Journal of Animal and Veterinary Advances 9 (6): 1026-1029, 2010
ISSN: 1680-5593

Comparison of Fish Aggregating Devices (FADs) Having Different Attractors

[1]Ugur Altinagac, [2]Ali Kara, [1]Adnan Ayaz, [2]Deniz Acarlı, [3]Cenkmen R. Begburs and [1]Alkan Öztekin
[1]Department of Fishing and Processing Technology, Faculty of Fisheries,
Çanakkale Onsekiz Mart University, Çanakkale, Turkey
[2]Department of Fishing and Processing Technology, Faculty of Fisheries,
Aegean University, Izmir, Turkey
[3]Department of Fishing and Processing Technology, Faculty of Fisheries,
Akdeniz University, Antalya, Turkey

Abstract: In this study three FAD types, which were being commonly used in small scale fisheries and had different attractors were tried. Attractors such as pyramid, rope and panel types were tied to static FADs. The fish species and densities attracted by them were examined. The samplings were made through visual census, trammel nets and line fishing before and after the deploying of FADs. Any significant difference was not able to be found statistically between the attractors tied to fish aggregating devices. In the result of observation and samplings before and after the deploying of FADs, while 10 fish species belong to 6 families were observed before deployment, 16 fish species belong to 11 families were determined after the deployment of the FADs.

Key words: FADs, fish aggregating devices, FAD attractors, visual census, small scale fisheries, Turkey

INTRODUCTION

Fishermen learned thanks to their experiences lasting for years that fish gathered around objects floating or drifting in the middle of the sea and that they had higher catches near them (Anderson and Gates, 1996). They discovered sometimes tones of fish were caught around these floating objects. In the result of these observations, fishermen started to make their own artificial floating objects (buoy, raft, bamboo, etc.) named as Fish Aggregating Devices (FADs).

FAD systems can be static type which is fixed to the bottom with an anchor near the coast, for small scale fisheries or free floating type which is drifted with currents for industrial fisheries in the open sea.

Although, FAD systems frequently used in developed countries such as Canada, USA as well as Far East countries such as Japan, Philippines, Indonesia and Malaysia have many types, all of them are based on the same principle. Principally, FAD systems fixed at the bottom with an anchor are connected to a buoy in the surface through a rope. Depending on desire, an attractor part can take place in the middle part according to depth and current states (Acarli, 1998).

The attractor part can be fixed at a desired depth under the surface buoy. Palm leaves, polyester or plastic panels, ropes, nets and sack parts are materials which can be used as attractor.

In this study, 3 different attractor models connected to FADs, which were designed for small scale fisheries and were in static type, were tried and fish aggregating ability of these, were compared.

MATERIALS AND METHODS

The study was carried out in Gerence region connected to Çeşme district of Izmir in Turkey (Fig. 1). This region taking place in Aegean Sea coast have many specialties such as providing clean and clear underwater sight and facilitating underwater observations like observing the density of fish populations. FADs were placed 3 km far from the coast and as 750-1000 m between each of them. Water depth in the region, where FADs were placed is between 25-35 m.

In this study, 3 different examples of FAD systems being used in the world successfully for long years were tried. As shown in Fig. 2, the attractor part of FADs was mounted on FAD rope as 5 m lower than the surface. About 120 kg weight concrete blocks were used as anchor and these were attached to 24 mm PP ropes as mooring line by the help of thimble and clamps. In the surface, they were connected to 80 L buoys like in Fig. 2.

The pyramid type FAD is a FAD, which has a skeleton made of iron bar having 8 mm diameter and the surface of which is covered with the net and nylon sack material and which has a pyramid shaped attractor part.

Corresponding Author: Ugur Altinagac, Faculty of Fisheries, Canakkale Onsekiz Mart University, Canakkale 17100, Turkey

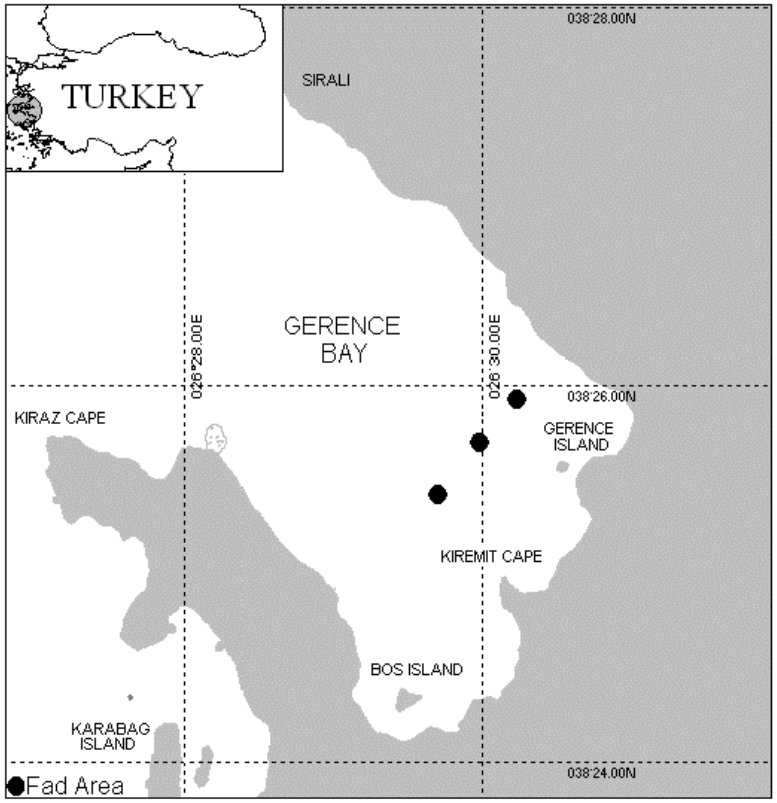

Fig. 1: Study area

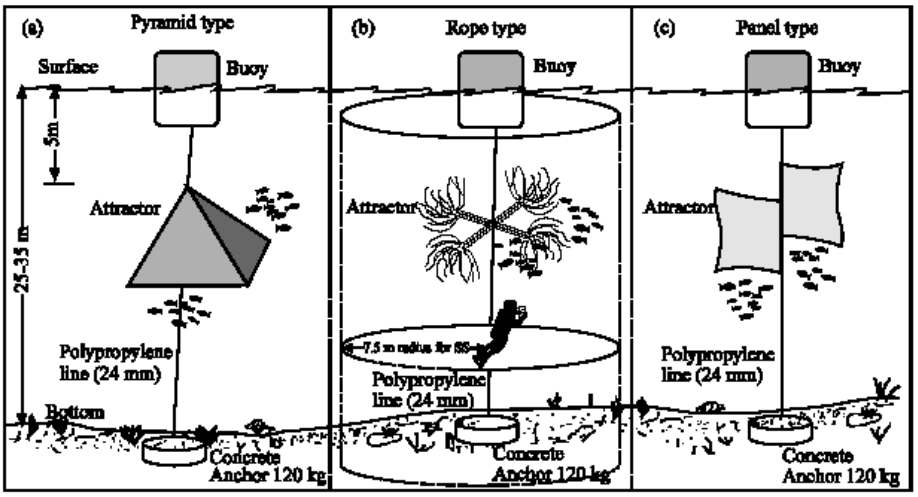

Fig. 2: Three types of different FADs attractors (a): Pyramid type (b): Rope type (c): Panel type

The rope type FAD is a FAD, in which there are 2 m long 3 iron bars having 8 mm diameter and 4 m long 3 ropes having 44 mm diameter are connected on these bars and which has an attractor part formed by opening the end parts of ropes and so making them fringes.

The panel type FAD consisted of white color polyester panel. It was got by the separating of 1.20 m wide and 4 m long panel into 2 equal parts and by the tying of them vertically and longitudinally to the rope as seen in the figure. To determine the species, which came later around FADs, observations and samplings were made before and after deploying of FADs.

In the study to determine fish species found in the area before moored the FADs, underwater observation

was carried out in the region during a year. Initially, the line transect method, being one of visual census method, was used and species of that region were tried to be determined. Underwater observations were applied by divers in the same times of the days (between 11-14 am). Moreover, fishing was made with trammel nets and lines among fishing methods and the caught species were recorded.

After deployment the FADs in order to determine species coming near FADs, direct observation, trammel net fishing and fishing line methods were used as deploying before FADs. Stationary visual census or Stationary Sampling method (SS), being one of visual census methods was used.

Species near FADs were determined and counted. This method is based on the technique that the diver observes and counts all species within 7.5 m radius cylindrical area, from a point he randomly selects (Bohnsak and Bannerot, 1986).

In this study, the FAD rope was also accepted as the centre of the cylinder and species and their amounts within 7.5 m radius water mass, from the surface to the bottom, were determined. One-way analysis of similarity (ANOSIM; Clarke and Warwick, 1994) was used to determine the differences in the structure of the species composition among the FAD attractors. In this analysis, a test statistic of R is calculated from a matrix of the ranked similarities between all the replicate samples, representing the degree of difference between the groups. Large positive R (up to 1) signifies dissimilarity between groups.

RESULTS AND DISCUSSION

That FADs moored through the lines, gill net fishing samples and underwater observations noticeably increased fish species number and density in that region was observed. While 10 fish species belong to 6 families were observed before the deploying of FADs, 16 fish species belong to 11 families were detected after the deploying of FADs. The determined species were given in Table 1 and 2. Fish species were presented in Table 2 with sampling method and FAD type.

Twelve species coming near FADs were determined in the underwater observations. The fishes with unidentified species and their amounts were given in Fig. 3. When the graphic are examined that there are Horse

Table 1: Species observed before deploying FADs

Family	Species	Visual census	Trammel net	Fishing line
Sparidae	*Diplodus annularis*	-	*	*
	Diplodus vulgaris	-	*	-
	Pagellus erythrinus	*	*	-
	Boops boops	-	*	*
Labridae	*Labrus* sp.	*	*	-
Carangidae	*Spicara smaris*	-	*	*
Centracanthidae	*Spicara maena*	-	*	*
	Serranus scriba	-	*	-
Mullidae	*Mullus barbatus*	-	*	-
Gobiidae	*Gobius niger*	*	-	-
miscellaneous	*Murex* sp.	-	*	-
	Paracentratus lividus	-	*	-
	Holothuridae tubulosa	*	*	-
	Maia sp.	*	*	-
	Fish larvae	*	-	-
	Tonna galea	*	-	-

Table 2: Species observed according to the fishing methods and FAD type after deploying FADs

Family	Species	Visual census	Trammel net	Fishing line	Pyramid FAD	Rope FAD	Panel FAD
Sparidae	*Diplodus annularis*	*	*	*	-	*	-
	Pagellus erythrinus	*	*	*	*	-	-
	Boops boops	*	*	-	*	*	*
Labridae	Coris julis	-	*	*	-	-	*
	Labrus sp.	*	*	-	-	*	-
Carangidae	*Trachurus trachurus*	*	*	*	*	*	*
	Seriola dumerili	*	-	-	*	*	*
Centracanthidae	Spicara smaris	*	*	*	*	*	*
	Spicara maena	-	*	-	-	*	*
Serranidae	*Serranus scriba*	*	*	*	*	-	*
Scorpaenidae	*Scorpaena scrofa*	*	*	-	-	*	-
Mullidae	Mullus barbatus	-	*	-	*	*	*
Gobiidae	*Gobius niger*	*	-	*	-	*	*
Belonidae	*Belone belone*	*	*	-	*	-	-
Scomberomoridae	Sarda sarda	*	*	-	-	*	-
Sphyraenidae	Sphyraena sphyraena	-	*	-	-	*	-
miscellaneous	*Murex* sp.	*	*	-	-	-	*
	Holothuridae tubulosa	*	-	-	*	*	*
	Maia sp.	-	*	-	-	*	-
	Fish larvae	*	-	-	*	*	*
	Squid eggs	*	-	-	*	*	*
	Shark eggs	*	-	-	-	*	-
	Tonna galea	*	-	-	-	*	*
	Octopus vulgaris	*	-	-	*	-	*

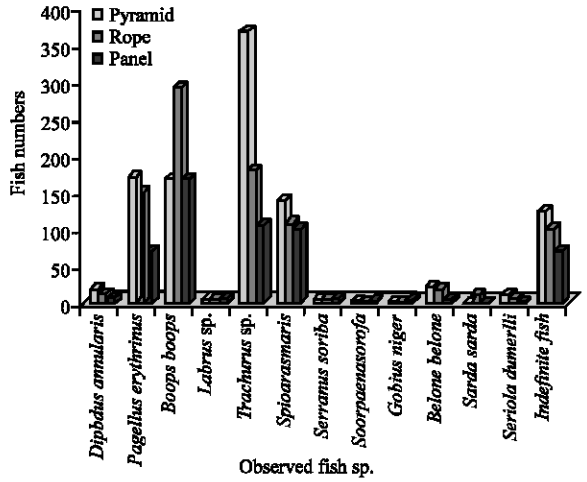

Fig. 3: Number of species observed with visual census method near FADs

mackerel and Bogue at the most as amount within observed species near FADs and the fish density takes place near pyramid type FAD.

The ANOSIM analysis revealed that the species composition observed around the different types of FADs were not significant different (R = -0.06927 , p = 0.9135).

Nevertheless that fish near FAD come together around FAD is a known fact, the reason why FADs attract fish still remain unexplained (Kimmel, 1985; Rountree, 1990; Kawamura *et al*., 1996; Ben-Yami, 1989; Buckley and Miller, 1995; Beets, 1989).

In general, the view of researchers is that the reason why fish prefer these devices is behaviors of feeding, reproduction, protecting themselves, sheltering and thigmotropism (Kara, 1996; Friendlander *et al*., 1994; Ben-Yami, 1989).

According to another view that this is only object fish meet within the sea area, fish accept this object as a physical reference point and gathering station (Freon and Dagorn, 2000; Acarli, 1998).

CONCLUSION

In this study by trying different attractor materials on FADs it was observed that FADs provided fish density to increase significantly in the region where they were deployed. It was seen that according to fish density gathering around FADs as number and species, the Pyramid type FAD attracted fish at the most, later Rope type and Panel type at the least. It is predicted that Pyramid type FAD attracts fish for in it at the most because of easier to be protected from large fish and that Rope type FAD attracts small fish by hiding inside fringes. We are considered that there is benefit in trying FAD attractors by using more different materials.

ACKNOWLEDGEMENTS

This study was supported by The Aegean University, Scientific Research Project Commission (Project number 1998/SÜF/014). We render thanks to the Gerence Su Urunleri staffs spending effort for this study.

REFERENCES

Acarli, D., 1998. Investigations on fish aggregating devices (FADs). M.Sc. Thesis, Aegean University.

Anderson, J.D. and P.D. Gates, 1996. FAD Manual: Planning FAD Programmes. SPC., Noumea, New Caledonia.

Beets, J., 1989. Experimental evaluation of fish recruitment to combinations of fish aggregating devices and benthic artificial reefs. Bull. Mar. Sci., 44: 973-983.

Ben-Yami, M., 1989. How to Make and Set FADs. FAO., Rome, pp:73.

Bohnsak and Bannerot, 1986. A stationary visual census technique for quantitatively assessing community structure of coral reef fishes. NOAA Technical Report NMFS 41, pp: 15. http://spo.nwr.noaa.gov/tr41opt.pdf.

Buckley, T.W. and S.B. Miller, 1995. Feedings habits of Yellowfin Tuna associated with fish aggregating devices in American Samoa. Bull. Mar. Sci., 55: 445-459.

Clarke, K.R. and R.M. Warwick, 1994. Change in Marine Communities: An Approach to Statistical Analysis and Interpretation. 1st Edn., Plymouth Marine Laboratory, UK.

Freon, P. and L. Dagorn, 2000. Review of fish associative behavior: Toward a generalization of the meeting point hypothesis. Rev. Fish Biol. Fish, 10: 183-207.

Friendlander, A., J. Beets and W. Tobias, 1994. Effects of fish aggregating device design and location on fishing success in the US virgin island. Bull. Mar. Sci., 55: 592-601.

Kara, A., 1996. Attracting, concentrating and frightening fish. E.U. J. Fish. Aquat. Sci., 13: 63-82.

Kawamura, G., T. Matsushita, M. Nishitai and T. Matsuoka, 1996. Blue and green fish aggregating device are more attractive to fish. Fish. Res., 28: 99-108.

Kimmel, J.J., 1985. A new species-time method for visual assessment of fishes and its comparison with established methods. Environ. Biol. Fishes, 12: 23-32.

Rountree, R.A., 1990. Community structure of fishes attracted to shallow water fish aggregating devices off South Carolina, USA. Environ. Biol. Fishes, 29: 241-262.