



Lochaber
Fisheries Trust

Deployment of Coastal Fyke Nets Standard Operating Procedure

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Introduction

This standard operating procedure (SOP) covers the equipment, preparation and deployment of a fixed coastal fyke net for the purpose of sampling wild salmonids. The SOP was developed as a significant output of a project, funded by Crown Estate Scotland, to develop techniques to monitor wild fish in an agreed and objective manner, ultimately with the objective of providing an appropriate feedback loop to salmon farm management. We are extremely grateful to Crown Estate Scotland for their support of this project.

The deployment and routine checks of the net would not have been possible without the significant collaborative support of Mowi Scotland. Particularly in relation to deployment and retrieval of the net, the equipment and technical expertise of the aquaculture industry are crucial. Early engagement with fish farms local to the net deployment site is therefore vital.

Equipment

The coastal fyke nets deployed in this project were developed by Lochaber Fisheries Trust with help from wild fish researchers in Ireland and Norway. The following equipment is required prior to deployment:

- Coastal fyke net according to specifications set in Figure 1
- Otter guard (rigid grill with mesh no wider than 85mm. We used 75mm)
- 5 anchors each needing:
 - 40-50kg weight
 - Length chain
 - Rope (length needs to be 5x the depth of water where the anchor will sit, see Figure 2)
 - Marker buoy, at least 40cm diameter and hi-vis
- 5 additional buoys
- Rope for wings and leader
- Creel
- Creel doors x4

More detailed diagrams of the anchor placement can be viewed in Appendix 1 & 2.

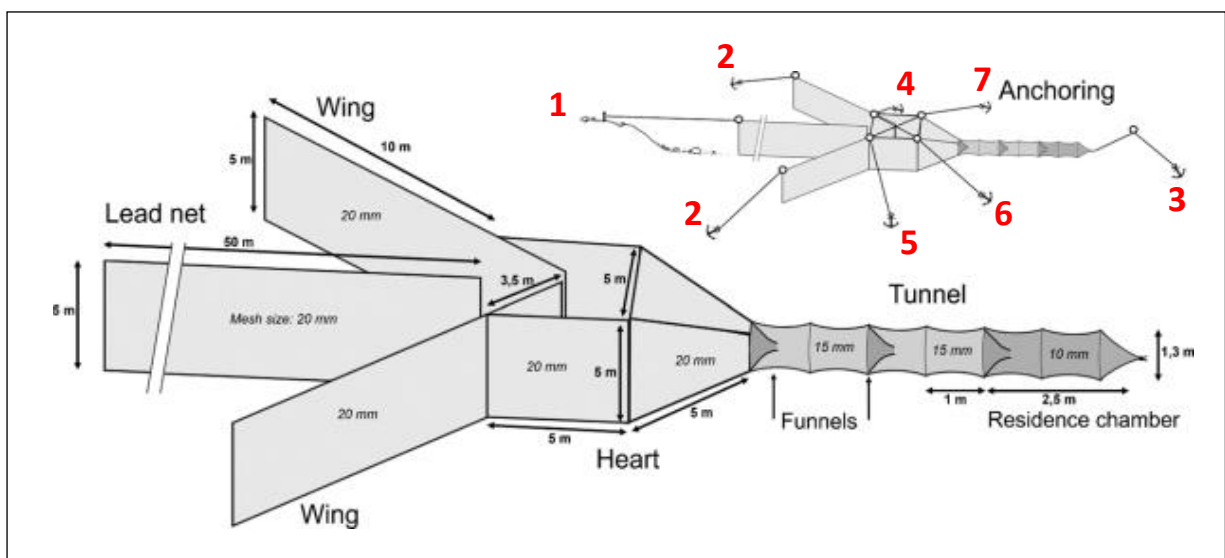


Figure 1. Diagram of fyke net (lengths are approximate). The top right diagram shows the order in which to set the anchors (see Appendix 2 for additional details of back anchor attachment)

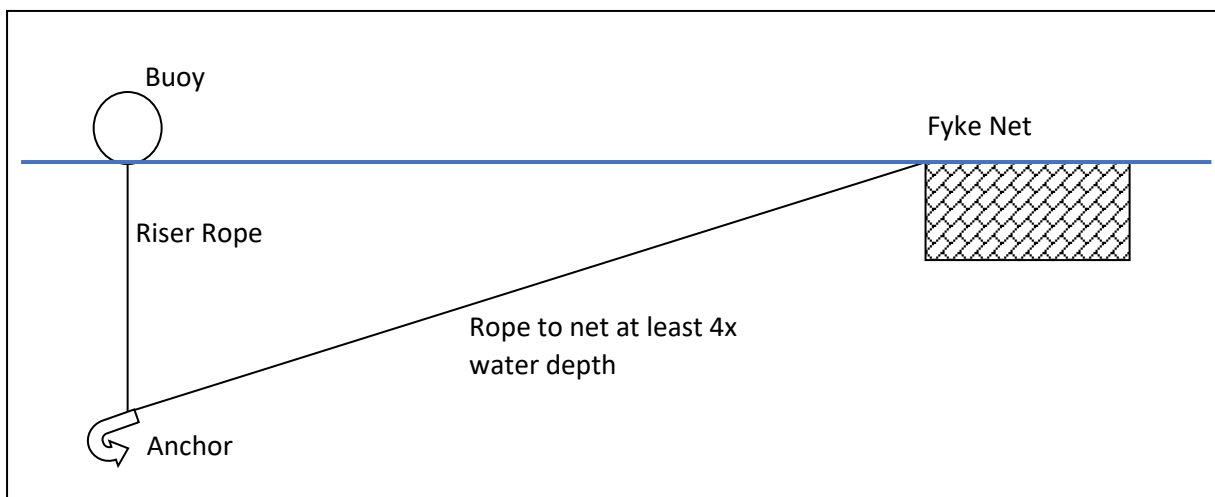


Figure 2. Diagram showing the attachment of the back anchor, riser rope and buoy.



Figure 3. Coastal fyke net deployed in Loch Linnhe.

Site Selection

It is important to choose a site in which there is a good chance of intercepting migratory salmonid fish. A desktop exercise should be undertaken, utilising expert local knowledge and considering tides, admiralty charts, rivers and traffic to broadly identify suitable locations. The location of past commercial salmon netting stations might also be worth further consideration.

Sites with steep intertidal zone will minimise the leader being dried out at low tide. Rocky outcrops work well as the net can form a barrier at high tide and still fish at lower tides. Shallow sloping sites can be used but the net will fish for less time.

Very deep water makes the process more complicated; it can be done but lifting the net is much harder unless you checked the net at low tide. See appendix 3, for further detail of the approach to mooring in deep water. It is important, if possible, to find out the water depth at anchor points.

Trees make useful shore-based attachment points for the leader and wing ropes.



Figure 4. Shallow shore at low tide: all the leader is dry and net not fishing.



Figure 5. Steep shore: even at low water the net is still fishing.

Permissions

A Licence may be required from Marine Scotland Licensing Operations Team (MSLOT) – further guidance can be found on the Marine Scotland website¹. Even if you don't need a license you must consult with the maritime and coastguard agency, the Northern Lighthouse board and local harbour authority (if applicable), and SNH if the site is designated. You must also contact MSLOT for an exemption.

You will also need a lease from the Crown Estate. This process can take around two months in total, but this timeline may reduce. Note: you can apply for several CE lease sites in one application. Once granted there is no flexibility within the lease to move the net so it is better to give yourself several options in the first case.

¹ <https://www2.gov.scot/Resource/0054/00547090.pdf>.

Preparation

1. Lay the net out and work out which way it goes up - the top of the heart has no mesh, just ropes across. We numbered each corner of the heart according to the anchor plan (Figure 6). This makes it easier to identify the appropriate orientation when it's all crumpled up in the boat.

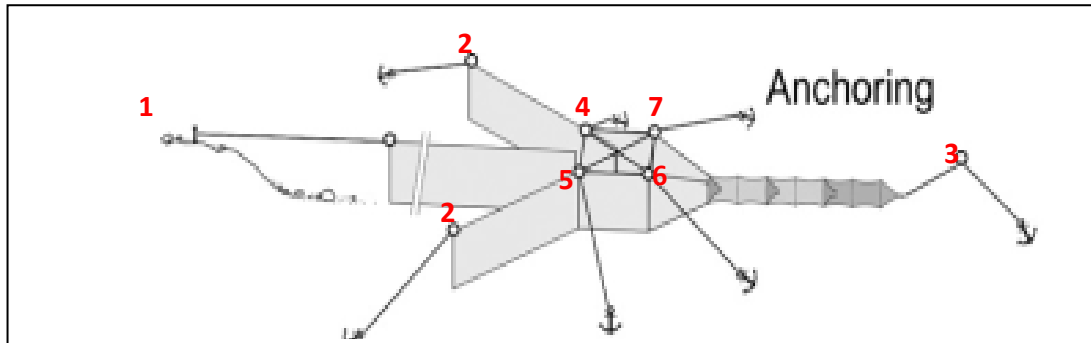


Figure 6. Close up of anchoring plan

2. Sew the otter guard into the mouth of the front funnel of the fyke section of the net (Figure 7)



Figure 7. Otter guard sewn into the first (front) funnel of the fyke section of the net. The orange mesh is the heart section

3. Put trapdoor in each section of fyke (see Figure 8). We used a door from a creel and stitched it in, with a bit of smolt mesh sewn over.



Figure 8. Creel doors sewn into fyke section

4. Prepare all anchors. Each anchor will have two ropes – one to attach to the net and one riser with a marker buoy attached (see Figure 9).
5. Attach chain and rope ready to go to net on the shank ring, and riser rope and buoy on the crown/grapnel end.
6. Mark each anchor with numbers so you know which is which. Coil ropes neatly so ready to deploy

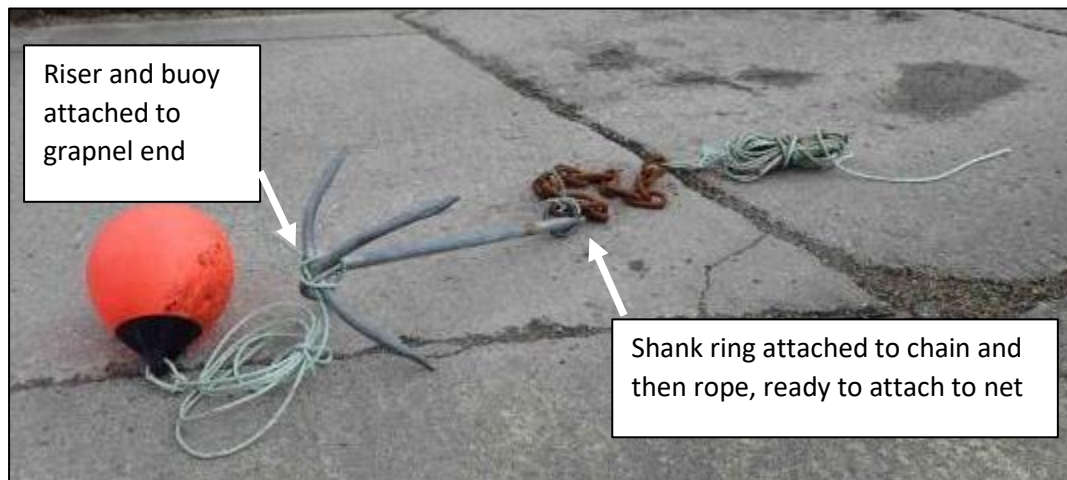


Figure 9. Attachment of chain and rope to anchors

7. Tie a loop in the back anchor rope, 11.5m from the end to be attached to the net. This will allow you to attach the fyke tensioning riser.
8. Tie a loop in the fyke tensioning riser, 1m from the surface buoy.

Deployment

Overview: Where possible the net should be deployed at slack tide. The net should be placed in the boat in the reverse order that you want it to come out (i.e. offshore end goes in first, shore end goes in last). At the site location, attach the leader to the shore, reverse the boat out in a straight line, feeding the net over the bow of the boat. Set the back anchor and get tension. Then set heart anchors and adjust back anchor if needed.

Step by step details:

1. If possible, arrange for a fish farm forklift to move the weights and net to boat;



Figure 10. Forklift taking anchors to boat

2. Place net in boat so it's ready to deploy i.e. load fyke end first so it is at the bottom of the pile, front of net at top with wings at edges. Attach one end of the leader to heart and then concertina the rest of the leader on top neatly;
3. When everything is in the boat, attach ropes to leader and wings. Attach back anchor rope to the heart section of the net and fyke tensioning riser to back anchor rope. Don't attach heart anchors yet.
4. On arrival at the deployment site, tie the leader rope to the shore (using a tree or anchor), with the front of leader positioned so it will block fish passing at high tide. Loosely tie wing ropes to shore (leave plenty of slack so the leader will tension before the wings). The boat will be positioned with its bow to the shore.



Figure 11. Net with leader and wings tied to shore.

5. Slowly reverse boat perpendicular to shore, feeding out leader and then wings. Deploy the entire net, and when you get to the offshore end of the fyke, slow right down and tie the fyke tensioning rope to the fyke tensioning riser;
6. Continue reversing and set/tension the back anchor. This is the backbone of the net set;
7. Return to the fyke tensioning rope and tighten until the fyke net is taut. If the fyke is not taut the funnels will not work properly and its harder for fish to enter the fyke;
8. Return to shore and tighten wing ropes;
9. Now return to attach heart anchors. Attach the inshore anchors first, then the offshore ones. Then examine the heart, and make sure it's symmetrical and that the wings feed into the heart well. This may require some tweaking (see 11 below);
10. If the net is set at mid to low tide it should be at good tension through most of the tidal cycle. It will not be perfect in all tidal heights;
11. **Caution:** there is potential to get caught in ropes/net/anchors so be incredibly careful of where your feet are in relation to ropes. The fewer people feeding the net out the better. Also watch your fingers;
12. When tensioning anchors, grab the riser buoy, loop a rope from the front of the boat through the riser attachment and tie it off on the boat with a quick release knot. Reverse the boat until well tensioned. This saves you directly taking any tension through your arms.
13. If the tide is strong you may need to add chain to the bottom of the leader/wings to help them sit vertically in the water. Attaching an anchor and buoy at the front of the leader helps to keep the net the right height on steep shores (Figure 12)



Figure 12. Weight prevents the front of the leader from being too high on steep sloping shores.

The net performs best when it is relatively clean. Algae will grow, mainly on the leader, and should be removed. The net can either be cleaned with a power washer or taken ashore to dry.

Monitoring of migratory salmonids

The net must be checked every 24 hours. If bad weather is forecast or lack of staff means the net cannot be checked (e.g. weekends) then the net can be left open by tying trapdoors open.

Fish should be removed from the fyke net using hand nets with knotless mesh. Non-target fish can be returned to the water immediately. Target fish should be sampled according to SFCC protocol for seine netting before being returned.

All crabs must be removed from the net as they will predate on fish.

Retrieval of Net

To remove the net, disconnect all anchor ropes from the net, attaching small floats to the loose rope ends. Drag the net ashore and place into the boat. Return to collect the anchors, preferably with an empty boat if using winches. Approach the site being careful not to get loose ropes round the propeller. Anchors should be lifted using winches, or one person on each rope.

If the net is only being removed temporarily then anchors can be left in place but remember to coil the non-riser rope and attach to the riser buoy (to prevent losing ropes).

Useful Contact details

Licensing:

Check if you need a Marine Scotland license: <https://www2.gov.scot/Resource/0054/00547090.pdf>

Northern lighthouse board: Fingal McKiernon - fingalm@nlb.org.uk

Maritime and Coastguard Agency - AberdeenMO@mcga.gov.uk

Local harbour (if applicable) authority can be found at
<https://marinescotland.atkinsgeospatial.com/nmpi/default.aspx?layers=841>

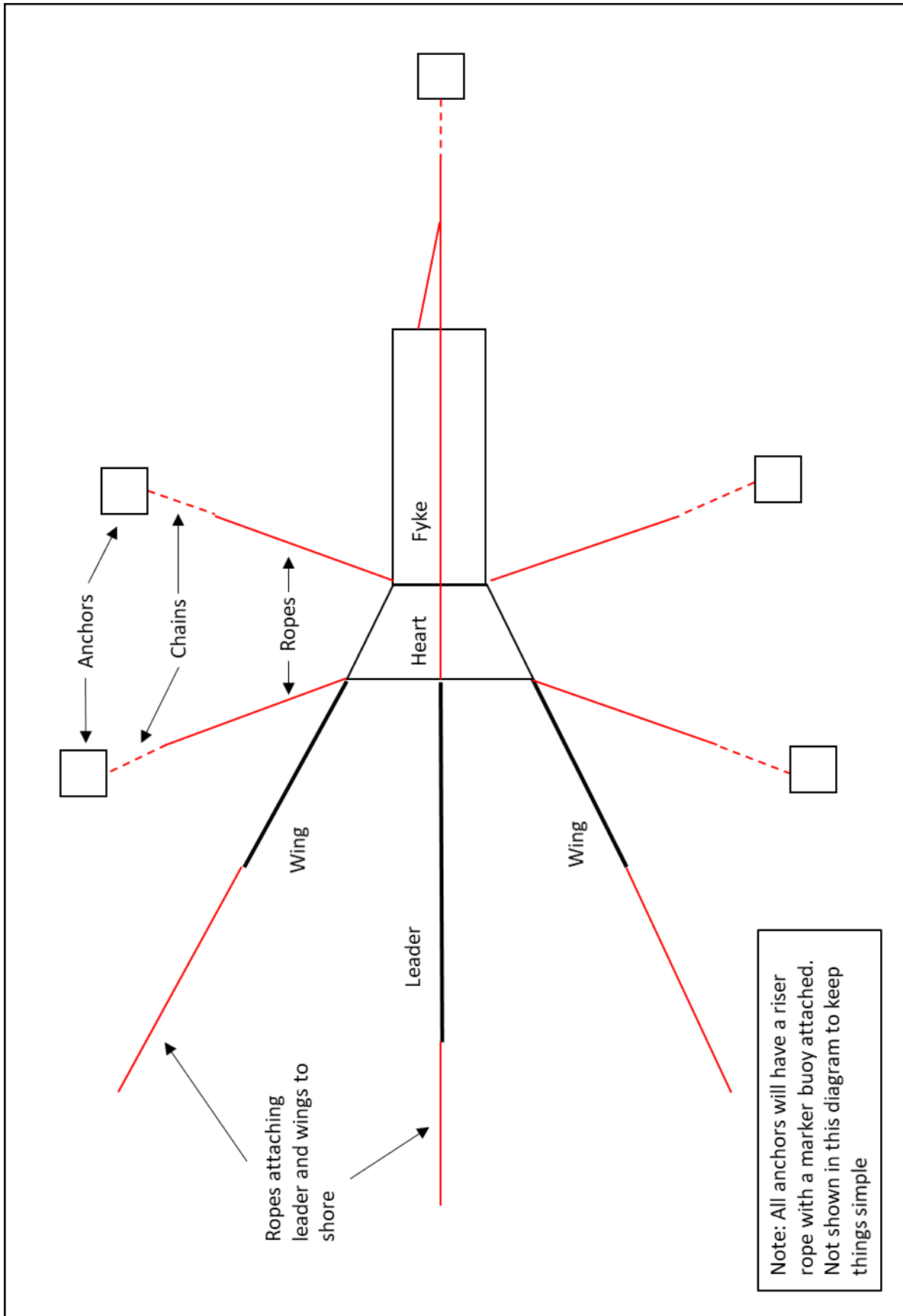
MSLOT contact: Jack Versiani Holt: Jack.Versianiholt@gov.scot

Crown Estate: alex.adrian@crownstatescotland.com or emma.riach@crownstatescotland.com

Net producer: reidkv@online.no

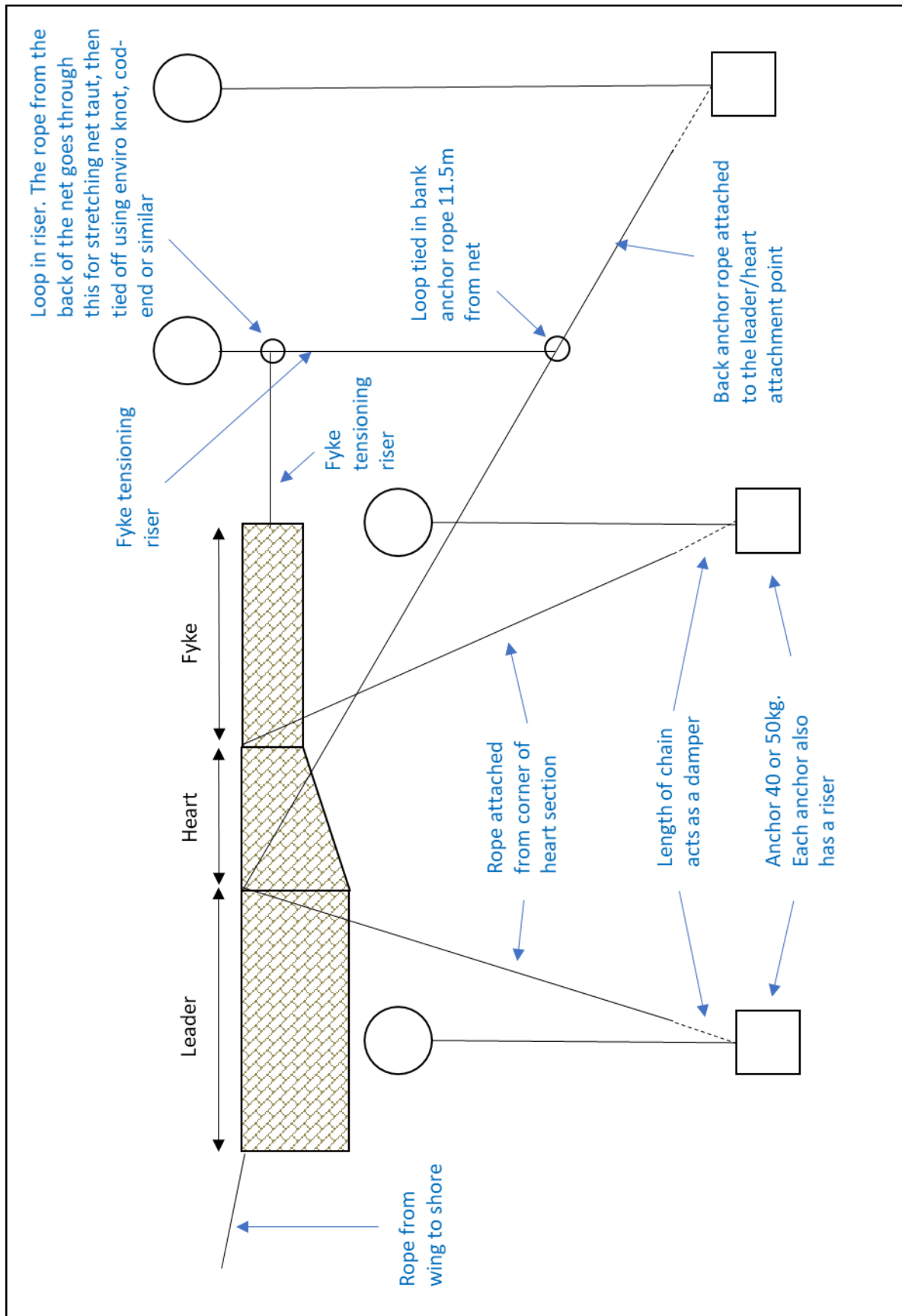
Appendix 1

Top view of anchor points



Appendix 2

Anchors- side view (wings not shown)



Appendix 3.

Deep water mooring: back anchor modification (other anchors stay the same as Appendix 1 and 2.)

