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Construction and Effectiveness of Scoop Light Fishing (SLF) in Bero Village, West Muna, Southeast Sulawesi, Indonesia

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ABSTRACT

The Scoop Light Fishing (SLF) gear is an innovative fishing technology capable of producing catches exceeding one ton per trip. Despite its high productivity and ability to operate during all lunar phases, including bright-moon periods, its construction and effective fishing time have not been scientifically assessed. The purpose of this study is to examine the construction of the SLF and identify its effective fishing period in the waters of Bero Village, Pulau Tiga, West Muna Regency. The research employed a survey method, with data collected through direct observation and interviews, and analyzed using qualitative and quantitative approaches. Quantitative analysis included a normality test and a one-way ANOVA at the 0.05 significance level, followed by an LSD post hoc test. The results show that the SLF consists of two main components: an elongated scoop-net bag directly connected to the fish hold and a square lighting system comprising four panels equipped with white and yellow lights, producing a total output of 4,765 watts. The SLF operates effectively during all lunar phases; however, fishing effectiveness is highest during the full moon phase (Q.III), as indicated by a significance value of less than 0.05.

Keywords: *Effectiveness; moon phases; scoop light fishing*

INTRODUCTION

Fisheries activities in Southeast Sulawesi constitute an essential component of the livelihoods of coastal communities, particularly through fishing operations. These activities have progressively evolved in response to advancements in fishing technology. The development of such technology within local communities has significantly influenced the patterns of fishery resource utilization. Furthermore, fishing technology not only provides insights into fishing practices but also encompasses the selection of gear materials, gear design and construction, auxiliary fishing devices, catch composition, and the environmental sustainability of fishing operations. (Pattiasina *et al*. 2020; Bubun *et al*. 2021).

Fishermen, as the primary actors in capture fisheries, continue to modify their

fishing units while maintaining the use of existing technologies. This trend is also evident among fishermen in Bero Village, Pulau Tiga, West Muna District (Southeast Sulawesi, Indonesia). The fishing community in Bero Village is predominantly composed of Bajo fishermen; however, their social and cultural practices have been substantially influenced by fishermen from South Sulawesi, particularly in relation to fishing customs and techniques. The fishing technology utilized by fishermen in Bero Village is a form of SLF, locally known as "perre-perre." The term "perre-perre" referring to SLF was first introduced by Bubun *et al*. (2024) in the Patent Document.

SLF is a type of modified active fishing gear. Its main components consist of a scoop net and a light source. The fishing technique employed by this gear is generally similar to other light-based fishing methods, such as bagan and purse seine, which are typically operated during new moon phases. However, SLF can be operated throughout all lunar phases, including both dark and bright moon periods, and is particularly effective during the full moon. This fishing method utilizes the positive phototactic behavior of fish toward light. The aggregation of fish around the light source helps create an effective fishing ground, as the illumination induces both physical and biological interactions among fish within the catchable area surrounding the gear (Bubun *et al*. 2015). The light used in fishing gear provides a greater opportunity for catching fish, especially for pelagic fish species (Afonso *et al*. 2021).

The effectiveness of fishing gear can be defined as the ratio of the catch obtained from a specific gear to the total catch from all fishing gears operating within the study area, expressed as a percentage (Dollu *et al*. 2023; Yonvitner *et al*. 2020). The SLF fishing gear used by fishermen in Bero Village, Pulau Tiga, West Muna Regency, represents a unique fishing technology with a relatively simple construction. The construction comprises only a small scoop net (lift net) and a light source; however, it is capable of yielding catches of more than one ton in a single fishing trip. This feature makes the SLF gear highly beneficial for fishermen in Bero Village, particularly because it can be operated during both dark and bright moon phases. In addition, the SLF gear, locally known as "perre-perre", demonstrates a high level of environmental friendliness, with an index value of 29 – 29.5 (Fadillah *et al*. 2023; Karmila *et al*. 2025), indicating that SLF is classified as a highly environmentally friendly fishing gear. Nevertheless, scientific studies investigating the construction and optimal operational time of SLF, both qualitatively and quantitatively, remain very limited. Quantitatively, the use of SLF demonstrates a high level of fish catch production and can be operated continuously throughout the fishing period. However, further investigation is required to determine the most effective operational timing for fishing activities. Determining the optimal fishing time will improve operational performance and increase cost efficiency in fishing operations. Qualitatively, SLF technology has not yet established standardized technical specifications regarding its construction, including both the fishing gear structure and the lighting system design, with a total light intensity reaching 4,765 watts in a single fishing unit. The absence of fundamental research on SLF gear construction limits the ability to formally classify this fishing gear within existing government regulations. Establishing a scientific basis for SLF construction is therefore essential to ensure that the technology is standardized and that its utilization can be regulated within designated fishing zones. Such regulation is important to prevent potential conflicts between SLF fishers and other light-based fishing operations, such as purse seine and lift net fisheries. The observations indicate that the SLF fishing gear used by fishers in Bero Village, Pulau Tiga, has not yet been scientifically standardized in terms of its construction. The design of the scoop and the lighting system differs from other types of light-fishing gear. These differences are evident in the structure of the fishing unit, the size of the scoop net, the materials used for the frame and net, the lamp mounts, and the number and placement of yellow and white lamps. In addition to gear construction, the most effective nighttime fishing period for operating SLF has also not been standardized. Research on scoop nets conducted by Fitri *et al*. (2022) in the waters of Cilacap demonstrates a similar function in utilizing light to aggregate fish within the catchable area of the scoop net. The catch composition was predominantly dominated by anchovies (*Stolephorus commersonii*). The main distinction between scoop nets operated in the waters of Cilacap and SLF is in the structural design of the lamp mounting frame. This difference represents a form of novelty in fishing technology innovation, contributing to the improvement of fishing productivity, particularly for fishermen in the waters of

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Pulau Tiga, Desa Bero. Scientific information regarding operational timing throughout the month is needed, as nighttime fishing activities may be influenced by lunar phases. The approach used in this study is both empirical and comparative. The empirical approach is used to obtain accurate information as primary data from the field regarding the SLF technology. The comparative approach is used to provide a qualitative description in accordance with the real conditions in the field related to the SLF technology. The objective of this study is to examine the construction of the SLF gear and to determine the effective fishing time for SLF operations in Bero Village, Pulau Tiga, West Muna District.

METHODS

The materials that are the subject of this research were the SLF unit and the fish catch. The research location is in the waters of Bero Village, Pulau Tiga, West Muna District. The research was conducted from June to September in Desa Bero, Pulau Tiga, located in the southern part of Southeast Sulawesi, which was closely related to the prevailing weather conditions during the data collection period. During these months, the waters of Desa Bero experience the east monsoon season. Wind and wave conditions during the east monsoon in the waters of Desa Bero, Pulau Tiga, were relatively calmer, allowing fishermen to operate SLF more effectively and safely. The research location can be seen in Figure 1.

The research method used was a survey method, with data collection through observation and structured interviews with 10 fishermen, in accordance with the population of fishermen operating SLF in Bero Village, Pulau Tiga, West Muna District. This data was collected to answer the research objectives related to the construction of the SLF unit and its relationship with the environmental friendliness of the fishing gear. Data collected through field observations were obtained from three sampled units of SLF gear. The sample size was limited to three units because all ten SLF units operating in Bero Village, Pulau Tiga, exhibited similar characteristics in terms of construction and fishing time. Data collected for the identification of the SLF unit construction were obtained from three fishing gear units. The data collected on the construction of the SLF included the types of materials used, the dimensions of the SLF unit, the shape and dimensions of the net, and the design and size of the lamp. The data collected to determine the effectiveness of fishing time comprised the total catch obtained during a single fishing trip. A fishing trip was

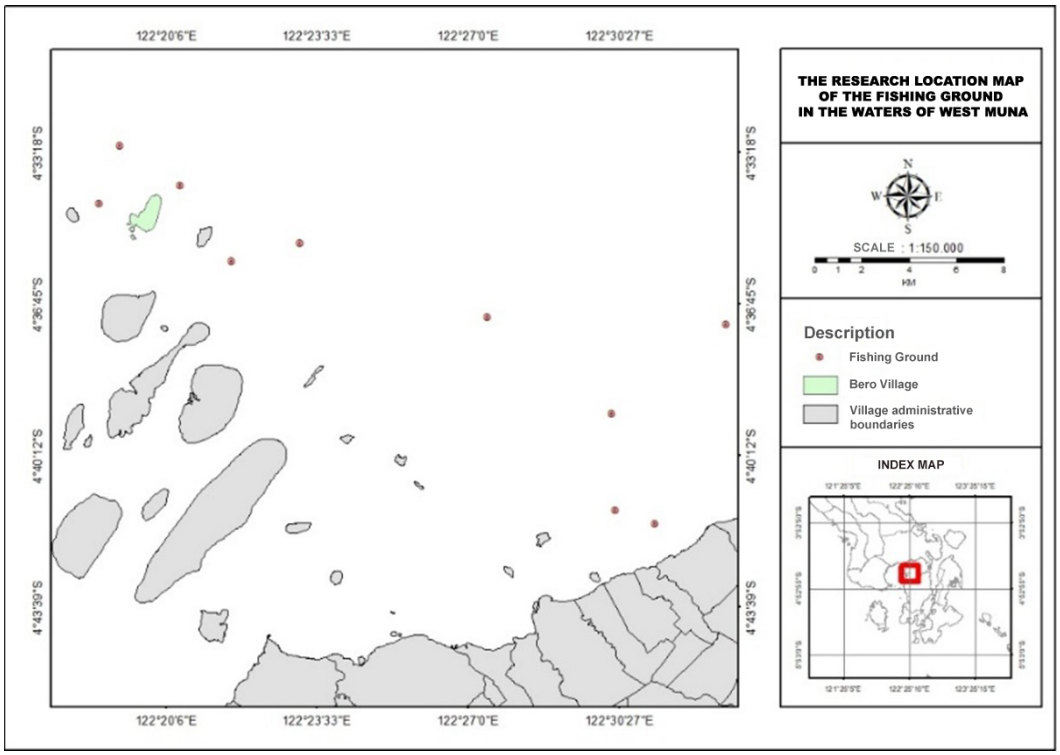

Figure 1 Research location in the waters of Bero Village, Pulau Tiga, West Muna District (Southeast Sulawesi, Indonesia)

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defined as departing for the fishing ground at 18:30 WITA and returning to the fishing base at 22:00 WITA. Data collection was conducted by observing the fishing operation. The use of a single fishing unit for observation was justified by the fact that the fishing grounds of the SLF units operating in the waters of Bero Village are located in relatively close proximity to each other (1 mile). The fishing trips were recorded based on the Gregorian calendar and subsequently converted to the Islamic (Hijri) calendar to identify the dark moon and full moon phases.

The data analysis employed in this study encompasses both qualitative and quantitative approaches. Qualitative data analysis is used to describe in detail the technical aspects of the SLF unit, including the construction of the scoop and light, auxiliary fishing tools, the materials and fishing gear used, as well as the fishing method (Bubun *et al*. 2021). Quantitative data analysis is used to determine the effectiveness of fish capture using the Normality Test and one-way ANOVA test with a significance level of 0.05. The one-way ANOVA test was used to determine whether there is a difference between one or more groups of data (Hardianti *et al*. 2024). Data is considered normal if the significance value is greater than 0.05, and it is considered effective if the significance value in the One-Way ANOVA test is less than 0.05, followed by the Post Hoc LSD (Least Significant Difference) Test. The post hoc LSD test was used to determine the meaningful value between groups of data (Putri *et al*. 2024). In this study, the post hoc LSD Test was used to determine the moon phase that was most effective for fish capture using the SLF. The lunar phases referred to in this study consist of the new moon phase (First Quarter = Q.I), the first quarter moon phase (Second Quarter = Q.II), the full moon phase (Third Quarter = Q.III), and the last quarter phase (Fourth Quarter = Q.IV).

RESULTS

1. Construction of the SLF Unit

The SLF gear, locally known by the fishing community in Bero Village, Pulau Tiga, as “Perre-perre,” is primarily employed to catch small pelagic species such as anchovies (*Stolephorus* sp.). The SLF unit comprises several main components, including the scoop net, light source, engine, boat, and a Matari generator set with a power capacity of 8,000 watts. The propulsion system consists of a Yamaha 40 HP outboard engine used to operate the boat and a Kohler engine that produces the characteristic “perre-perre” sound. The boat is constructed from fiberglass, with a total capacity of 1.5 tons, an LoA 12 m, a width of 1.5 m, and a height of 1 m. The picture of an SLF fishing vessel can be seen in Figure 2.

The construction of the SLF consists of the scoop net and the lights. The scoop net consists of the net and the net frame. The scoop net mesh is divided into the mouth and the bag sections. The net frame consists of the net frame and the scoop net handle. The specifications of the SLF gear can be seen in Figure 3 and Table 1.

Figure 2 SLF fishing boats used by fishermen in Bero Village, Tiga Island, West Muna Regency, located in Southeast Sulawesi, Indonesia

https://doi.org/10.29244/e3dw9280

Table 1 Specification of scoop net SLF in Bero Village, Pulau Tiga, West Muna District (Southeast Sulawesi, Indonesia)

No	Item	Specification
1	Scoop net frame	L = 3 m; material bamboo
2	Scoop net funnel	L = 3 m;
3	Scoop net mesh size	# = 3 mm (diamond); material polyethylene (PE)
4	Scoop net handle	L = 2,5 m; material hardwood (*Eucalyptus*)
5	Scoop net bag	L = 9 m; # = 3 mm (diamond); material polyethylene (PE). This section is directly connected to the fish hold.

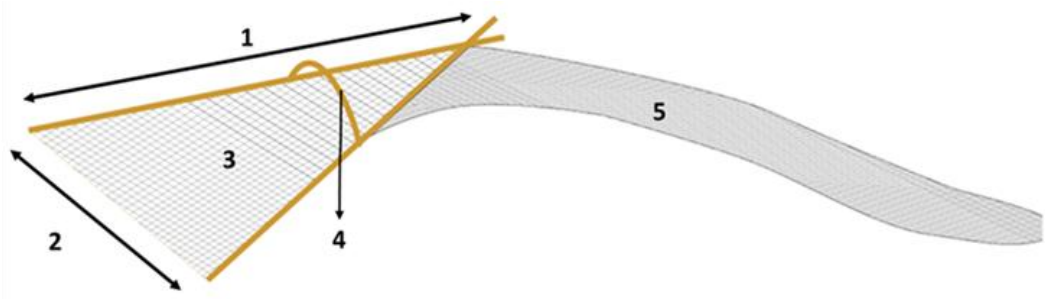

Figure 3 Parts of SLF gillnets used by fishermen in Bero Village, Tiga Island, West Muna Regency (Southeast Sulawesi, Indonesia)

Lighting on the SLF consists of several LED light bulbs with different power ratings between 15 watts and 40 watts. The total number of lights is 257, consisting of 254 white lights and 3 yellow lights. The positions of the white and yellow bulbs are arranged as shown in Figure 4. The light panel is made of a square shape. The light panel consists of four sections, each of which is of a different size. The sizes of each section of the light panel are as follows: Panel I measures 120 cm x 120 cm; Panel II measures 90 cm x 90 cm; Panel III measures 60 cm x 60 cm; and Panel IV measures 30 cm x 30 cm. Panel IV shows three yellow lamps, two lamps with a power rating of 25 watts each and one lamp with a power rating of 40 watts. The light panel is made of teak wood (Tectona grandis). On the back, there are light cables connected to a generator set (genset) as the power source. The supporting wood on the light panel serves to hang the lights on a special section of the boat designed for light fishing, located on the stern of the boat parallel to the scoop net.

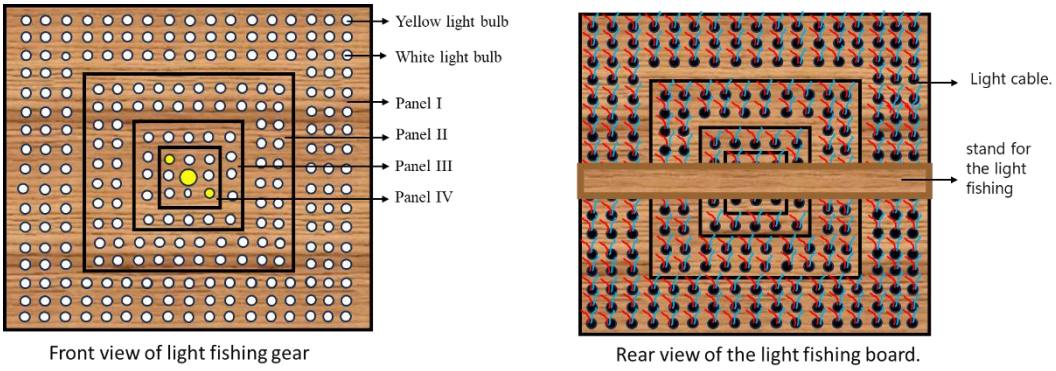

Figure 4 The lightweight lighting design on the SLF used by fishermen in Bero Village, Tiga Island, West Muna Regency (Southeast Sulawesi, Indonesia) consists of square panels and comprises four sections (Panels I, II, III, and IV). There are a total of 257 lights, 254 of which are white and 3 are yellow. The lights are located on one side of the panel (front view), while the other side of the panel (rear view) is connected to a light cable that is connected to a generator set (genset) as a power source

The SLF fishing method begins upon arrival at the fishing ground with the preparation of the scoop net, which is positioned beneath the lighting system. A mechanical device that produces “perre-perre” sounds and generates water splashes is then activated to attract fish. Subsequently, all lighting panels are switched on simultaneously. Once the fish aggregate beneath the lights, the scoop net is lowered and operated by scooping. During the hauling process, the lights on Panel I, Panel II, and Panel III are turned off sequentially, leaving only Panel IV illuminated. This procedure is repeated until all fish holds are filled with the catch. Fish entering the scoop net are directly transferred to the hold through the scoop-net bag section. Throughout the fishing operation, the machine producing perre-perre sounds and water splashes remains active until the fishing process is completed. The dominant catch obtained during SLF fishing operations consisted primarily of white anchovy (*Stolephorus commersonii*) species.

2. The Effectiveness of SLF Fishing Time

The effectiveness of SLF is calculated based on the new and full moon phases. The moon phase refers to the period of the moon orbiting the Earth, measured from one new moon phase to the next (Pebrian *et al*. 2023). The new and full moon phases based on the Hijri calendar occur from the 1st to the 10th day and from the 25th to the 28th day of the month, while the full to new-moon phases occur from the 11th to the 24th day of the month (Hidayaturrohmah *et al*. 2018). The effectiveness of fish harvesting using the SLF, based on in-situ data, can be observed during the third quarter (QIII) of the lunar phase, in which the catch volume was higher than in Q.I, Q.II, and Q.IV. The catch volume across lunar phases during the 28 fishing trips is presented in Table 3.

Table 3 SLF fishing boat catch volume during the white anchovy (*Stolephorus commersonii*) species moon phase by fishermen in Bero Village, Tiga Island, West Muna Regency (Southeast Sulawesi, Indonesia)

Fishing Trip	Gregorian calendar date	Hijri calendar date	Moon Phase	Fish Catch (Kg)
1	25-Aug-24	15 Safar 1446	Q.III	750
2	26-Aug-24	16 Safar 1446	Q.III	600
3	27-Aug-24	17 Safar 1446	Q.III	550
4	28-Aug-24	18 Safar 1446	Q.III	400
5	29-Aug-24	19 Safar 1446	Q.III	500
6	30-Aug-24	20 Safar 1446	Q.III	350
7	31-Aug-24	21 Safar 1446	Q.III	300
8	1 September 2024	22 Safar 1446	Q. IV	300
9	2 September 2024	23 Safar 1446	Q. IV	250
10	3 September 2024	24 Safar 1446	Q. IV	200
11	4 September 2024	25 Safar 1446	Q. IV	250
12	5 September 2024	26 Safar 1446	Q. IV	130
13	6 September 2024	27 Safar 1446	Q. IV	100
14	7 September 2024	28 Safar 1446	Q. IV	125
15	8 September 2024	1 Rabiul Awal 1446	Q. I	100
16	9 September 2024	2 Rabiul Awal 1446	Q. I	150
17	10 September 2024	3 Rabiul Awal 1446	Q. I	200
18	11 September 2024	4 Rabiul Awal 1446	Q. I	275
19	12 September 2024	5 Rabiul Awal 1446	Q. I	125
20	13 September 2024	6 Rabiul Awal 1446	Q. I	250
21	14 September 2024	7 Rabiul Awal 1446	Q. I	100
22	15 September 2024	8 Rabiul Awal 1446	Q.II	100
23	16 September 2024	9 Rabiul Awal 1446	Q.II	150
24	17 September 2024	10 Rabiul Awal 1446	Q.II	200
25	18 September 2024	11 Rabiul Awal 1446	Q.II	250
26	19 September 2024	12 Rabiul Awal 1446	Q.II	300
27	20 September 2024	13 Rabiul Awal 1446	Q.II	400
28	21 September 2024	14 Rabiul Awal 1446	Q. III	450

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The moon's revolution period consists of four phases, each lasting seven days: the new moon phase (First Quarter = Q.I), the first quarter moon phase (Second Quarter = Q.II), the full moon phase (Third Quarter = Q.III), and the last quarter phase (Fourth Quarter = Q.IV) (Fauziah *et al*. 2024); (Pebrian *et al*. 2023). The analysis results based on the normality test in Table 4 indicate that the collected data are normally distributed, with a significance value > 0.05.

The effectiveness of fishing based on the moon phase from the One-Way ANOVA test results shows that all moon phases are effective for fishing using the SLF gear (Table 5). This is shown by the significance value being smaller than 0.05. Therefore, these results can proceed with the post hoc LSD. Therefore, these results can proceed with the post hoc LSD (Least Significant Difference) test.

The analysis results from the Post Hoc LSD test in Table 5 can be explained as follows: the comparison of significant values between the moon phases in Q. I and Q. III shows a significant value less than 0.05. The significant value between the moon phases in Q. II and Q. III also shows a significant value less than 0.05. The significant value between the moon phases in Q. IV and Q. III is also less than 0.05. Therefore, it can be stated that the most effective time for operating the SLF gear is during the moon phase in Q. III (Table 6).

Table 4 Normality test results: The relationship between the moon phase and the catch volume of white anchovy (*Stolephorus commersonii*) in SLF fishing boat capture fisheries in Bero Village, Tiga Island, West Muna Regency (Southeast Sulawesi, Indonesia)

Tests of Normality

	Moon Phases	Kolmogorov-Smirnov[a] Statistic	Df	Sig.	Shapiro-Wilk Statistic	Df	Sig.
Fish Catch (Kg)	Q. I	.189	7	.200*	.892	7	.288
	Q. II	.141	7	.200*	.962	7	.837
	Q. III	.152	7	.200*	.968	7	.880
	Q. IV	.225	7	.200*	.914	7	.422

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

Table 5 Results of One-Way ANOVA Test: The significance value between lunar phases and the catch volume of white anchovy (*Stolephorus commersonii*) species in capture fisheries of the SLF fishing boats in Bero Village, Tiga Island, West Muna Regency (Southeast Sulawesi, Indonesia)

ANOVA

Fish Catch (Kg)

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	453681.250	3	151227.083	11.652	.000
Within Groups	311485.714	24	12978.571		
Total	765166.964	27			

Table 6 Post Hoc LSD Test Results on effective fishing times based on the moon phase on SLF fishing boat in Bero Village, Tiga Island, West Muna Regency (Southeast Sulawesi, Indonesia)

Multiple Comparisons

Dependent Variable: Fish Catch (Kg)

	(I) Moon Phases	(J) Moon Phases	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
LSD	Q. I	Q. II	-92.857	60.895	.140	-218.54	32.82
		Q. III	-321.429*	60.895	.000	-447.11	-195.75
		Q. IV	-22.143	60.895	.719	-147.82	103.54
	Q. II	Q. I	92.857	60.895	.140	-32.82	218.54
		Q. III	-228.571*	60.895	.001	-354.25	-102.89

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Multiple Comparisons

Dependent Variable: Fish Catch (Kg)

(I) Moon Phases	(J) Moon Phases	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
	Q. IV	70.714	60.895	.257	-54.97	196.39
Q. III	Q. I	321.429*	60.895	.000	195.75	447.11
	Q. II	228.571*	60.895	.001	102.89	354.25
	Q. IV	299.286*	60.895	.000	173.61	424.97
Q. IV	Q. I	22.143	60.895	.719	-103.54	147.82
	Q. II	-70.714	60.895	.257	-196.39	54.97
	Q. III	-299.286*	60.895	.000	-424.97	-173.61

*. The mean difference is significant at the 0.05 level.

DISCUSSION

1. Construction of the SLF Unit

The fishing activities conducted by fishermen in Bero Village, Pulau Tiga, West Muna District, are classified as small-scale fisheries. Small-scale fishing represents a highly dynamic sector in the utilization of fishery resources, carried out by full-time, part-time, or seasonal fishers. The primary market for their catch is the local market, where the fish are sold mainly to meet daily household needs (Ramlah *et al*. 2022). The fishing activities conducted by SLF fishermen take place in the waters surrounding the Tiworo Strait. The fishery resources in the Tiworo Strait are dominated by pelagic species, particularly small pelagic fish that serve as the main target catch, along with more than 50 species of demersal fish and shrimp (Purwoko & Nurulludin 2022). This condition is utilized by SLF fishermen to take advantage of fish resources, especially small pelagic fish species that are the target catch.

The construction of the SLF gear consists of two main components: the scoop net and the light source. The scoop net is designed with two primary parts: the funnel and the bag. The funnel functions to guide and collect fish that aggregate within the catchable area, while the bag section differs from that of most other fishing gears, which are typically designed with open-ended nets. In contrast, the SLF bag is closed, serving as a temporary storage compartment for the catch before it is transferred into specific containers or baskets (Pikal *et al*. 2019). The net bag of the purse seine fishing gear is formed by pulling the color rope, causing the bottom part of the purse seine net to close (Satyawan *et al*. 2023). The design of the net bag in the SLF gear differs from that of conventional fishing nets in that the end of the bag remains open. The SLF net bag is directly connected to a container positioned at the center of the boat (Table 1). This design allows the captured fish to be immediately transferred into the container, thereby minimizing physical damage that may occur from contact with surrounding structures on the vessel. Post-capture handling of fish on board requires careful attention to reduce the risk of bruising, skin abrasion, or ruptured abdomens, all of which can lead to a decline in fish quality (Handoko & Yuniarti 2023; Putri & Manengkey 2023).

The light or light fishing on the SLF is designed to resemble a square table, with the size of the lamp panel decreasing toward the center. This construction is made so that the light does not spread widely in the water but instead focuses on the light fishing area around the lamp panel. The functioning principle of light fishing is as a fishing aid that utilizes the light spectrum to attract plankton, which are attracted to the light and gather around it. This, in turn, attracts small fish, which become prey for larger fish, thus creating a fishing zone (Bubun *et al*. 2016; Gumelar & Al-Fatih 2021).

The fishing method employed in the SLF gear is classified as a filtering method based on the mechanism of fish capture and as an attraction method based on fish behavior. The filtering method is generally applied in net-type fishing gears, where the principle of operation involves fish entering the gear being filtered and subsequently collected into the net bag. (Siregar *et al*. 2023). The fishing method using the attraction method (attractor) is employed to lure or attract fish towards the fishing gear, using tools such as

light (light fishing), bait, or other attractors to increase the effectiveness of fish capture (Chen *et al.* 2024). This fishing method is applied in fish capture using the SLF gear. The light is used to attract fish towards the catchable area, and then a scoop is used to filter the captured fish from the water.

2. Effectiveness of Scoop Light Fishing (SLF)

The fishing time for other light fishing gear units, such as purse seines (Choerudin *et al*. 2022) and lift net "bagan", is typically carried out during non-full moon phases. This is because the absence of natural moonlight enhances the effectiveness of artificial light in attracting fish. Conversely, during the full moon or bright moon phases, fishing activities are typically avoided, as the presence of natural light diminishes the effectiveness of artificial illumination, thereby reducing the fish's phototactic response toward the light source. Therefore, fishing during the dark moon phase is preferred to optimize catches in light-based fishing techniques. This is different from the SLF, which operates during the transition from the new moon phase to the dark moon phase. The light fishing setup is positioned 1 meter above the water, with a lamp power of 4,765 watts, and the light emitted is brighter than the moonlight entering the water. This condition causes the target fish, particularly anchovies (*Stolephorus commersonii*), to be more attracted to the light of the SLF, even during the full moon phase. The intensity of the artificial light overpowers the natural moonlight, drawing fish towards the light source. The anchovy (*Stolephorus commersonii*) exhibits positive phototaxis towards light (Susanto *et al*. 2017; Ikhsan *et al*. 2024).

The effectiveness of fish capture using the SLF is closely related to the light and dark conditions during the moon phase, as this fishing gear operates at night, and its success depends on the light intensity. The analysis results show that the effectiveness of the SLF is highest when the moon is in the third-quarter phase (Q.III). The third-quarter moon phase falls within the full moon phase, which is when the moonlight is very bright, and the moon appears as a perfectly round shape.

Fishing activities using light fishing during the full moon phase generally avoid capturing fish, which contrasts with the SLF, which is highly effective for fish capture during the full moon phase (Q.III). The effectiveness is enhanced by the design of the light-based fishing gear, which operates very close to the water surface, with the lamp positioned approximately 1 m above the water. During the full moon, pelagic fish species that exhibit positive phototaxis spread throughout the water column in search of food, making them more susceptible to capture. The fishing ground for the SLF operating in Pulau Tiga is located at water depths ranging from 18 meters to 19 meters (Saputra *et al*. 2024). The relatively shallow water depth in the fishing area makes it easier for light fishing operations to attract fish from the water column to the surface, where they gather around the light fishing area. This condition optimizes the fishing operation, as fish that have gathered (catchable area) are more easily captured using a scoop net and directly placed into the hold. One of the factors that influences fish capture is the moon phase, as light affects the behavior of fish, particularly those that exhibit positive phototaxis towards light (Lestari *et al*. 2024). The rectangular SLF light panel narrows the horizontal dispersion of the light, resulting in a more vertically focused penetration of the water surface. This vertical focus concentrates the catchable area beneath the light, optimizing the fish-scooping process with the SLF. Allowing the simple design of the SLF gear to be operated more efficiently for capturing fish concentrated within the catchable area. The construction of the SLF gear, which can be operated during the full moon phase, represents an innovative advancement in fishing technology. The effectiveness of the scoop light fishing, when operated during the full moon, challenges the theory that light-based fishing gear is only effective during dark moon conditions.

CONCLUSION

The construction of the SLF consists of two main parts: the scoop net and light fishing. The scoop net is in the form of a long pouch and is directly connected to the fish-holding container. The light fishing system is rectangular in shape and consists of four light panels, with white and yellow lights distributed across each panel. The effectiveness of fishing can be carried out throughout the entire moon phase cycle (First Quarter = Q.I, Second Quarter = Q.II, Third Quarter = Q.III, and Fourth Quarter = Q.IV). However, the most effective fishing occurs during the full moon phase (Third Quarter), with a significant value smaller than 0.05.

SUGGESTION

Future research is recommended to conduct an in-depth analysis of light

illumination both vertically and horizontally by SLF.

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REFERENCES

Afonso AS, Mourato B, Hazin H, Hazin FHV. 2021. The Effect of Light Attractor Color in Pelagic Longline Fisheries. *Fisheries Research*. 235: 105822. DOI: https://doi.org/10.1016/j.fishres.2020.105822

Bubun RL, Fajriah, Hamka E, Saputra A, Fadilah S, Saputra RW. 2024. *Scoop Light Fishing Gear* (Patent 000639769). Directorate General of Intellectual Property.

Bubun RL, Mahmud A, Alam R. 2021. Bombo Cakalang, a Fishing Gear Technology in Iwoimendaa Water, Kolaka Regency Southeast Sulawesi. *Marine Fisheries: Journal of Marine Fisheries Technology and Management*. 12(1): 89–100. DOI: https://doi.org/10.29244/jmf.v12i1.33192

Bubun RL, Simbolon D, Nurani TW, Wisudo SH. 2015. The Formation of Fishing Ground Using Light Fishing. *Jurnal Airaha*. 4(1): 27–36. DOI: https://doi.org/10.15578/ja.v4i1.41

Bubun RL, Simbolon D, Nurani TW, Wisudo SH. 2016. Trophic Level in Fishing Ground by Using Light Fishing in Southeast Sulawesi. *Marine Fisheries: Journal of Marine Fisheries Technology and Management*. 5(1): 57–76. DOI: https://doi.org/10.29244/jmf.5.1.57-76

Chen LC, Hu CW, Weng JS, Lan KW, Tseng CT, Hsieh HJ. 2024. Variations in the Abundance, Biodiversity, and Assemblage Structure of Larval Fish in the Restricted Waters of the Wang-an Light Fishery off Penghu, Taiwan. *Journal of Marine Science and Engineering*. 12(8): 1434. DOI: https://doi.org/10.3390/jmse12081434

Choerudin H, Husein ES, Muhammad M, Nurlaela E, Annur MY, Kusdinar A, Perangin-angin R, Mualim R, Sumarno T, Goenaryo G, Saputra A. 2022. The Influence of Operating Time on the Composition of the Fishing of Purse Seine in Sabang, Aceh. *Jurnal Kelautan dan Perikanan Terapan (JKPT)*. 5(1): 75-81. DOI: https://doi.org/10.15578/jkpt.v5i1.11022

Dollu EA, Plaimo PE, Iwabang ML, Kurang RY. 2023. Effectiveness of Fish Aggregating Device (FAD) Utilization in Fishing Operations in the Waters of Kabola, Alor Regency, East Nusa Tenggara Province. *Jurnal Ilmu dan Teknologi Perikanan Tangkap*. 8(1): 19–24. DOI: https://doi.org/10.35800/jitpt.8.1.2023.37876

Fadillah S, Bubun RL, Hamka E. 2023. *Environmental Friendliness Level of the "Perre-Perre" Fishing Gear Operated in the Northern Tiworo Strait, Pulau Tiga, Bero Village, West Muna District*.

Fauziah ANM, Agustin BPT, Imamy HS, Fachrina I. 2024. Understanding the Process of the First Quarter Moon Phase and its Intensity Effects at Night. *BIOCHEPHY: Journal of Science Education*. 4(1): 44–50. DOI: https://doi.org/10.52562/biochephy.v4i1.1075

Fitri ADP, Hapsari TD, Sabdono A, Adiyanto F, Fitriyani A. 2022. *Study on the Effect of Scoop Net Towards Stolephorus Indicus and Sardinella fimbriata Capture in Cilacap Waters, Indonesia.* 15(2): 671-681. DOI: https://bioflux.com.ro/docs/2022.671-681.pdf

Gumelar RA, Al-Fatih RW. 2021. An Information Study on the Sustainable Development Goals (SDGs): Life Below Water. *Journal of Computer, Electronic, and Telecommunication*. 1(1): 1–16. DOI: https://doi.org/10.52435/complete.v1i1

Handoko YP, Yuniarti T. 2023. Fish Handling on the Ship and on the Landing: Implementation, Impact, and Method to Improve. *Jurnal Kelautan dan Perikanan Terapan*. 1(khusus): 123–128. DOI: http://dx.doi.org/10.15578/jkpt.v

Hardianti S, Mahdi N, Syaiful RH. 2024. Effectiveness Test of Analgesic Combination of Ethanol Extract from Cat's Whiskers Leaves (Orthosiphon

stamineus Benth) and Celery Leaves (Apium graveolens) on Male Mice (Mus musculus). *Borneo Journal of Pharmascientech*. 8(2): 179–185.

Hidayaturrohmah, F, Sulardiono B, Taufani WT. 2018. Abundance of Fish Larvae Based on Moon Phase in Prawean Beach Seagrass, Jepara. *Journal of Maquares*. 7(4): 431–439.

Ikhsan AN, Nainggolan JM, Ula NM, Lestari VB, Pangaribuan YPP, Waru D. 2024. Tuna Fishing Technology Using Sound and Light Powered by PLTGL-SB Integrated with IoT to Enhance Fishermen's Productivity. *Jurnal Pendidikan, Sains dan Teknologi*. 3(3): 474–478.

Karmila, Najamuddin, Hajar MAI. 2025. Analysis of the Level of Environmental Friendliness of Fishing Gear Perre-Perre in the Waters of Sinjai Regency. *Egyptian Journal of Aquatic Biology & Fisheries*. 29(3): 2755–2768.

Lestari NK, Prihandono T, Nuraini L. 2024. The Influence of the Lunar Phase on Fish Catches at Muncar Port, Banyuwangi Regency. *Jurnal Pembelajaran Fisika*. 13(2): 57–64. DOI: https://doi.org/10.19184/jpf.v13i2.48589

Pattiasina S, Marasabessy F, Manggombo B. 2020. The Operation Techniques of Hand Line Fishing to Catch the Red Captain Fish (Lutjanus sp.) in the Territorial Waters of Kanai Village Padaido District Biak Numfor Regency. *Jurnal Perikanan Kamasan*. 1(1): 20–28.

Pebrian R, Kayadoe ME, Manoppo L. 2023. The Influence of Moon Phases on Sero Fishing Catches. *Jurnal Ilmu dan Teknologi Perikanan Tangkap*. 8(1): 11–18. DOI: https://doi.org/10.35800/jitpt.8.1.2023.43868

Pikal A, Kurniawan K, Bachtiyar M. 2019. Study of Mini Trawl Fishing Gear Used by Fishermen in Pulau Tinggi, Penutuk Village, Lepar Pongok District, South Bangka Regency. *Journal of Tropical Marine Science*. 2(2): 51–58. DOI: https://doi.org/10.33019/jour.trop.mar.sci.v2i2.1122

Purwoko RM, Nurulludin N. 2022. Species Composition and Stock Density of Demersal Fish and Shrimp in Tiworo Strait, Southeast Sulawesi. *Jurnal Penelitian Perikanan Indonesia*. 28(1): 31–38. DOI: http://dx.doi.org/10.15578/jppi.28.1.2022.31-38

Putri AS, Mulyadi RA, Tirtana D, Rosalia AA, Hutapea RY. 2024. Used of the Light Attractor in Traps for Catches in Bengkunat Waters, Pesisir Barat Regency. *Arwan: Jurnal Ilmiah Program Studi Perairan*. 6(1): 68–74. DOI: https://doi.org/10.51179/jipsbp.v6i1.2490

Putri ET, Manengkey JI. 2023. Handling Process of Caught Fish and Physical Damage of Main Catch Fish by Pole and Line on KM. Inkamina 523. *Jurnal Bluefin Fisheries*. 5(2): 129–143.

Ramlah S, Adimu HE, Asni A, Fekri L. 2022. Analysis of Small Scale Catch Fisheries Business in Kolaka District, South Sulawesi. *Jurnal Kebijakan Sosial Ekonomi Kelautan dan Perikanan*. 12(1): 1–10.

Saputra RW, Bubun RL, Hamka E, Husain SA. 2024. Correlation of Oceanographic Parameters with White Anchovy Catches Using" Perre-Perre" Fishing Gear in Tiworo Strait. *Jurnal Airaha*. 13(2): 228–239. DOI: https://doi.org/10.15578/ja.v13i2.644

Satyawan NM, Larasati RF, Bhagaskara INS. 2023. Construction Design and Operation Techniques of Mini Purse Seine with One Boat System in Kendari, Southeast Sulawesi. *Journal Perikanan*. 13(1): 278–288. DOI: http://doi.org/10.29303/jp.v13i1.476

Siregar ES, Kusumo R, Ardianti E, Akbar R, Nasution AS. 2023. Environmental Damage Impact of Trawl Net Usage in Marine Ecosystems. *Jurnal Keadilan*. 3(2): 77–89.

Susanto A, Fitri ADP, Putra Y, Susanto H, Alawiyah T. 2017. Response and Adaptation of Anchovy (Stolephorus sp.) to Light Emitting Diode (LED) Lamp. *Marine Fisheries*: *Journal of Marine Fisheries Technology and Management*. 8(1): 39–49. DOI: https://doi.org/10.29244/jmf.8.1.39-49

Yonvitner Y, Boer M, Kurnia R. 2020. Study on the Effectiveness of Fisheries for Sustainable Development in Banten

Province. *Jurnal Kebijakan Perikanan Indonesia*. 12(1): 35–46. DOI: http://dx.doi.org/10.15578/jkpi.12.1.2020.35-46