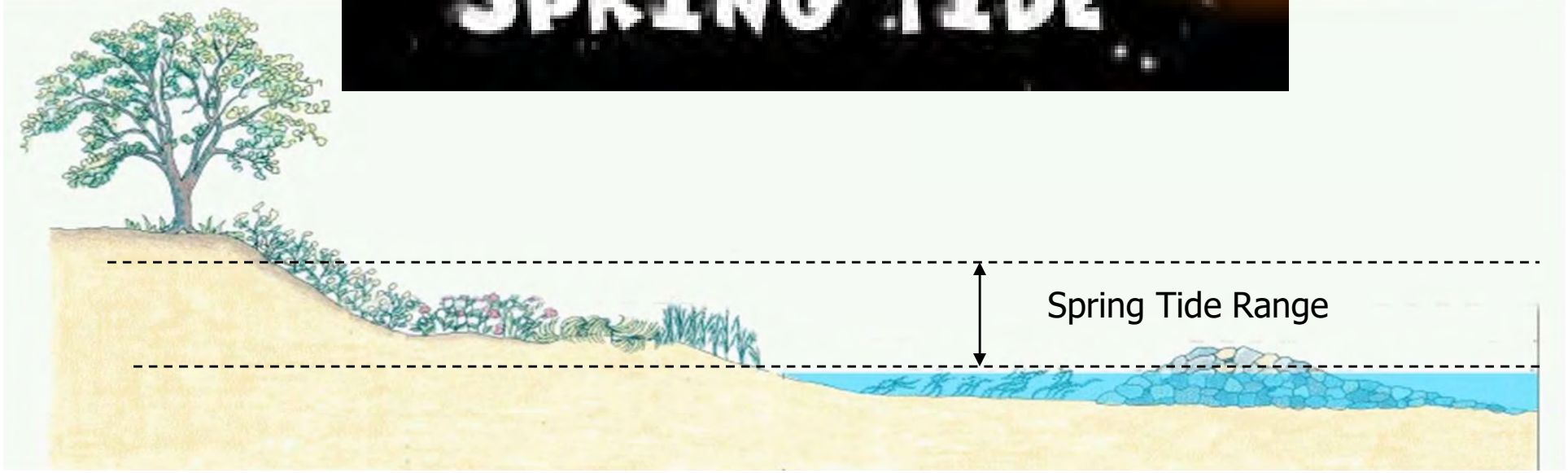
Tidal Bore is a tidal phenomenon in which the leading edge of the incoming tide forms a wave (or waves) of water that travel up a river or narrow bay against the direction of the current.

Neap Tide





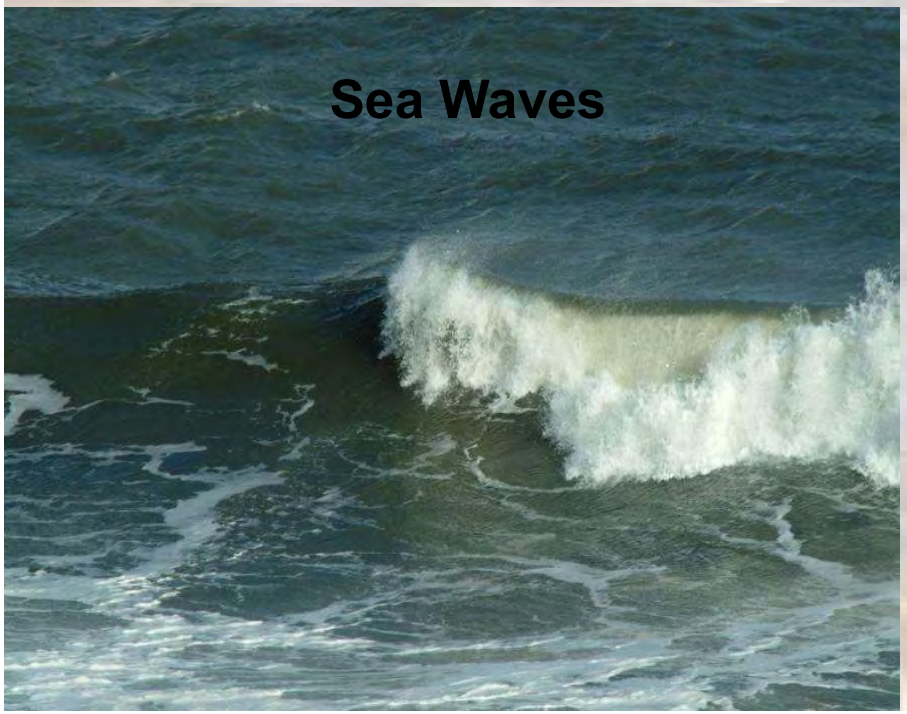
Spring Tide



Sea & Swell

Sea waves: waves generated by the wind blowing at the time, and in the recent past, in the area of observation.

Swell waves: waves which have travelled into the area of observation after having been generated by previous winds in other areas. These waves may travel thousands of kilometres from their origin before dying away. There may be swell present even if the wind is calm and there are no 'sea' waves.



Seiche (*pronounced as* Say-SH)

- A seiche is a standing wave in an enclosed or partially enclosed body of water.
- Its presents as a typical Tsunami Affect in the Great Lakes but it comes in waves.


Any Questions??