

5 Safe FAD deployments

5.1 FAD deployment location and bathymetric surveys

The location of a FAD deployment can ultimately influence the effectiveness of the FAD to attract and maintain an assemblage of pelagic fish. PICTs across the region will use different strategies and priorities to select the general area in their countries where FADs are deployed. This manual focuses on providing recommendations on selecting the actual FAD deployment location. While it is recognised that FADs deployed further offshore are more likely to aggregate large pelagic fish, well-placed nearshore FADs can also aggregate pelagic species, although smaller fish, such as skipjack tuna and bonito are usually aggregated. One of the most common, often overlooked, mechanisms in the FAD deployment location selection process is the involvement of local fishers or fisher associations. Discussions with fishers and communities prior to the selection of FAD deployment location can increase fisher and community ownership and enhance the identification of a more productive location (and thus effective FAD) through their local knowledge of ecological conditions favourable for pelagic fish.

A suitable FAD deployment location is one that is;

- physically suitable: favourable bathymetry such as flat or slight slope, with moderate currents;
- ecologically suitable: known presence of pelagic fish, or pelagic fish movement near the location; and
- accessible: fishers have suitable vessels and skills available to safely access and fish the FAD.

Nearshore FAD deployments should avoid deploying close to a river mouth, as the low salinity environment around rivers adversely affects tuna aggregations.

Bathymetric surveys using an echo sounder and the production of a bottom contour map are essential for the identification of a suitable physical location for a FAD. The detailed method for conducting bathymetric surveys and producing a contour map to guide FAD site selection can be found in the SPC 2005 FAD manual (Chapman et al. 2005). FAD sites that are less than 1,000 m can use a 1 kw echo sounder, while a 3 kw/28 khz sounder is required for deeper depths.

In general, it is recommended that FADs be deployed where the bottom contour is flat or slopes gently, far away from pinnacles or steep drop-offs. Some PICTs, however, have an unavoidable issue with slope and have limited options.

In such situations, the following can provide further guidance:

- try to retain slope to less than 30°;
- a small shelf can sometime be identified through bathymetric surveys of the seafloor that can be targeted for the anchor deployment site;
- ensure that extensive bathymetric surveys are undertaken and GPS locations of the best

- possible location are accurately recorded;
- undertake bathymetric surveys and deployment on slack tide (peak of high or low tide) for more accurate deployments;
- use a grapnel or danforth anchor in addition to a block-type anchor to provide additional holding power;
- ensure the best possible weather and current conditions for deploying the FAD; and
- deploy the FAD at the same slack tide when the bathymetric survey was undertaken (high or low).

5.2 Small boat deployments

FAD deployments from small boats are becoming more common across the region due to limited availability / high cost of large vessels and the deployment of FADs in remote locations. Deployment from large vessels can also reduce deployment accuracy. While the trend to small boat deployments contributes to more widespread fisher access to FADs across the region, it is essential to ensure that deployments are conducted as safely and efficiently as possible. Safe FAD deployments from small boats (recommended to be larger than 23 ft) are possible, but some precautions should be undertaken to enhance safety using small boats.

1. Restrict anchor weight to 500 kg (deployment depths to 500 m).
2. Ensure the boat is stable and equipped with a GPS and echo sounder.
3. Position the anchor, anchor chain, main line rope and upper floatation appropriately in the boat to prevent entanglement (see 5.2.1 Pre-deployment layout arrangements and Chapman et al. (2005) for guidance).
4. Limit the number of personnel in the deployment boat to only those who are trained and essential for the deployment. (An additional vessel can be used to transport other people interested in watching the FAD deployment but they must be given clear instructions on where the vessel can be located once at the deployment site).
5. Prepare a pre-deployment plan and conduct a pre-deployment briefing to ensure that all crew are aware of the deployment plan and their role.
6. Use safe heavy lifting techniques for moving the anchor to the boat (e.g. lifting posture and using lift-bars). Image 6 above shows the use of steel pipe lifting bars on an engine block, enabling more people to share the weight of the anchor.
7. Deploy the FAD during calm seas on a slack tide.

5.2.1 Pre-deployment layout arrangements

The boat must have the anchor system in a position where it can be easily deployed while maintaining stability of the boat. The floatation and ropes should be loaded on board in a location that makes it easy and safe to deploy and avoid rope entanglement. On small boats, where space is limited, ropes can be either be flaked on the deck of the boat (when two boat deployments are used – see 5.2.3), or into a drum (Image 8). Ensure that flaking of ropes starts with the bottom of the mooring line, and begin with large loops (or figures of eight) at the base of the deck, becoming consistently smaller as the rope is flaked onto the deck. This prevents rope entanglement during deployment.



Image 8. Pre-deployment layout of ropes when using small boat deployments.

5.2.2 Onboard anchor platform

Onboard anchor platforms can be used to ease the deployment of anchors from small boats. The platform spreads the weight of the anchor across the boat to enhance stability of the boat during transport to the deployment location. The platform needs to be secure in the boat; this can be achieved by ensuring it is wider than the boat and timber blocks are attached under the platform, running down the outside of the boat gunnel. Ensure that the platform is also supported in the centre, by constructing a simple timber structure that fits within the boat. During deployment, one side of the platform is lifted with lift-bars and the anchor slips off the platform. Onboard anchor platforms can be used for different anchor types, e.g. single large blocks or multiple small blocks (Image 9).

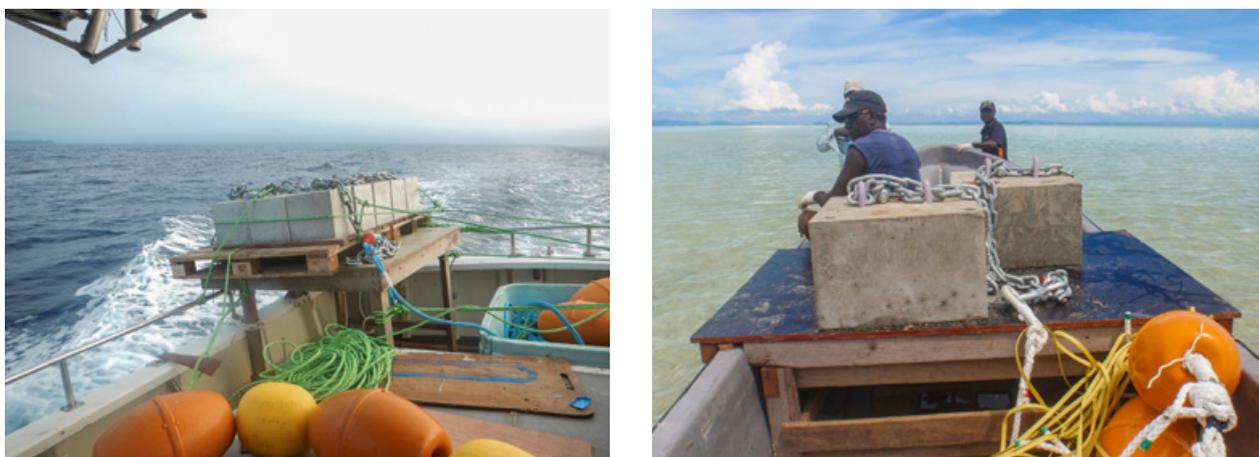


Image 9. An onboard anchor platform showing two different designs.

5.2.3 Two-boat deployments

Small boat FAD deployments often use two boats due to the limited deck space. In this situation, one boat contains the anchor system, while the other contains the upper floatation and main line rope. During two-boat deployments, ensure that the upper floatation is deployed first, prior to connecting and deploying the anchor.

5.2.4 Anchor-first deployments

Anchor-first deployments are generally not recommended for deploying FADs, as they are higher risk and require trained FAD technicians. Anchor-first deployments may, however, be required when anchoring on a slope to enhance deployment accuracy. The deployment technique for anchor-first deployments should follow sub-surface FAD deployment techniques as outlined below in 5.4.2 Sub-surface and lizard FAD deployment sequence.

5.3 Small barge deployments

Deploying FADs using a small barge originated in French Polynesia as a mechanism for safe deployment of FADs in remote islands and is rapidly gaining traction across the region (Image 10 Figure 30 Diagram of the French Polynesia small barge). While the initial upfront construction costs for the barge are high, small barge deployments in remote locations can be a viable option for deploying FADs, including FADs that require a heavy anchor system, such as offshore FADs. The barge has been specifically designed with a sloped platform where the anchor is secured prior to deployment. Care must be taken to ensure that the anchor is secured well during transport, to ensure it does not prematurely slip into the ocean.

The barge, containing the anchor system, is towed by a smaller vessel to the FAD deployment site, while the upper floatation and main line rope are positioned in the vessel towing the barge. At the deployment location, the upper floatation and mooring system are deployed first, prior to connecting the main line with the anchor system. Once in position, the anchor is then deployed by simply releasing the ropes securing it in the barge.

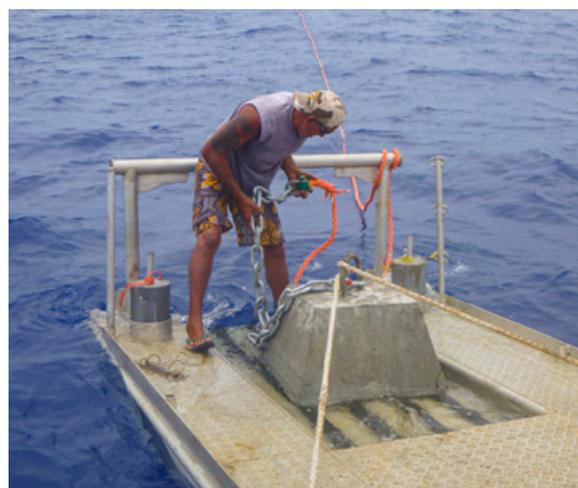


Image 10. Using the French Polynesia small barge for anchor deployment.

For further details and the specifications for the small barge design, contact the FAD Program Manager, French Polynesia, Department of Fisheries and Marine Resources.

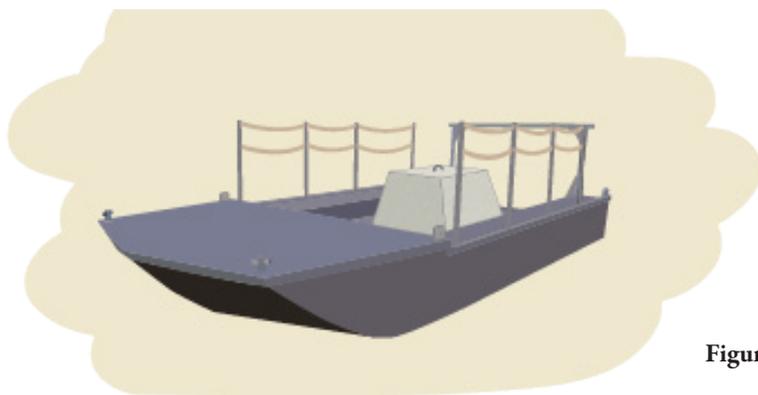


Figure 30. Diagram of the French Polynesia small barge.

5.4 Deployment techniques

All FADs should be deployed during optimum conditions when seas are calm and there is no wind (usually early morning). Websites and apps such as windy (www.windy.com) provide wind and wave forecasts that can aid in deployment planning. Unfortunately, even with the best planning, weather can change, and it may be safer to deploy the FAD rather than return to shore. Under these circumstances, ensure that the boat is side on with the waves and use a hairpin deployment method (see 5.4.1 Surface FAD deployment sequence). Another common issue sometimes faced is that, while planned for daylight hours, due to unforeseen circumstances, deployments end up as night deployments. While it is not recommended to deploy FADs at night due to safety issues, light sticks can be placed on the polypropylene rope to enable you to see the rope during deployment.

5.4.1 Surface FAD deployment sequence

Surface FAD deployments should follow the sequence described below.

1. Motor to the deployment GPS location, keeping an eye on the echo sounder to ensure you are within the planned deployment depth, and place the upper floatation into the water.
2. Motor the vessel in either a circle or hair-pin bend (Figure 31) until the boat is back to the deployment location, while feeding out the main line. This will help ensure that the boat does not become entangled with the ropes.
3. Once back at the deployment location, confirm that the GPS location and depth are correct and drop the anchor.

Circle and hair-pin deployments should always be conducted to ensure that the boat is headed in the direction of shallower waters/land. This will ensure that the anchor, which takes time to reach the bottom, does not end up in deeper waters, resulting in submersion of the upper floatation.

Surface FADs can also be deployed by straight line techniques, following the same approach of first deploying the upper floatation section, feeding out the main line and finally the anchor. Straight-line deployments are usually done in one of two ways.

1. Heading the boat into the current (and along the contour line if required) – the upper floatation is placed in the water when the boat is about two-thirds of the main line distance away from the deployment location. The main line rope is then fed into the water while heading towards (and past) the deployment location. Once the boat is one-third of the main line distance past the deployment location, the anchor is dropped.
2. Running the boat from shallow to deep water – the upper floatation is placed in the water when the boat is about four-fifths (80%) of the main line distance away from the deployment location. The main line rope is then fed into the water while heading towards (and past) the deployment location. Once the boat is one-fifth (20%) of the main line distance past the deployment location, the anchor is dropped.

The disadvantage of straight-line deployments over hair-pin or circle deployments is that the main line rope is pulled through the water during anchor deployment and the upper floatation system is often pulled to deep depths, prior to resettling on the water surface.

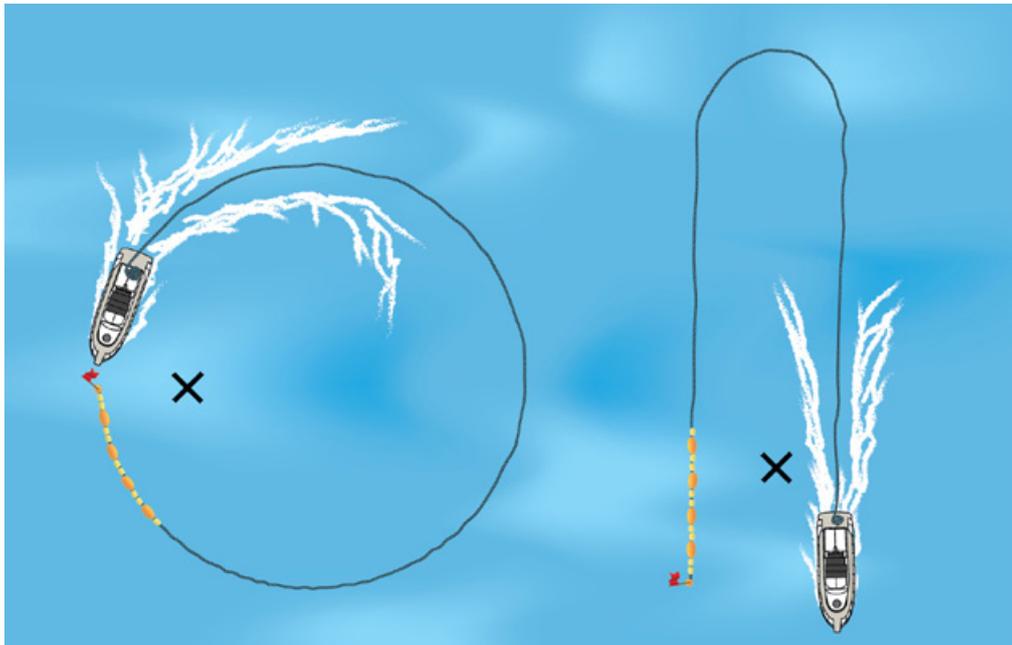


Figure 31. Circle and hair-pin deployment techniques. The cross (X) represents the intended final anchor location.



Figure 32. Straight line/contour deployment technique. The cross (X) represents the intended final anchor location.

5.4.2 Sub-surface and lizard FAD deployment sequence

Sub-surface and lizard FAD deployments follow a slightly different deployment sequence to ensure that the top of the upper floatation ends up at the correct depth (i.e. 20 to 40 m below the surface). The sequence is described below.

1. Motor the boat towards the deployment location and follow the deployment depth contour line, using the echo sounder.
2. When the boat is two times the depth away from the deployment site, release the main line (attach the end of the float line on the boat bollard on the opposite side of the boat to the anchor).
3. Continue to follow the contour line and once you are $\frac{1}{4}$ depth distance beyond the deployment mark, drop the anchor. Once the anchor tugs a little, release the floats into the water.
4. If the subsurface FAD is going to have a marker float attached, retain the marker float and messenger line in a drum on board and allow the messenger line to pay out (retaining the end of the messenger line attached to the boat). Once the anchor and floatation have settled, motor the boat above the FAD and measure out about 5 m of additional rope, attach the float/flag and place it in the water.

The lizard FAD follows the same principle but the lizard tail, i.e. the surface floatation, remains on board and is connected after the messenger line (16 mm nylon rope) is paid out. Ensure that the messenger line remains attached to the boat prior to attaching the surface floatation.



Figure 33. Sub-surface and lizard FAD deployment technique. The cross (X) represents the intended final anchor location.

5.5 Safety considerations for FAD deployments

Responsibility for safety lies with the FAD deployment teams, which should always use trained FAD technicians. FAD deployments often involve community members and fishers and, while it is important to retain community and fisher interest and involvement in deployments, this can lead to difficult scenarios and safety challenges. Ensure that the untrained personnel are involved in the pre-deployment briefing so they are aware of the safety risks and where their boats should and should not be located during FAD deployment. Request all unnecessary personnel to remain in a separate vessel and try to minimise the number of additional vessels at the deployment location. It is particularly important to ensure that these personnel remain out of the way of the anchor and ropes and understand the risks involved.

5.5.1 Safety checklist for FAD deployments

Ensure a clear pre-deployment procedure briefing outlining the deployment plan, individual roles and safety for onlookers.

Ensure that a sturdy boat is used for deployment (wide hull, or outrigger floats) and the anchor is secured during transit to the deployment location.

Plan deployments for suitable weather and do not hesitate to postpone if seas are rough or conditions unstable.

Minimise the number of people in the deployment vessel to those essential for the deployment.

Equip each crew member with a knife (in case of entanglement in rope during deployment) and ensure that the boat is equipped with a safety kit.

Have an emergency response system in place, for 'just in case'.

Safety kit essentials

1. First aid kit
2. Safety clothing for all crew (leather gloves, knife, high visual shirt/vest, safety shoes)
3. Standard boat safety gear (lifejackets, EPIRB or PLB, spare fuel, engine tools/spares, sea anchor, signalling device, water, bailing device, etc.)
4. Light sticks (in case of late deployments)