Eagle Ocean Marine

SHIP ANCHORING AND MOORING CONSIDERATIONS IN RIVERS DURING HIGH WATER CONDITIONS

EAGLE OCEAN MARINE

April 2021

Introduction

The run-off of melting snow each spring, and often heavy seasonal rains, create periods of high water in river networks around the globe which can result in additional risks for vessels operating there, particularly for those which load and discharge cargo at midstream moorings. The following guidance provides an overview of best practices that should be considered for midstream buoy mooring, actions to be taken to prevent fouled or stuck anchors, and further recommendations on actions to be taken if anchors, or anchor chains, are lost.

Claims resulting from delays, salvage equipment costs, tugs, underwater surveys, etc., can be substantial and can very quickly add up to significant figures. Therefore, preparedness of equipment is vitally important. Of equal importance is the vigilance and preparedness of mariners to prevent losses and to mitigate exposure if an incident does occur.

Prevention & Preparedness

When high water prevails, a vessel's equipment can be subjected to large external forces which can exceed its maximum design load. Any weak link in a vessel's mooring and anchoring equipment is likely to be exposed to such forces, thereby running the risk of a dangerous and costly incident. These risks can be minimized if a vessel is fully prepared for the voyage and its equipment is always maintained to its best working condition.

The following checklist may be utilized to reduce such relevant risks:

- Ensure the vessel's windlass and anchor equipment are always in best condition and working order. Areas of weakness typically include: loose or worn guillotine stoppers and pins; worn anchor links close to maximum allowable diminution by the classification society; fatigued or worn components of the winch motor and gearing; worn hydraulic power unit (HPU) components and sticking pressure relief valves; and, worn brake bands and/or pads, etc. as seen in the examples illustrated in **Figures 1** through **3** below.
- Regularly check with local agents, regulatory agencies and weather services for latest information on river conditions, forecasts, and any restrictions in place. High river restrictions can commonly include mandatory pilotage and tug requirements for deep draft vessels at anchor, daylight only transits and speed limits, one-way traffic restrictions, daylight only berthing requiring line boat operations, increased spacing, and head-up docking only.
- When anchoring in conditions of high water and high current, the anchor and chain may become immersed in the soft muddy bottom causing them to become stuck, and making it more difficult to heave and recover them. Also, dragging anchors are more likely to snag on riverbed debris. To reduce and mitigate such risks, the vessel should heave and re-anchor every few days depending upon the anchorage location and river conditions at the time.
- Re-anchoring may involve the additional cost of pilots and tugs. This should be discussed with the

pilot after anchoring, depending upon existing conditions and any local restrictions in place at the time.

- During high water, all deep draft vessels should have three means to hold position, unless moored to a shore side facility or mooring buoys. An example would be two fully operational anchors and the propulsion system. However, should a vessel lose an anchor, or propulsion, then a reliable means of back-up to hold its position is required. In practical terms, this obligates a vessel to engage an assist tug.

Figure 1 | Failed common link to anchor chain resulting in loss of chain and anchor

Figure 2 | Ruptured motor housing to windlass experienced during attempted recovery of anchor

Figure 3 | Failed stopper pins from the anchor windlass guillotine stopper

Considerations for midstream buoy moorings

At some locations there are deep draft midstream buoy terminals offering non-stop cargo handling services loading and discharging to and from hopper barges via high capacity floating crane barges. While operations at these facilities may not be restricted during high water (other than the effect of daylight only berthing/unberthing), the strong river currents expose them to higher risks of parted moorings, lost chains and anchors, and breakaways, many of which routinely occur each year. The following recommendations can be considered to reduce risks which may arise at these facilities:

Figure 4 | Midriver three-point mooring at bow, two point mooring astern

- In addition to anchoring in the conventional open spread moor with both anchors, the berthing arrangement should aim to stabilize the vessel via a set of anchored mooring buoys; typically, three at the bow and two at the stern as seen in **Figure 4**. A typical midstream mooring operation is also shown in **Figure 5**.
- Vessels should ensure that enough mooring ropes (including spares) of adequate length (up to 220

Figure 5 | A typical midstream mooring facility

meters for some facilities) are readily available for rapid deployment if necessary.

- It is imperative that the anchors and moorings are regularly monitored and adjusted as necessary. Anchors should take an equal amount of strain, and moorings should be maintained tight for stabilization purposes.
- Changes in the vessel's trim, draft, and the positioning of floating cranes and barges on both sides of the vessel, can all influence the loads acting upon the vessel's hull and should be monitored closely so that necessary adjustments can be made to avoid an incident.
- Should excessive yawing or fishtailing occur, then the anchors and mooring ropes can experience repeated high load cycles (fatigue) and/or become overloaded, resulting in premature failure (see Figure 6). Such excessive vessel movements while moored should be addressed swiftly by a well-trained and instructed crew by adjusting anchors, moorings, trim and barge position. Further actions may require the use of the vessel's main engines, tug assistance, pilotage and possible re-anchoring/mooring. The crew should not hesitate to request assistance from the terminal if necessary.

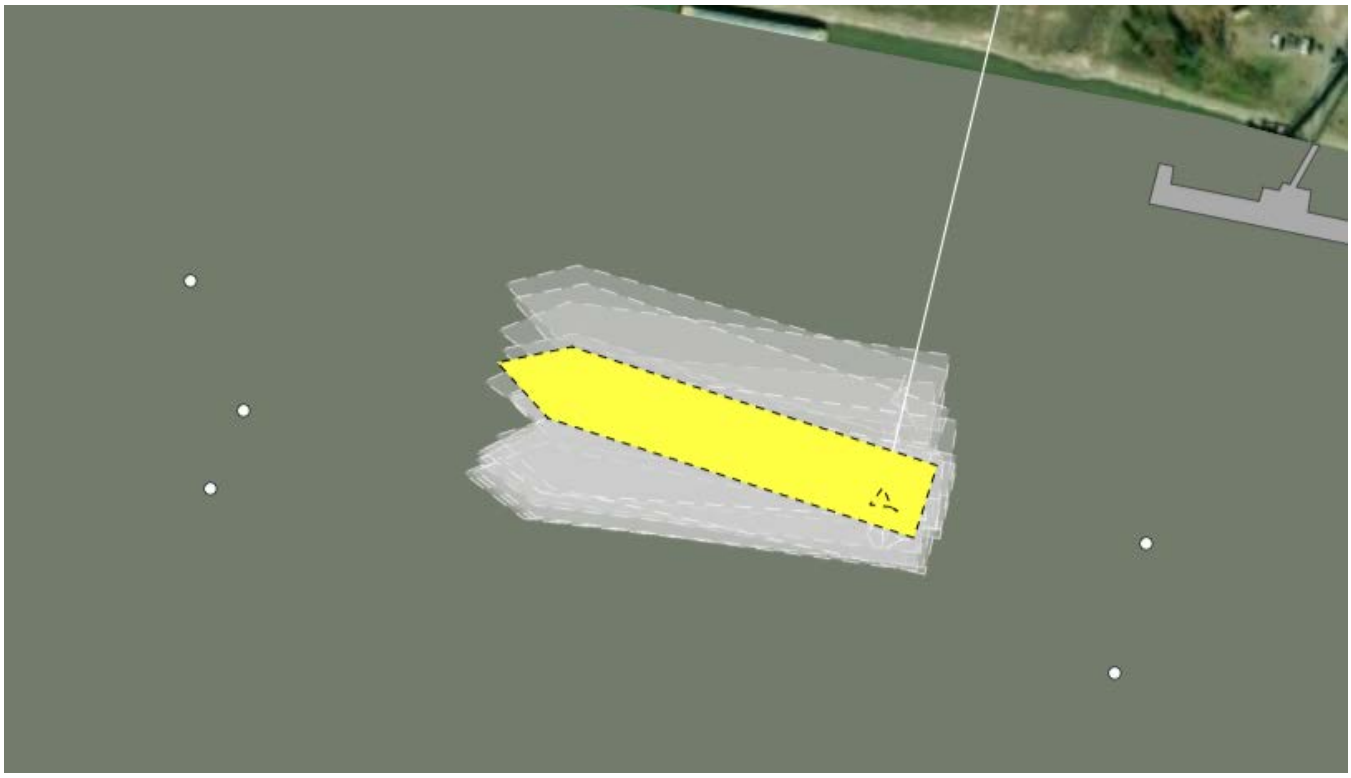

Figure 6 | A typical midstream mooring facility

Recommended actions for a fouled/stuck anchor

It is a common occurrence during periods of high water and strong river currents for vessels to have trouble heaving anchors. The anchor and/or chain may have sunk into the silty mud bottom of the riverbed, or there may be weaknesses in the vessel's windlass, motors and/or hydraulics, or a combination of these things.

- It is imperative that the anchors and moorings are regularly monitored and adjusted as necessary. Anchors should take an equal amount of strain and moorings should be maintained tight for stabilization purposes.
- In most cases, the anchor and/or chain may likely have sunk into the mud bottom, which can cause a suction effect on the anchor when attempting to break free.
- Occasionally, the anchor may be fouled on other lost or abandoned anchor chains, steel wires, revetment or other debris.
- Care should be taken to avoid overloading the chain or windlass, which may cause equipment failure or loss of the anchor and chain. This can result in a more costly problem and is especially problematic at a facility where the terminal may claim obstruction and unsafety of the berth

requiring expensive salvage attempts while imposing high tariff charges against the vessel for delays.

- If most of the chain comes up but the anchor remains stuck, the vessel may elect to attempt (with great care) to break the suction which is preventing the anchor from being heaved by keeping the chain directly vertical (up and down), and holding it at the strongest point of the windlass, typically the stopper as seen in **Figure 7**. The vessel should then be maneuvered to apply alternating forces in a forward and aft, port and starboard direction. Tug and pilotage assistance may also be required.
- This effort can be repeated several times (with care) before ordering a crane barge (as seen in **Figure 8**) to assist if the anchor remains stuck and requires recovery as seen in **Figure 9**.

Figure 7 | Proper securing of the anchor chain with disengagement of the gear reduces the risk of winch or motor damage

- If there is the possibility of significant delay or further consequential loss due to a lost or abandoned anchor, then it is advisable to immediately arrange for a crane barge to assist in recovering the anchor. During high water season the local vendors will often be responding to numerous incidents at other locations in the river network, significantly delaying response time. Consequently, early and decisive action to arrange assistance can significantly reduce the costs and scope of an incident.
- In some cases, the anchor still cannot be recovered with crane barge assistance after which the anchor chain may need to be released.

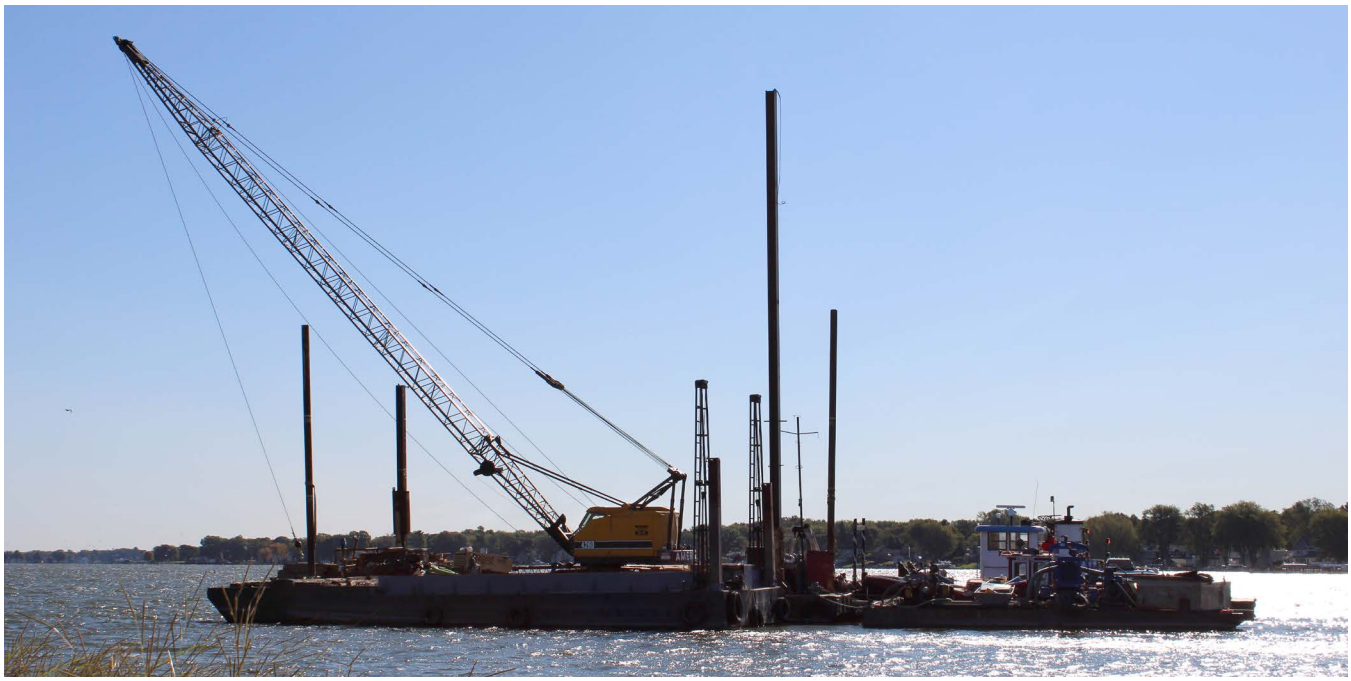

Figure 8 | Typical crane and/or deck barge

Figure 9 | Floating crane barge assistance in recovering an anchor

Recommendations in regard to a lost anchor or chain

Unfortunately, there are many occasions where overloading, cyclic fatigue or premature failure of the vessel's equipment may result in the separation of the anchor and/or chain from the vessel. Such a situation may present particular challenges in recovering the equipment, associated recovery costs, additional local authority requirements that may be imposed, and/or potential risks and liabilities that an abandoned/lost anchor or chain may pose to other river users, designated anchorage areas, midstream moorings, berths and terminals.

As an anchor is part of a vessel's ground tackle, it is considered an insured part of the vessel, and the hull & machinery underwriters will normally cover the cost of its recovery, subject to the terms and conditions of the policy. Shipowners should therefore notify their hull & machinery underwriters upon the loss of an anchor. An unrecovered anchor can also cause a threat to other vessels, underwater pipelines or cables, and might be liable to cause the shipowner to incur liabilities, costs and expenses for which he is insured by the Eagle Ocean Marine (EOM). Therefore, it is also necessary (as per the General Terms and Conditions of the EOM facility) that EOM be promptly notified if an anchor is lost.

- In the event that the anchor and/or chain is lost then the local authorities will likely restrict the vessel's movements until several requirements are satisfied:
    - A statement from the vessel's classification society attesting to the replacement of the anchor to their satisfaction OR a letter of dispensation from the vessel's flag State authorizing the vessel to depart without the anchor.
    - A written salvage plan documenting how the lost anchor will be located and subsequently recovered. Local regulatory authorities must approve the salvage plan which typically takes one

Figure 10 | Typical grapple hook used for anchor recovery

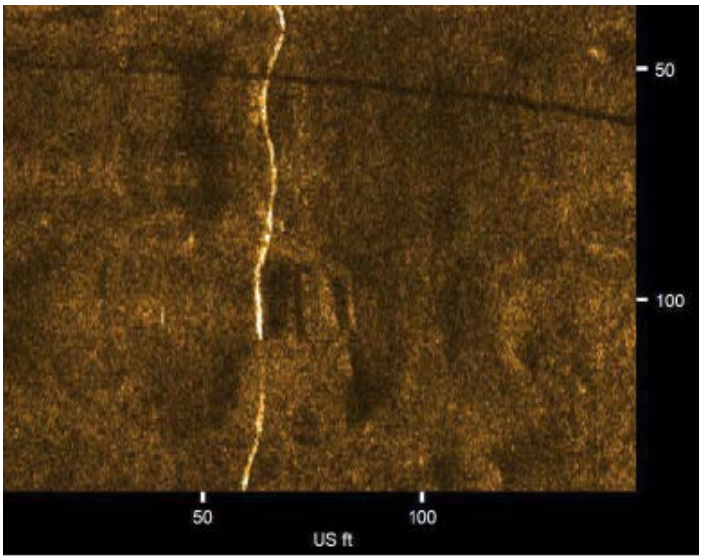

Figure 11 | Multibeam bathymetry system and/or side scan sonar surveys can help to locate lost anchors and chains

to two days.

- A written statement signed by the vessel's Master that the main engines will be ready for immediate use if the vessel intends to re-anchor before the lost anchor is replaced.
- The serial number of the lost anchor to aid identification if the anchor is subsequently recovered or found (or worse, determined to have fouled another vessel's anchor).

- Depending on the location of the lost anchor and/or chain, and river conditions at the time, it is likely that safe or successful salvage by means of grapple dredging may or may not be possible (see **Figure 10**).
- Local salvage companies, acting in cooperation with local agents, will often demand costly day rates (varying on mobilization time and distance) for providing a salvage plan and commitment that they will return with a crane barge to the suspected site of the anchor/chain at a later date (typically in the spring or summer months following cessation of the high water season). However, this commitment is not always necessary and the odds of successful recovery many months later is very small (especially for anchors only). Other methods applied to locate sunken chains or anchors include such techniques as multibeam bathymetry or side scan sonar surveying (see **Figure 11**).
- Replacement of anchors does not always need to be completed by expensive floating crane barges. Rather, replacement anchors can often be transported to the vessel on the back of a crew boat, or small supply boat, or delivered dockside, and reconnected by the vessel's crew.
- In situations where anchors are lost at a berth, or at a midstream buoy terminal, then it is also possible to have a bottom hydrographic survey conducted to help locate the anchor and/or demonstrate that the lost anchor/chain does not pose a danger to navigation.
- Due to the potential for a quick escalation of costs, shipowners should act as a prudent uninsured (i.e., choosing to mobilize assist tugs and a crane barge sooner rather than later). However, each circumstance is different, and the best course of action depends on several factors including the specific anchorage or berth, existing river conditions, and/or other restrictions in places, including commercial considerations.

Summary

With high river conditions come the potential for significant delays and backlog to commercial operations. A 3-4 day expected port call can become weeks longer. The prolonged duration of being anchored, moored, or in transit in rivers exposes vessels and their equipment to greater stresses and increased exposure.

Preparedness and knowledge are key, and when incidents do occur, quick action can often reduce the delay and expense.

Eagle Ocean Marine would like to specially thank Independent Maritime Consulting, LLC for their contribution to this document.

www.eagleoceanmarine.com

New York Head Office

Eagle Ocean Marine
c/o Eagle Ocean Agencies
One Battery Park Plaza, 31st Floor
New York, New York 10004 U.S.A

TEL +1 212 847 4600
EMAIL info@eagleoceanmarine.com

London Office

Eagle Ocean Marine
c/o Shipowners Claims Bureau (UK) Ltd.
78-79 Leadenhall Street
London EC3A 3DH, U.K.

TEL +44 20 7709 1290
EMAIL info@eagleoceanmarine.com

Piraeus Office

Eagle Ocean Marine
c/o Shipowners Claims Bureau (Hellas), Inc.
Filellinon 1-3, 3rd Floor
Piraeus 185 36 Greece

TEL +30 210 429 4990
EMAIL info@eagleoceanmarine.com

Hong Kong Office

Eagle Ocean Marine
c/o SCB Management Consulting Services, Ltd.
The Workstation, 28th Floor
43 Lyndhurst Terrace, Central
Hong Kong SAR
People's Republic of China

TEL +852 3905 2150
EMAIL info@eagleoceanmarine.com

powered by