SKIPPERS WORKSHOPS ROUND 8 - REPORT 15. ISSF Skippers Workshops bring tuna fishers together with marine scientists for participatory sessions — at key fishing ports worldwide — to share ideas and information on best practices to reduce bycatch. Skippers workshops are an important component of ISSF's mission. Held throughout the year at major ports in the Atlantic, Pacific, and Indian Oceans, ISSF workshops have welcomed crew members from vessels fishing under more than 25 national flags. In 2018, we have embarked on our 8th round of Skipper Workshops. The information below summarizes results obtained during the noted Round 8 workshop.

Dates & Locations:
16th November – 5th December Bermeo and Sukarrieta (Spain)

Nº Participants: 75 (see Appendix I)

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SKIPPERS WORKSHOPSCOMMENTS + NEW IDEAS

COLOR CODES FOR MEASURE ACCEPTANCE LEVEL

HIGH	MID-HIGH	MID	MID-LOW	LOW

SHARKS

Sharks in the net	**KEY POINT: A RIGID FRAME GRID TO SEPARATE LARGE SHARKS AND MANTAS FROM TUNA COULD BE USED IN THE SACKING OPERATION** - Fishers in the Indian Ocean were somewhat more receptive to the idea of fishing sharks in the net, while those in the Atlantic and Eastern Pacific thought that sharks are usually larger, and they would be difficult to fish by hook and line. - Most skippers thought that separating the sharks from tuna before or during the set was very difficult. A fisher suggested introducing a metallic grid in the net before sacking up, which would divide in two the sac. The tuna and other fish could escape to one side and large sized animals such as sharks, marlins, or manta rays stay on the other. - Normally when sharks appear gilled in the PS net it is in the first corkline panels. Often the net is not fully extended to create a "straight wall of netting", instead it forms several folds, and when sharks try to escape, they get stuck in between these folds.
Release practices from deck	

KEY POINT: SKIPPERS IN THE EPO USE HOPPERS TO RELEASE BYCATCH AND SAY IT IS HIGHLY USEFUL AND DOES NOT SLOW DOWN BRAILING. A RAMP FROM THE HOPPER TO A RELEASE DOOR COULD BE FITTED TO AVOID HAVING TO HANDLE DANGEROUS SHARKS.

- All except one purse seiner from the company Garavilla, operating in the Eastern Pacific Ocean (EPO), use a hopper. They are in the process of making a custom sized hopper for the remaining boat that does not have it due to little deck space. The hoppers they use fit 4 tons of catch per load. All skippers were very happy with the hopper and said it greatly increased release of bycatch species. It helped spot all bycatch easily and facilitated their quick release. Skippers said that the brailing process was not slowed down by the hopper, as some fishers who have never used hoppers claim. In fact, a skipper explained how he had measured the time it takes to brail with and without the hopper and said the latter was faster. This is because the hopper is located close to the net on the starboard side, so the brail must travel a shorter distance when unloading. Although some vessels might have hoppers which fit 12 t, the norm in the Spanish vessels is about 7-8 t.

- When the hopper is not being used, it stays stored on the upper deck towards the port side. When needed it is either lifted with the crane or several crew will move it to the starboard. A captain informed that in rough seas the hopper might move or slide slightly on the upper deck. However, another skipper pointed out that he does not have this problem because he secures the hopper in place with some ropes.

- Currently the bycatch in the hopper is lifted manually and released overboard. Handling large sharks between two fishers is not ideal due to risk of injury. Although they had stretcher beds, the shark still had to be manipulated to lay it on the bed. A skipper suggested that an additional door should be fitted on one side of the hopper and fit a ramp that goes directly to sea. The ramp could be either an aluminum one or even a ramp with rollers like the ones to move boxes, etc. He estimated the ramp would have about 7-8 m length and suggested making it foldable, so it takes up less space onboard.

- Skippers of some of the larger sized Spanish vessels commented that their top decks often have little space because of the large-sized machinery (e.g. bigger winches to pull the longer nets) and thought that there might be reduced space for a hopper. However, as mentioned before custom-made hoppers can be built to the required specifications of each vessel.

- Vessels of Inpesca carry onboard an aluminum-built ramp of approximately 5 m. When releasing bycatch the ramp is moved with the crane and goes from the brail to the door opening (approx. 1.5 m wide) in the railing of the port side. A stool or high wooden block is used to rest the top side of the ramp near the brail to maintain it in an inclined position and enable easy sliding down of bycatch.

- Fishers of other companies liked the idea of the ramp but insisted that scientists need to convince the ship-owners about adopting these liberation tools. Only ship-owners have the power to give the

go ahead with buying the materials, building the equipment and allowing fishers to used them during the fishing operation.

- Deck bosses and crew raised the point that although they are the ones doing the actual release practices and handling the bycatches it is up to the fishing masters to really transmit down to their crew the importance of releasing bycatch adequately. Deck bosses complained that some fishing masters are more worried about loading the fish quickly and less about best release practices, thus releases are not a priority in some vessels. They also said that if there are fines or sanctions related to poor release practices, the fine should not fall on the captain, who is legally responsible of the vessel, but rather on the fishing master who really has the last word of what happens in the vessel. Lack of legal accountability of fishing masters regarding this subject may incentivize poor practices.

- On the other hand, a skipper in Sukarrieta said that it takes a lot of effort and insistence to train African deck crew in releasing the bycatch the right way. Note that in the Atlantic and Indian Ocean the majority of deck crew are African. Often language barriers (e.g. many African deck crew do not speak Spanish fluently) means that communicating bycatch release methods is difficult. Skippers thought that having specially dedicated workshops for African deck crew in their native language (many originating from Senegal, Ivory Coast, or Madagascar speak French) would be a good idea.

- A few skippers argued that they did not want to force upon their crew shark release practices, because of the high risk of being injured. They thought they could put at risk the lives of the crew if they obliged them to release large live sharks and narrated several serious injury accidents that have occurred on their vessels.

- Deck bosses and crew also thought that large sharks are dangerous and difficult to lift and handle manually and that the only real safe option is to lift them by the tail with a loop and the help of the deck crane.

- A fisher said that because lifting a manta ray with the canvas or cargo net can take up to 10 minutes, often they just lay the manta ray to a side on the deck until loading the catch is finished and then proceed with this maneuver.

- Other fishers suggested that releasing the manta ray with the brail is the best option, even if some tones of fish are lost in the process. However, some skippers explained that not all boats are able to conduct this maneuver. Some brail lines will not have enough reach to free animals outside the net, or it may require moving the boom, but at this time of the fishing operation the boom is engaged in keeping the sac open, so its position cannot be changed. Therefore, being aware that they must release mantas most continue to do it manually “their way”. These manual releases are slow and difficult sometimes as the animal can be very heavy and does not have easy grabbing points. As a fisher said, “manta rays do not have handles”.

	- A fisher working in the EPO commented that he once tried to release a manta ray by opening the brail outside the net and because the brail contained 5 t of tuna he received a sanction. IATTC, and other RMFOs, do not allow tuna discards and the observer annotated the manta release event as tuna discarding. This is why EPO fishers are not very keen on this method, even though Annex I of resolution C-15-04 talks about using the brail for releases. RFMOs should clearly state in their measures and inform observers that limited tuna discarding is allowed if done for the purpose of releasing manta rays or large shark with the brail. - As manta rays occur mainly in free school sets, and most of the Spanish fleet sets occur on FADs, fishers say these species appear very rarely, maybe once a month or less depending on the fishing zone. - While a few participants said that they already have their (manual) methods and that this does the job, most fishers agreed there are not enough efficient and safe release equipment tools on board for large sharks and manta rays and that better tools and methods should be designed and tried. - A skipper had tried to use a bamboo-built grid to let fish go down to the lower deck while brailing and retain the manta on top for release. He said that the weight of the manta ray crushed the bamboo frame in the first trial. AZTI scientists suggested that the shorting grid should be metallic and with enough diameter to support the large weight of manta rays. Improvements suggested were that the grid should consist of a simple cross of metallic circular tubes (i.e. no sharp edges to prevent injury) and the structure should be slightly concave (i.e. not flat) because it is difficult to open the bottom of the brail on a flat surface, it needs some depth to open properly. - Good release practices “are impossible to carry out” according to skippers when large numbers of sharks (e.g. >50) appear on deck, especially adult dangerous ones. This case is particularly exemplified by some sets in Gabon. Three skippers explained how they had accidentally come across a massive number of sharks (e.g. +800 individuals) in three different sets. Apparently all three sets where on free schools and were very localized happening within a very close area in the same week. Maybe with a communication system between boats alerting when unusually high numbers of shark bycatches appear in a particular time-zone, could have prevented more than one set of this magnitude. Fishers involved in these 100 t shark sets thought they had caught a large school of tuna and where not aware that it was mostly sharks, as it is not distinguishable with the acoustics (e.g. sonar). - Fishers said that sets with large numbers of sharks tend to occur closer to the coast (e.g. within 80 nm), but occasionally can also happen in waters outside EEZs. In the highly productive areas of Gabon and Angola, sets with +50 sharks are not infrequent, typically adults. Most of the sharks that come onboard in these sets have died in the sac, but those that are alive are extremely difficult to handle due their size. Fishers pointed out that hammerhead and especially mako sharks are extremely

dangerous, and several skippers informed about crew members being bitten. Skippers commented that when there are many sharks in a set, these can cause substantial damage to the net when trying to bite through it. Some fishers when they discover they have a large quantity of sharks in the net they will open the net and let everything go. Slipping regulations are in effect in some fisheries of the EU and may be an option when many tons of sharks appear in the net.

- Fishers working in Gabon said that while these waters have always been rich in marine megafauna like sharks, whale sharks, mantas, whales, etc. this year has been exceptional. Some fishers working in the Atlantic for over 30 years said they have never encountered so many sharks and whales as in 2018. For example, a fisher described how he had encircled in a set 15 whales, which broke though the net and all escaped.

- A fisher from the Atlantic said that these days most of their annual catch, he estimated 70%, comes from sets near the African coast in regions like Mauritania, Gabon, Senegal or Angola. These areas near the continental shelve happen to be also the regions where sharks tend to occur more frequently compared to open pelagic waters.

- This year in the northern area of EPO 140°-180° W and 4°-5° N fishers have encountered many sharks, with sets of over 150 individuals, many being adults. Fishers in this ocean said they are seeing more sharks than other years.

- There is a tendency towards larger mesh size (e.g. 8-9 inch) in many of the Spanish vessels, which may result in smaller fish and some small sharks or other bycatch escaping through the net.

- Vessels of the company Echebastar have a second conveyor belt in the lower deck which feeds into a side opening of the hull to release bycatch directly. Skippers from other companies noticed that in some of the boats an opening in the lower deck area would not be possible due to risk of flooding because it would lie near or below the vessels' line of floatation.

- A fisher said that small sharks usually appear dead in the brail, larger individual are more likely to be alive, inferring they were more resistant. It was suggested that if an important part of the shark mortality in the sac is due to suffocation, as most species are obligate ram ventilators (i.e. need to move for oxygen rich water to pass through gills), introducing a hose with oxygen when sacking could enhance survival rates of sharks arriving onboard.

- In Ecuador PS vessels get a very small fine if a shark is found during unloading, only 1$ per shark. In Majuro (Marshall Islands) a boat was heavily fined when a few sharks were found in the well. The captain who accidentally fished them in the EPO was not aware at the time of the shark-related penalties in the Marshall Islands. Since, depending on which port they will unload, making sure sharks do not accidentally enter the wells has become a priority.

Non-entangling DFADs	**KEY POINT: NEW NON-ENTANGLING FAD MODELS ARE EMERGING LIKE THE "CAGE FADS" BEING USED IN THE INDIAN OCEAN** - Most Spanish companies are using lower entanglement risk FADs made with small-mesh net or tied in "sausages". These FADs are considered by RFMOs as non-entangling (NEFADs). Much of the small-mesh net comes from secondhand nets of small pelagic fish purse seiners. Apparently, some smaller companies try to save money by buying reused nets of poorer quality and this results in more FADs lost (e.g. higher incidence of broken off FAD tails). - In the Indian Ocean the latest FAD trend are the so-called "cage" FADs, named like this due their shape (see photo Appendix II). These FADs have a square raft made with a metallic frame and below hang 4 short (2 m deep) walls of small mesh netting. The raft is slightly submerged below the sea surface, hanging from 4 black PVC float balls. This FAD design goes against the trend seen in recent years of deeper tails in the Indian and other oceans. It apparently works for certain regions of the Indian Ocean where currents are superficial. The original design was invented by a skipper from Albacora, but many companies are now copying it. - A Spanish fisher complained that the French skippers in the Indian Ocean are still using entangling FADs, not due to the tail which is tied in "sausages", but because of the raft being wrapped in large mesh (>2.5 inch) purse seine netting and not covered with canvas. - The company Echebastar was the first Spanish company around 2012 to move to FADs with "sausage" tail FADs. Now it only uses ropes in the underwater appendage. - A skipper explained that tuna always swim against the current, so FADs are designed to also drift in a counter current way, following the natural movement of tunas. In NEFADs fishers still maintain design elements (e.g. small net or canvas sails) at certain depths, to allow for FADs to track these eddies and countercurrent systems. - Some skippers who had worked in the WCPO thought that "Korean style" FADs with deep tails reaching 60 to 100 m worked better than shallow tails in the EPO too.
Degradable FADS and FAD retrieval	**KEY POINT: FISHERS IN THE INDIAN OCEAN HAD THE PERCEPTION THAT BIODEGRADABLE FADS WERE NOT LASTING AS MUCH AS SYNTHETIC MATERIAL ONES AND PREFERED TO USE THEIR OWN BIODEGRADABLE FAD DESIGNS RATHER THAN THE ONES SUGGESTED BY THE BIOFAD PROJECT.** - The company Marine Instruments is working of prototypes of remotely operated self-propelled FADs. These FADs carry a solar panel for energy provisioning and a small propeller to move the FAD

structure while remotely controlled. The idea is to keep the FAD within productive waters, presumably the speeds that it can reach are low (e.g. 1-2 knots). Fishers in theory would be able to remotely direct FADs away from the coast if they see danger of beaching.

- The captain of a medium sized boat (1200 GT) in the Atlantic with no supply vessel estimated that in a month he might deactivate about 100 FADs and of those he will later recover at port around 30 buoys (e.g. 30 FADs have been stolen by other vessels, the rest might be lost, or the buoys have not been returned if stolen). The norm is to return to port FADs stolen to others, but some say that not all skippers do this and sometimes sabotage the buoys of others (e.g. drill a hole in them to sink them).

- A supply vessel captain in the Atlantic described how when finished seeding FADs and have space onboard, he picks up old FADs and takes them to port. He explained how he had to train his crew to always recover old materials, as many crew were used to just throw away old plastics and nets because “it is much easier and less work”. This participant pointed out that not many supply vessels carry out this “recycling” function and that there was much room for improvement for FAD retrieval in the Atlantic.

- Vessels which have access to buying many buoys often do not mind deactivating many of the ones that are in the water. This is because they prefer to get a new batch of buoys with the latest technological updates. This high deactivation rate results in more abandoned FADs generating marine pollution.

- In the Indian Ocean several fishers argue that the reduction of number of supply vessels (presently one per two vessels of the same flag allowed) may have resulted in a lower rate of FAD maintenance and retrieval. Fishers said that when FADs drift to the east, towards the Maldives, few times they go to retrieve them as these are generally poor fishing grounds. They agreed that informing local Maldives fishers of FAD positions to fish on them in exchange for picking the FAD up and taking it to land was a fair deal. However, note that some of these FADs with over 80 m deep tails can be tricky to pull up without cranes and can take considerable space on a small fishing boat. Other fishers thought that having a dedicated vessel to pick up FADs near the Maldives would not make a great difference due to the huge number of FADs required and the large area it would need to cover.

- In general traceability and reporting by the Spanish fleet for biodegradable FADs (EU/ISSF BIOFAD project) in the Indian Ocean is good, with high rates of compliance in terms of changing the metallic ID plates and sending reports on encountered biodegradable FADs. One weak point that a captain brought up was that biodegradable FADs have two green ID plates, one on the raft and other on the buoy. In theory that red ID plate should go on the buoy, but some fishers might be putting it on the raft. If the raft is submerged underwater it is difficult to see it and it will not be identified as an experimental FAD.

	- Fishers in the Indian Ocean have been seeding FADs in the last months, starting May 2018. Although most started seeding later than this because many stopped one or two months in June-July during the monsoon season when catches are usually slower. Some fishers were concerned with biodegradable FADs having to sustain high stress during the rough seas of the monsoon season. Even synthetic material FADs deployed between June to September around the 2°N area end up breaking or in a poor state. The number of BIOFADs per vessel is small and skippers had only limited information of the FADs they had seen at sea. Some thought that the structure of the frame was not as strong as what they were using before (e.g. metallic frames) and that the black canvas to cover the raft was breaking quickly (e.g. < 2 months), unlike agricultural synthetic covers used in synthetic FADs. Part of the reason for the canvas breaking quickly could be that to tie it to the raft structure most fishers make holes in the cloth. These holes are weak points, facilitating the creation of rips that undermine the structural integrity of the material. - Fishers also pointed out that they had found BIOFADs with the cotton rope broken off, usually finding only 2-3 m of rope left hanging. As several skippers pointed out, having such deep biodegradable ropes with 80 m depth it is highly likely that they can break due to weight stress. Even nylon and coral synthetic ropes can break if supporting such deep tails. Some skippers said both their biodegradable and paired synthetic FADs had lost the tails and echo-sounder information was showing no aggregation. However, other fishers reported finding biodegradable FADs of their own after five and six months still in good condition. They also had made sets on them, although these had small sized schools (e.g. < 15 t). - Several Indian Ocean skippers made it clear they would have preferred to have received the biodegradable materials and be able to choose their own designs, instead of having to choose between two or three prototypes. For example, some wanted to try a biodegradable version of the “cage” FADs. On one hand having a large variety of biodegradable FAD designs might have resulted in lower statistical power when doing type comparisons, but on the other skippers might be more inclined to test them and also might reach faster better working designs. - A few Indian Ocean skippers noticed that the bamboo canes provided for the BIOFADS were quite narrow and more fragile than the think mature canes they are used to. This could translate in poorer floatability and structural integrity of the raft. Some skippers had also run out of allocated black cotton canvas before seeding all BIOFADS because they were using extra material to wrap the raft several times around in canvas. Their companies have ended buying extra canvas materials from the provider (Ternua) to be able to complete production of all experimental FADs. - A fisher explained that when they used to put plastic covers on synthetic rafts, the weight of the water accumulated on the plastic cover would eventually end up weakening or even breaking the

bamboo underneath. This is one of reasons to wrap the bamboo in netting material, providing greater structural integrity.

- So far Spanish fleet BIOFAD project collected data shows that only a small number of sets have been conducted on experimental FADs, but there were a few more sets on biodegradable FADs than on the paired non-biodegradable ones. A skipper in the Indian Ocean estimated that out of 2000 FADs maybe only 100 would have fish. Implying that only a very small percentage of all seeded FADs yield catches. Other fishers thought that 1 in 10 FADs might aggregate enough tuna for a set (e.g. > 5 t).

- Gabon was requiring that FADs used within their EEZ were built with biodegradable materials. Some companies tried bamboo rafts and cotton ropes three years ago and obtained decent catches. However, last year the biodegradable FADs failed drastically, most sinking or loosing the tail, resulting in very poor catches. The companies this year decided to use synthetic material FADs (e.g. plastic floatation, nylong netting) in conjunction with biodegradable elements. An experienced skipper pointed out that in the Atlantic a FAD needs to mature for a long time (e.g. 6 months) before it starts aggregating tuna. This different from the Indian Oceans in which FADs require a shorter colonization time and thus are not required to be so durable in time (e.g. 3 months would be enough).

- The fishing technology company Zunibal launched a raft for FAD use which is constructed in oxo-degradable plastic. The shape of the raft is circular with a diameter about 1.8 m and dark grey in color for camouflage. The raft structure has empty spaces inside that can be filled up with water to control desired buoyancy. Only one Spanish company seems to be using this plastic raft type regularly.

- Weight gain in biodegradable FADs was a major concern for many fishers as it puts a lot of stress on the FAD's materials and it can also greatly reduce floatability, making them sink and be lost. In the Indian Ocean warm water in the spring time results in many FADs being heavily covered in flying fish eggs. In other regions like the Atlantic, cold waters rich in nutrients (e.g. Angola, Namibia, Mauritania) result in heavy barnacle growth biofouling that can make FADs easily sink. Skippers said they used plastics in rafts because biofouling was lower in these surfaces.

- Unlike the Eastern Pacific and Indian Ocean in which historically shallow FADs have worked in many areas, the Atlantic Ocean fishers say that only deep tail FADs work there. Korean skippers in the Atlantic have been using + 50 m FADs for over 40 years.

- Most natural floating objects in the Atlantic do not have tuna aggregated. In general, there are few large river deltas in the Eastern African continent discharging natural floating objects. Fishers say they only find tuna under very large natural objects, like dead whales or a big log, but not under smaller objects The only exception could be marine algae mats (referred to as "hierbas" in Spanish) coming out of the rivers in the Guinea region under which tuna are fished sometimes.

	- A skipper said that the oceanographic drift in the South West and East Atlantic are quite different too, and FADs work differently. - A skipper in the Indian Ocean reported having successfully tested rafts built with wooden pallet structures. If pallets structures prove to be structurally solid and provide good flotation it could be considered a good biodegradable option as there is no shortage of them and can be obtained at a very cheap price. - According to a company manager with vessels in the EPO the OPAGAC vessels as part of the FIP in this ocean will start testing biodegradable FADs in 2019. This participant was not so sure that TUNACONS members would finally participate also in the project, but they were still in the process of trying to reach an agreement to do this experiment jointly (e.g. OPAGAC + TUNACONs). Each large PS would deploy about 20 biodegradable FADs per year and there would be three prototypes to choose from.
SMALL TUNA	
Buoys with echo-sounder	**KEY POINT: FISHERS THINK THAT WITH CURRENT YFT AND BET CUOTAS PER VESSEL INFORMATION ON SPECIES COMPOSITION IN FADS HAS BECOME EVEN MORE NECESSARY** - Remote information on species composition in FADs with echo-sounder buoys has become an even more important priority for fishers now that they have BET and YFT quotas in several oceans. - Participants proposed to incorporate camera systems to FADs to gain remote information on the size and species compositions under FADs. - A fisher commented that the SIMRAD sonar, developed for cold-water species originally, does not work as well in warmer waters. - A skipper suggested that buoys should only have GPS and remove the echo-sounder as an effort control measure. He thought that echo-sounder buoys greatly increase the fishing efficiency and also pinpoint the presence of fish in areas that they would have not even visited if it was not for the remote information. He said fishers no longer follow the seasonal movements of tuna as they used to, instead moving between zones based on estimates provided by the echo-sounder buoys. There is no time lost searching for fish.

FAD management **Options and YFT/BET cuotas**	**KEY POINT: CLEAR DIFFERENCES IN TERMS OF PREFERRED YFT AND BET MANAGEMENT OPTIONS SURFACED BETWEEN SMALLER AND LARGER VESSEL COMPANIES DUE TO THEIR DIFFERENT FISHING STRATEGIES** - The Spanish flag fleet estimates for YFT are based on the information provided by the fishing diary from the vessel (e.g. DEA sent daily). Meanwhile, Seychelles flagged vessels have a 2500 t quota and YFT catches are estimated as 30 per cent of all landed catches (based on historical catch statistics) to all boats. - Some skippers working in the EPO said they all knew what the solution for the bigeye overfishing was, reducing FAD numbers. However, they did not want to contemplate this option as it could reduce drastically their fishing. A fisher questions why the FAD limits are similar in number (e.g. 450-500 FADs) in the EPO and the Atlantic, when the latter is much smaller in size. - A company with only one supply vessel and a history of low FAD numbers compared to other Spanish companies said that the Indian Ocean FAD limit regulations have led most boats to operate within the upper range of the limit. Whereas before 2014 they were using less than 300 FADs, now they work with the 325 active buoy limit and 700 buoy purchase limit per vessel, estimating they probably deploy over 500 FADs in a year. Scientists pointed out that the buoy limit was first self-imposed by the Spanish purse seiner associations at 450 buoys per year and was intended to put a stop to the escalating number of FADs being deployed by the largest vessels. The trend in FAD use was clearly going up quickly since the late 1990s and it is quite likely that even the less FAD-intensive companies would have arrived at 325 active FADs or more regardless of regulations. - Fishers of larger vessels in the Indian Ocean say that with the current YFT quotas they are stopping about 4 months a year. They thought that if it was not for these long stops, the current limit of 700 buoys bought per year would be insufficient. A fisher estimated that about 25-30 of his FADs are stolen per month, this would be about 350 FADs stolen per year. Note that they also find and appropriate FADs from others. Besides the 700 new buoys they can buy per year, they also can use the ones bought in previous years and that are being recovered. Many of the older buoys are constantly “recycled” because buoys from FADs stolen by other vessels are often returned to port. This way an old buoy can be lost and found up to 4 or 5 times during its lifetime. - Fishers in the Indian Ocean question the validity of the YFT stock assessments and most say they have not seen so much adult free school YFT in many years. This could be the result of FAD regulations making an effect (e.g. FAD limits) or maybe a flourishing of YFT due to certain environmental effects like the catches of large adult YFT near Tanzania in 2006-2007. However, skippers said that in Tanzania the effect was more localized and easier linked to zone-specific environmental conditions such as

upwellings and high abundance of crustacean food sources, while now they see large schools of YFT in many areas year-round.

- Skippers said that the YFT quotas are counter intuitive because they now avoid catching the large adults, as sets on free-school YFT would result in consuming their annual quota too quickly and having to stop the boat earlier in the year. Instead, now FAD fishing has become even more intensive, as vessels focus on fishing floating objects, which have a lower quantity of YFT compared to SKJ. Even the French companies which were known to have a more free-school directed fishing strategy are moving towards more FAD sets. YFT free school fishing is basically dissapearing in the Indian Ocean as a fishing form.

- A skipper of one of the largest vessels in the Indian Ocean thought it was unfair that all vessels had the same YFT TACs. He thought that he should be entitled to a larger quota because his ship-owner had made a greater economic investment by constructing a larger vessel and now needs to fill the vessel with more fish. Scientists argued with him that this had been a "tactical decision" by the ship-owner and could not be used as an argument to have more fishing rights than other vessels.

- Fishers thought that real-time closures (RTC) triggered by information provided by fishers on temporal hotspots of YFT or BET was an interesting idea, although had doubts on the way in which it could be implemented. Instead, some skippers (especially of larger boats) in the Indian Ocean called for a two-month stoppage with ports going to port, similar to the EPO's one, rather than quotas. Probably larger vessels, with supply vessels too, would fish more tons of tuna per year with the two-month closure than with the quota system. In fact, with current YFT quotas some of the vessels are more or less stopped during 4 months of the year.

- Another skipper thought that if a closure was to be applied in the Indian Ocean to protect YFT stocks, it should be done between June to September. His observation was that adult YFT females around those months found in the areas between Seychelles and Somalia are ripe with eggs and his theory was that they were in breeding season. Meanwhile, adult YFT after October more to the east (e.g. Chagos) have fewer eggs and may not be reproducing as much. He thought that the tuna that grow in the coasts of Somalia, as they grow, they start moving out up north and then become available to PS fishers.

- ICCAT introduced in 2018 for the first-time flag-based quotas on BET. The Spanish fleet had reached its BET quota by November and many boats have stopped. However, some vessels have decided to continue fishing for the remainder of the year but will carry onboard an EU-based person observer to check the amount of BET being caught. The idea is that the vessels will only fish on free schools of SKJ and YFT, which in theory do not have BET, and avoid fishing on FADs.

	- PS skippers in the Indian Ocean complained that YFT vessel TACs should also be applied to longliners and any other tuna fishing gears. - A few fishers said that the Korean PS vessels (flagged under Senegal) in the Atlantic where filling the boats with a large amount of small tuna (e.g. < 1.5 kg SKJ) and skimming some of the most important breeding grounds like seamount areas (e.g. those near Sierra Leone). Spanish fishers thought that nobody was controlling what was being unload by those vessels at port. - The Spanish fleet company Echebastar, operating in the Indian Ocean, has recently reached Marine Stewardship Council (MSC) certification for all its skipjack tuna caught on FADs. This is the first company being MSC certified for their catches of FADs. This certification received criticism from some NGOs (e.g. Greenpeace, WWF, Shark Advocacy) and fishing organizations (IPNLF). Echebastar's FAD tuna certification will probably open the doors for many other FAD fisheries or companies to achieve this eco-label. At present other Spanish owned companies (under the Spanish flag or others) are undergoing Fisheries Improvement Programs (FIPS) to reach MSC certification in the Indian, Atlantic and Pacific Oceans. - Currently the active buoy limit per vessel in the Indian Ocean is 325 FADs (and a 700 buoy purchase limit per year). In the Atlantic the limit is higher, reaching 500 active buoys at any time. A skipper from the Atlantic thought that 500 active FAD buoys was quite a high number and that many vessels do not reach that upper bound, only the larger vessels. He thought that with a 325 active buoy limit they would still have enough FADs to operate profitably in the Atlantic. - To reduce bigeye catch using shallower purse seine nets could work, but fishers were not very enthusiastic about this as it could result in more null sets due to fish escaping under the sorter nets. - An Atlantic Ocean fisher estimated that less than 10 per cent of catches come from free schools. The rest is from FAD sets.
BONY FISH AND OTHERS	
Utilization	**KEY POINT: SOME OF THE BONNY FISH BYCATCHES SUCH AS DOLPHINFISH, MARLIN, WAHOO, ETC. ARE FROZEN WITHOUT BRINE TO SELL IN HIGHER END MARKETS.** - A few companies like Echebastar in the Indian Ocean are introducing ultra-freezer wells for large bigeye and yellowfin tuna to sell in the higher priced markets. They also ultra-freeze species like marlin, barracuda or wahoo for high end sales to restaurants or supermarkets. A skipper estimated that they ultra-freeze about 5-10 t of these species in one trip. Note that since 2018 the IOTC calls for retention of all bycatch species, except for those in a vulnerable status (e.g. sharks, manta rays).

	- In the EPO many vessels are keeping most bony fish bycatch species (except trigger fish and rainbow runner). These species are not stored in brine, but rather frozen in an empty well. When most wells start to be filled with tuna, the utilized bycatch is moved and stored on top of the frozen tuna. All money earned from these bycatch sales goes directly to the fishers (not the ship-owner or company). - Most species in the Atlantic have traditionally been sold in local markets as "faux poisson". Fishers said that now some vessels are even selling small pelagic species such as scads and blue runners.
LONG TERM (FUNDAMENTAL RESEARCH) ACTIONS	
Tuna behavior and ecosystem changes	**KEY POINT: THE CLOSURE TO PS FISHING IN SEVERAL EEZS OF THE WESTERN INDIAN OCEAN MAY WORKS AS A LARGE MARINE PROTECTED AREA THAT EXPLAINS THE HIGH CATCHES OF TUNA IN RECENT YEARS IN THIS OCEAN DESPITE CUOTAS.** - At present fishers in the Western Indian Ocean have no licenses to fish within the EEZ waters of many of the coastal countries. This has resulted in a *de facto* large marine protected area. These closures are only recent like Somalia since 2007, Chagos since 2010 and Tanzania, Kenya since 2016-17. Before most boats would fish at times even within 20 miles of the African coast, but now they are outside the 200 miles of most EEZS. Many skippers attribute the good health of the Indian Ocean fishery and the strong catches in recent times to these no entry zones acting as marine sanctuaries and enabling replenishment of tuna stocks. Very recently the Chinese Overseas Fishing Association has reached an agreement with the Somalian government for 30 fishing licenses, mostly longliners. This increase in capacity could have deleterious effects on this key tuna breeding area. - A skipper working in the Atlantic thought that FADs drifting to west, where waters are less productive (e.g. towards the Brazilian continental shelve) are mostly abandoned. Only a few companies will send tender vessels to retrieve FADs at times doing a one-month trip near Brazil. The skipper thought that the high quantity of FADs moving towards the west affect tuna migrations, moving the fish westward. - A skipper with 40 years' experience thought that the seasonal distribution of tuna in the Atlantic could be changing, and part of it could be related with the abundance of FADs. He explained that traditionally July was the best time of the year for fishing in Gabon, but nowadays the fish enter earlier in the season and by July there is little tuna left. He also said that these tuna movement shifts could be related to climate change. In 2018 in Gabon there were quite rough seas and fish were less abundant. In this region when the sea is calmer there is more tuna. He also mentioned that Mauritania in the last 5-7 years has yielded a lot of tuna, mostly large sized, especially after the EU fleet was granted fishing licenses after quite a few years of not fishing there. However, last year and this one, skipjack schools found in Mauritania are not so large anymore (e.g. < tons) and the individuals have a

	smaller size (e.g. < fork length). This might reflect the heavy fishing exploitation taking place in the Mauritanian EEZ in the last years. - Several vessels "guarding" FADs near sea mountains have regularly made good catches. These sea mountains are considered very high production hotspots and fishers try to control these areas. - Fishers in the Atlantic say that in coastal countries like Gabon or Angola petrol companies are exploring and setting up many oil platforms in their EEZs, extracting oil at 1500 m depths. In some places like Angola the tuna boats are fishing between platforms and may be a nuisance for petrol companies. Some fishers believed that in the future, as petrol companies leave much more money in these countries than PS fishing licenses (many millions of dollars vs 2-3 million dollars) and industrial PS are generating bad publicity due to high bycatches of vulnerable species (e.g. Sea Sheppard campaigns in Gabon), the African governments will discontinue their licenses. Note that currently no EU vessels have fishing licenses for Gabon, only those from other "flags of convenience". Fishers also commented that in some sets catches have arrived "black" covered in petrol. - An Atlantic Ocean fisher said that FADs have more tuna during the rising and full moon phases. The clarity likely pushes up closer to the surface the deep scattering layer (DMS) and with it the tuna. This phenomenon is likely to occur in other oceanic regions as well. Larger YFT and BET individuals which usually move in deeper layers outside the reach of purse seiners (e.g. <150 m) might be more vulnerable to fishing by this gear during the full moon phases if they move up in the water column too. Vessels in the WCPO use lights before dawn to attract tuna to the FAD. Similarly, some supply vessels in the Atlantic sometimes use lights as well to gather more fish around a FAD. In the Indian Ocean the use of lights in FADs is prohibited. Fishers described how in Gabon sometimes tuna aggregate around the PS vessel at night if the boat lights are on. - Fishers in all oceans report increasingly expanding their fishing grounds north and south to colder waters, where rough weather is more common but also where the large adult tunas are more prevalent. In the Atlantic boats are going to the south of Namibia, while in the Indian Ocean fishers fish now south of Madagascar. In the EPO boats are also moving south (14°-17° S) towards Chile to catch the bigger tuna. They said that although weather is worse, only in very few occasions it prevents them from making a set. The idea of incorporating a triplex system rather than using the power block to retrieve the net in PS vessels was also discussed.
CPUE AND FISHING EFICIENCY	
Fishing technology, observers and FADs	**KEY POINT: MANY COMPANIES HAVE A NOW CENTRAL COORDINATOR WHO DIRECTS FROM AN OFFICE ALL THE FISHING MOVEMENTS OF THEIR PURSE SEINERS.**

	- Some older skippers thought that the skill set required to be a good fisher is being lost. With the high dependence on FADs and the aid of echo-sounder buoys, nowadays many companies have a central figure, usually the fleet manager, who decides where each vessel of the company must go fishing next instead of the fishing masters. Therefore, skippers are losing autonomy to independently plan their fishing strategy and now simply obey orders from a coordinator, who based on the readings of all the company's echo-sounder buoys on screen and other information, tells them what to do next. In fact, some of the largest companies are taking up young skippers, who have less fishing knowledge than experimented skippers, but are more receptive to follow fishing strategy orders and have a lower cost in terms of salary. - Older Spanish skippers remembered they use to have an unwritten code of conduct by which one, they could not steal another vessel's FAD if the owner was closer to the FAD than 32 miles (i.e. the range of detection of the bird radar), and second, they could not set on fish which was within a radius of 3 miles from someone else's FAD. Apparently, high competition in the Indian Ocean has resulted in fishers often ignoring these rules. - The theme of observer corruption emerged again through out some of the meetings. Skippers said that observer bribing not only was generalized in the EPO and WCPO, where in theory there would be more incentives to pay off observers to avoid penalties related to infractions such as shark retentions, sets on prohibited species or discarding of tunas for example. In the Atlantic and Indian Ocean observers, both person and electronic have been up to now basically used for monitoring a voluntary Code of Good Practices, which is not associated with penalties or sanctions for the captains. However, with new observer tasks monitoring catch quotas, FAD limits, prohibited sets on whale sharks, or FAD closures there might be greater incentives to bribe observers. This is also true for national observers when PS are fishing within EEZs of coastal nations (e.g. Gabon, Angola, Mauritania), etc. A few fishers said that European observers were more professional, while African observers were more susceptible to bribes or just did not do their job properly. - A captain described how there have been many changes in overall fishing capacity throughout the years, narrating how up to 1983-1984 there were many fleets in the Indian Ocean, including several USA boats, but poor catches in those two years resulted in many vessels abandoning the fishery. Around 2007 many vessels left the Indian Ocean due to piracy and several ended in the Atlantic Ocean. Now some of those have returned again to the Indian Ocean. These sudden and strong transfers of fishing capacity from one ocean to another can have critical impacts on stocks. - The fishing technology company Marine Instruments has developed a drone to assist purse seiners (http://www.marineinstruments.es/productos/proximos-lanzamientos/tunadrone/). The drone can travel at 35 km/h and has an autonomy of 6 h. The IOTC already prohibited the use of drones, but other RFMOs have not.

	- A skipper from a one-boat company suspected that the larger companies are trying to drive the smaller companies out of the fishery. He argued that while a boat of a large company recovers maybe 100 of their buoys at port after a trip, he had not recovered even one stolen buoy in five trips. He thought that big boat companies deliberately try to reduce the efficiency and increase costs (e.g. by sinking small boats' FADs or buoys) of smaller companies so they are no longer economically viable and eventually disappear. - A fisher in the Atlantic said that he had seen FADs with lights incorporated to attract tuna. In the Indian Ocean the use of lights was banned a few years ago. - Some Spanish flag vessels in the Atlantic and Indian Ocean have supply vessels which are flagged under other nationalities (e.g. Seychelles, Belize, Thailand, etc.). - Indian Ocean Spanish fishers complained about the introduction of 300 tuna longliners owned by Asian companies and flagged in Madagascar. Apparently, this new longline fleet has been allowed in exchange for funding the construction of a transnational road that will cross the country. - Fishers in the Atlantic and Indian Oceans protested about the high number of fishing licenses needed to fish near coastal waters as there are so many countries. Many of these licenses are only given to vessels of certain countries (e.g. non-EU flagged boats in Gabon). - Skippers working in boats with "smaller vessels" questioned the fishing policies of companies with the large super super-seiners (e.g. >2000 GT) saying they were unsustainable in the long term. They thought that the very large boats fishing 20.000 t a year have to invest greater resources into many FADs, supply vessels, fuel consumption and overall may be end up earning less money in a year than a smaller 1000 GT vessel with a less FAD-intensive strategy catching 10.000 tons. - The last two points illustrate the division in terms of fishing strategies within the Spanish (and associated flags) fleet. Therefore, companies with different resources and fishing capacity prefer different tuna conservation measures (e.g. closures, TACs, etc.). - Some of the fishing companies which operate with fewer active FADs of their own, will often follow the trail of larger vessels with more FADs, as this will result in higher chances of finding FADs from others to exploit. In a smaller-vessel captain's words, the big PS are never too far away from a productive FAD. Due to the information from the echo-sounder buoys, supply vessel and other vessels of the company, large PS rarely go a day without fishing and are almost always in a zone with productive FADs. - A company sales person explained how in Spain some canneries are losing market share, for example with supermarket Lidl, as some retailers are asking for FAD free tuna. The sales person had serious

	doubts about the transparency and veracity of the chain of custody of the so called "FAD free tuna" being eco-certified coming from the WCPO.

NEXT SKIPPERS WORKSHOPS: POHNPEI, FEDERATED STATES OF MICRONESIA (2019)

Conclusions from the Round 8.15. ISSF Skippers Workshop (Bermeo and Sukarrieta) Spain 2018:

- Fishers suggested introducing a framed grid inside the net while sacking which could let smaller fish like skipjack on one side and large sharks and mantas on the other.

- Fishers using hoppers said they are very useful to sort bycatch and do not slow down the brailing process. It could be enhanced by adding a ramp to release large sharks and others directly to sea without need to handle.

- A rigid metallic grid to release manta rays was discussed, as not all vessels can release them with directly with the brail.

- Training of African deck crew in the Atlantic and Indian Oceans would be a good initiative according to skippers.

- Fishers in all oceans say they are seeing more sharks in general. Some hotspots like Gabon have huge numbers and when many arrive on deck, most dead, it is nearly impossible to conduct good release practices, other than slipping.

- Most NEFADs are deep in size and with sails, except some like the "cage model" in the Indian Ocean which is very shallow.

- There were mixed accounts over the durability of biodegradable FADs in the Indian Ocean trials. Some skippers thought that they should be allowed to test whichever biodegradable design they wanted rather than having to use a set prototype.

- Marine Instruments is making self-driven FAD prototypes that move with the help of a propeller.

- The direct effect of quotas on YFT and BET is that fishers are avoiding free schools and concentrating even more their efforts on FAD fishing.

- Depending on the size of the vessels and fishing strategy of the company fishers prefer different conservation measures to reduce small tuna catches.

- An Indian Ocean company from the Spanish fleet has been the firs in the world to get MSC certification for skipjack tuna caught in FAD sets. Many Spanish fleet vessels are in FIP projects at present.

- Fishers thought that the closure to PS fishing in many coastal zones of the Western Indian Ocean (e.g. Somalia, Tanzania, Kenya, Chagos) works like a large MPA that enables replenishment of tuna stocks.

- Many companies coordinate the fishing movements from all their vessels through a central manager aided by the echo-sounder buoy information, and skippers have less input into when and where to fish.

- Fishers said that they do not trust observer data as many person observers are easily bribed or do not execute their job correctly.

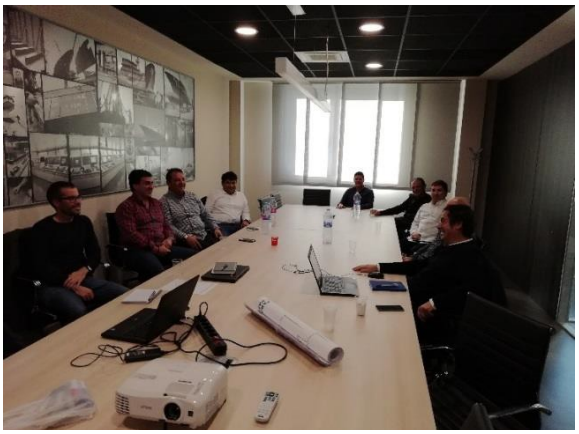
Appendix I – Participant Lists ISSF Skipper Workshops Sukarrieta and Bermeo (2018)

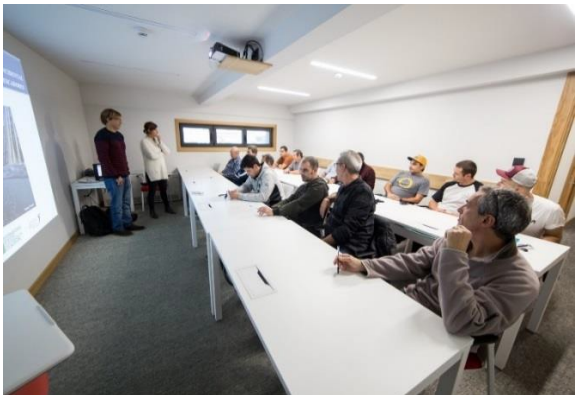
NAME	PROFESSION	VESSEL	COMPANY
JOSE LUIS OLIVERA ALONSO	SKIPPER	IRENE	JEALSA
IÑAKI URBINA	SKIPPER	PORT SAINT LOUIS	PEREIRA
JOSU HORMAETXEA	SKIPPER	JANE IV	UGAVI
KOLDO BADIOLA	SKIPPER	JOCAY	UGAVI
IMANOL MADARIAGA	SKIPPER	MONTELAPE	CALVO
JOSEBA DE LA ROSA	OFFICER	MONTEROCIO	CALVO
PATXI ARTECHEVARRIA	SKIPPER	MONTELUCIA	CALVO
ALBERTO GIMENEZ	SKIPPER	MONTELUCIA	CALVO
JON ANDER BILBAO	SKIPPER	MONTEFRISA	CALVO
JON EGAÑA	OFFICER	MONTEFRISA	CALVO
FRANCISCO JAVIER BERNAOLA	OFFICER	MONTECLARO	CALVO
JORGE SANISIDRO	FLEET MANAGER		CALVO
SARA ACENA	ENVIRONMENTAL MANAGER		CALVO
JOSE ANTONIO LOPEZ	SKIPPER	ALAKRANTXU	ECHEBASTAR
JOSU ELGEZABAL	SKIPPER	ELAI ALAI	ECHEBASTAR
JOSU LAYUNO	OFFICER	JAI ALAI	ECHEBASTAR
AINGERU ERAUZKIN	INSPECTOR		ECHEBASTAR
ELVIS ROJAS SERNA	SKIPPER	IZARO	ECHEBASTAR
JON SOTO	SKIPPER	ALAKRANA	ECHEBASTAR
UNAI BILBAO	SKIPPER	IZARO	ECHEBASTAR
IKER ZUDAIRE	SCIENTIST		AZTI
JON ITURRASPE BUTRON	OFFICER	GALERNA 3	ALBACORA
MARTIN ANDUEZO	CREW	CAPE CORAL	ALBACORA
JOSU XABIER ANPARAN CUADRA	CREW	INTERTUNA 3	ALBACORA
JON BILBAO MARIN	OFFICER	ALBATUN 2	ALBACORA
JON ORTUBE ACARREGI	CREW	GALERNA 2	ALBACORA
JULEN ABAROA HORMAECHEVARRIA	SKIPPER	ALBATUN 3	ALBACORA
ROBERTO SOLAS CASTRO	OFFICER	PACIFIC STAR	ALBACORA
IBON RIBERA GOLDARAZ	CREW	INTERTUNA 3	ALBACORA
GORKA ABASOLO TOJA	OFFICER	ALBACORA CARIBE	ALBACORA

ASSIER BULUKUA TELLETXEA	OFFICER	MAR DE SERGIO	ALBACORA
BORJA PEREZ LOPEZ DE LUZURIAGA	OFFICER	HAIZEA LAU	ALBACORA
AITOR ABERASTURI EGUIBAR	SKIPPER	HAIZEA LAU	ALBACORA
JOSE MARIA FERNANDEZ ZAUTUA	OFFICER	ALBACORA 9	ALBACORA
JON GOITIZ CARNEIRO	CREW	DRACO	ALBACORA
VALENTIN MENTXAKA ZULUETA	OFFICER	HAIZEA BAT	ALBACORA
SERGIO MUNITIZ	SKIPPER	TXORI TOKI	INPESCA
UNAX PONCIANO	SKIPPER	TXORI GORRI	INPESCA
JON ANDER AGUIRRE	SKIPPER	TXORI GORRI	INPESCA
IÑAKI EMILIO MUGICA	SKIPPER	TXORI ARGI	INPESCA
JULEN LAUCIRICA MARTINEZ	SKIPPER	TXORI ARGI	INPESCA
JON LARTITEGUI ISPIZUA	CREW	TXORI ZURI	INPESCA
GAIZKA ETXEBARRIA IBARRA	INSPECTOR		INPESCA
JAVI URIARTE RUBIO	SKIPPER	TXORI	INPESCA
JUAN JOSE VELASCO	CHIEF ENGINEER	TXORI ZURI	INPESCA
JUAN A. ASTIGARRAGA	SKIPPER	TXORI AUNDI	INPESCA
SANTI GAMBOA	SKIPPER	TXORI ZURI	INPESCA
GOTXON MARKAIDA	OFFICER	ITSAS TXORI	INPESCA
ZIGOR URKIDI	OFFICER	TXORI LAU	INPESCA
ANGEL ESTEO	CHIEF ENGINEER	TXORI AUNDI	INPESCA
PELI A. GERVASIO	CHIEF ENGINEER	TXORI BERRI	INPESCA
MARKEL MUGICA	SKIPPER	PLAYA DE AZKORRI	PEVASA
BITTOR ATXORRA	SKIPPER	PLAYA DE RIS	PEVASA
FERNANDO PARRA	SKIPPER	PLAYA DE NOJA	PEVASA
GAIZKA SERNA	SKIPPER	PLAYA DE ANZORAS	PEVASA
ALVARO LOPEZ	SKIPPER	PLAYA DE BAKIO	PEVASA
XABIER ALLICA	SKIPPER	PLAYA DE ARITZATXU	PEVASA
TUBAL SOLABARRIETA TXAKARTEGI	SKIPPER	ROSITA C	ATUNERA DULARRA
LUIS BILBAO URQUIDI	SKIPPER	ROSITA C	ATUNERA DULARRA
IGOR EGUREN ASTEINZA	SKIPPER	CHARO	ATUNERA DULARRA

IBON LARROZEA	SKIPPER	AURORA B	ATUNERA DULARRA
ARES GONZALEZ	SKIPPER	AURORA B	ATUNERA DULARRA
IMANOL RENTERIA	SKIPPER	ROSITA C	ATUNERA DULARRA
BRUNO MENENDEZ	SKIPPER	SAN ANDRES	ATUNERA DULARRA
DANIEL CALVO	MANAGING DIRECTOR		CONSERVAS GARAVILLA
HELENA ORELLA	SOCIAL R. MANAGER		CONSERVAS GARAVILLA
JOSEBA SALINAS	SKIPPER	ZUBEROA	ATUNSA
JON A. PONCELA	SKIPPER	IZURDIA	ATUNSA
IÑIGO MURELAGA	SKIPPER	EGALABUR	ATUNSA
PEDRO LECUONA	SKIPPER	DONIENE	ATUNSA
GAIZKA MARKAIDA	SKIPPER	EGALUZE	ATUNSA
JOKIN ROMANELLI	SKIPPER	EGALABUR	ATUNSA
MIGUEL A FERNANDEZ	FLEET MANAGER		ATUNSA
JOSE MARI FERARIOS	SKIPPER/SCIENTIST		AZTI
GALA MORENO	SCIENTIST		ISSF
JEFFERSON MURUA	SCIENTIST		AZTI/ISSF

Appendix II – ISSF Skipper Workshop photos 2018





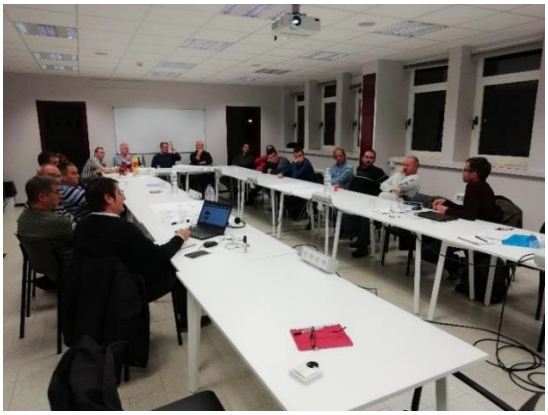


Fig. 1 a,b,c,d. Small group workshops by company in Bermeo ISSF Skippers Workshops in 2018

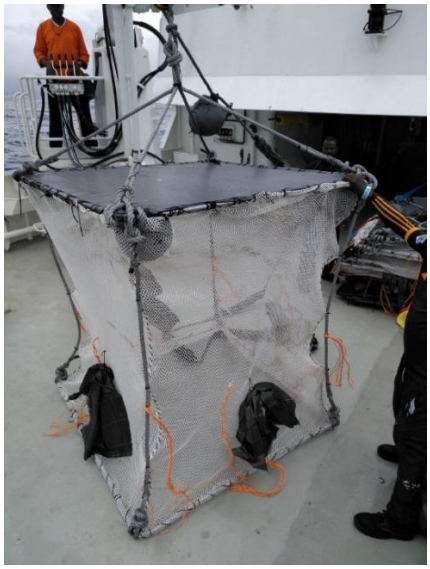


Fig. 2. Shallow "cage design" FAD used in the Indian Ocean

Appendix III- ISSF Skipper Workshop Participants since 2010 by stakeholder group

WS	LOCATION	DATE	SKIPPERS	CREW	SHIP-OWNERS	FLEET MANAGERS	FLEET REP.	GOV. OFFICIALS	SCIENTISTS	TOTAL
1.0	SUKARRIETA (SPAIN)	27/11/2009	15	1	1	1	6	1	0	25
1.1	MANTA (ECUADOR)	18/09/2010	56	18	1	0	1	0	0	76
1.2	PANAMA CITY (PANAMA)	22/09/2010	6	6	1	0	0	3	6	22
1.3	ACCRA (GHANA)	10/11/2010	2	0	0	2	21	6	1	32
1.4	SUKARRIETA (SPAIN)	13-17/12/2010	32	0	0	0	6	0	5	43
1.5/1.6	MAHE (SEYCHELLES) / PORT LOUIS (MAURITIUS)	1-19/02/2011	11	5	0	0	1	0	0	17
1.7	PAGO PAGO (AMERICAN SAMOA)	05/03/2011	2	0	2	1	4	3	2	14
1.8	MAJURO (MARSHALL ISLANDS)	22/06/2011	2	1	0	0	1	1	0	5
1.9	POHNPEI (MICRONESIA)	24/06/2011	3	1	0	0	4	0	0	8
2.1	ACCRA (GHANA)	14/03/2012	2	0	0	2	18	6	0	28
2.2	MAHE (SEYCHELLES)	21-18/05/12	5	2	0	0	1	0	0	8
2.3	PAGO PAGO (AMERICAN SAMOA)	11/06/2012	3	2	0	0	3	0	2	10
2.4	GENERAL SANTOS (PHILIPPINES)	08/09/2012	26	4	0	1	3	0	21	55
2.5	BINTUNG (INDONESIA)	11/09/2012	20	0	0	0	0	25	3	48
2.6	JAKARTA (INDONESIA)	13/09/2012	13	1	0	0	0	10	3	27
2.7	MANTA (ECUADOR)	26-27/09/2012	17	4	4	0	1	0	1	27
2.8	SUKARRIETA (SPAIN)	09/10;27/11-5/12/2012	87	3	2	2	9	0	6	109
3.1	ACCRA (GHANA)	08/05/2013	13	0	2	1	18	7	0	41
3.2	LIMA (PERU)	05/08/2013	0	0	2	2	16	2	15	37
3.3	MANTA (ECUADOR)	08/08/2013	37	5	0	3	4	1	0	50
3.4	PANAMA CITY (PANAMA)	12/08/2013	2	0	2	1	7	0	7	19
3.5	SUKARRIETA (SPAIN)	07/11-10/12/2013	44	6	2	2	5	0	0	59
4.1	BUSAN (KOREA)	14/02/2014	8	9	0	1	10	3	12	43
4.2	KAOHSIUNG (TAIWAN)	18/02/2014	1	0	0	6	12	0	0	19
4.3	CANGAS (SPAIN)	28-29/05/2014	20	10	0	0	0	0	0	30
4.4	ACCRA (GHANA)	15/07/2014	7	6	10	9	11	4	1	48
4.5	MANTA (ECUADOR)	12/08/2014	35	1	0	0	1	0	3	40
4.6	JAKARTA (INDONESIA)	19/08/2014	21	2	0	0	1	1	3	28
4.7	GENERAL SANTOS (PHILIPPINES)	05/09/2014	24	6	0	0	2	0	2	34
4.8.	SUKARRIETA (SPAIN)	18/09-14/10/2014	52	5	0	1	3	1	1	63
4.9.	PAGO PAGO (AMERICAN SAMOA)	15-20/10/2014	8	1	0	0	4	0	1	14
5.1.	MANZANILLO (MEXICO)	12/01/2015	34	20	1	1	2	4	0	62
5.2	MAZATLAN (MEXICO)	14/01/2015	65	46	0	1	1	4	1	118
5.3	SAN DIEGO (USA)	12/02/2015	5	0	0	1	3	0	0	9
5.4	TEMA (GHANA)	08/05/2015	10	5	2	9	18	0	1	45
5.5.	JAKARTA (INDONESIA)	19/06/2015	8	14	1	0	5	0	4	32
5.6	BINTUNG (INDONESIA)	22/06/2015	21	13	0	0	1	1	2	38
5.7	SIBOLGA (INDONESIA)	25/06/2015	22	15	0	0	0	1	1	39
5.8	LIMA (PERU)	11/08/2015	10	5	1	1	16	3	6	42
5.9	MANTA (ECUADOR)	14/08/2015	83	8	3	8	6	0	0	108
5.10	BUSAN (KOREA)	15/09/2015	8	0	0	1	8	2	25	44
5.11	CONCARNEAU (FRANCE)	13/10/2015	14	6	0	2	2	0	2	26
5.12	SUKARRIETA (SPAIN)	8,26-30/10/2015	49	5	4	1	2	0	0	61
6.1	SHANGHAI (CHINA)	06/04/2016	10	0	0	6	5	0	6	27
6.2	TEMA (GHANA)	04/05/2016	8	6	2	5	20	4	2	47
6.3	VIGO (SPAIN)	20/07/2016	51	23	0	1	0	0	0	75
6.4	MANTA (ECUADOR)	03/08/2016	33	17	0	2	3	0	1	56
6.5	POSORJA (ECUADOR)	05/08/2016	8	5	0	1	0	0	0	14
6.6	JAKARTA (INDONESIA)	05/09/2016	27	0	0	1	3	0	0	31
6.7	BINTUNG (INDONESIA)	07/09/2016	27	1	1	0	0	1	10	40
6.8	KENDARI (INDONESIA)	09/09/2016	32	0	1	3	1	3	10	50
6.9	BENOA (INDONESIA)	10/09/2016	21	0	0	0	6	0	0	27
6.10	SIBOLGA (INDONESIA)	14/09/2016	15	0	0	7	1	2	0	25
6.11	BANDA ACEH (INDONESIA)	16/09/2016	23	0	0	0	8	0	0	31
6.12	QUY NHON (VIETNAM)	17/09/2016	42	0	0	0	13	0	3	58
6.13	SUKARRIETA (SPAIN)	24-28/10/2016	42	5	1	0	3	0	1	52
6.14	MADEIRA (PORTUGAL)	01/11/2016	4	19	0	0	2	0	1	26
7.1	MANTA (ECUADOR)	10-11/01/2017	95	16	0	1	3	0	2	117
7.2	TEMA (GHANA)	21/02/2017	22	20	1	5	6	1	1	56
7.3	SAN DIEGO (USA)	27/03/2017	7	1	2	4	3	1	1	19
7.4	MAJURO (MARSHALL ISLANDS)	03/04/2017	5	4	0	0	2	0	0	11
7.5	POHNPEI (MICRONESIA)	06/04/2017	8	6	1	0	2	0	2	19
7.6	KENDARI (INDONESIA)	03/04/2017	23	9	0	0	0	4	0	36
7.7	PAOTERE-MAKASSAR (INDONESIA)	05/04/2017	20	8	0	0	0	3	0	31
7.8	TUMUMPA-MANADO (INDONESIA)	07/04/2017	35	6	0	0	0	1	0	42
7.9	AMBON (INDONESIA)	11/04/2017	22	1	0	0	0	4	0	27
7.10	ZHOUSHAN (CHINA)	01/08/2017	8	1	0	4	8	0	3	24
7.11	VIGO (SPAIN)	10/08/2017	24	68	0	0	0	0	0	92
7.12	SIBOLGA (INDONESIA)	04/09/2017	16	19	0	3	0	0	0	38
7.13	LAMPULO (INDONESIA)	07/09/2017	23	4	1	1	0	2	0	31
7.14	JAKARTA (INDONESIA)	19/09/2017	33	3	0	0	0	0	0	36
7.15	LIMA (PERU)	29/9/2017	14	8	0	1	8	3	4	38
7.16	MANTA (ECUADOR)	04/10/2017	29	41	0	0	0	1	1	72
7.17	CONCARNEAU (FRANCE)	09/10/2017	27	7	0	1	1	0	2	38
7.18	SUKARRIETA (SPAIN)	16-20/10/2017	46	16	0	3	1	0	1	67
8.1	TEMA (GHANA)	26-27/02/2018	22	30	4	4	10	5	2	77
8.2	MAJURO (MARSHALL ISLANDS)	12/04/2018	15	6	0	1	4	1	0	27
8.3	POHNPEI (MICRONESIA)	17/04/2018	7	4	1	0	0	0	0	12
8.4	BINTUNG (INDONESIA)	07/05/2018	32	7	0	0	1	9	2	51
8.5	PRIGI (INDONESIA)	09/05/2018	19	1	0	0	3	8	0	31
8.6	PEKALONGAN (INDONESIA)	11/05/2018	18	21	0	0	0	4	2	45
8.7	DAKAR (SENEGAL)	11/06/2018	4	3	0	3	3	3	2	18
8.8	VIGO (SPAIN)	16/07/2018	29	60	0	0	0	0	0	89
8.9	MANTA (ECUADOR)	14/08/2018	65	58	1	3	6	0	2	135
8.10	PANAMA CITY (PANAMA)	16/08/2018	6	0	0	0	2	3	1	12
8.11	SAN DIEGO (USA)	20/08/2018	9	0	3	0	3	0	0	15
8.12	YAIZU (JAPAN)	29/08/2018	1	0	0	0	17	0	11	29
8.13	LIMA (PERU)	01/10/2018	17	5	0	1	9	7	15	54
8.14	CONCARNEAU (FRANCE)	15/10/2018	17	2	0	3	2	0	0	24
8.15	SUKARRIETA (SPAIN)	15-21/11/2018	41	23	0	2	7	0	2	75
TOTAL			1964	747	60	124	396	159	225	3675

Appendix IV- ISSF Skipper Workshop Agenda Sukarrieta & Bermeo (2018)

Agenda

09:00-10:30

1- Workshop welcome and introduction

2 – ISSF Bycatch project

3 – Discussion on:

- Small bigeye and yellowfin tuna options (echo-sounder buoys, short tail FADs, FAD closures)
- Best on deck bycatch release practices (protocols, equipment, new ideas)
- Bycatch utilization (retention and sale of non-sensitive species)

10:30-11:00

Coffee break

11:00-14:00

4- Discussion on:

- Non-entangling and biodegradable FADs (BIOFAD experiments, other trials in EPO, Atlantic)
- Shark fishing in the net (latest results from Atlantic cruise)
- Proactive Vessel Register (requirements for fishers' certifications)

5 – Updated questionnaire round VIII

6 – Final questions and answers