

Article

Not peer-reviewed version

Comparative Study of Fishing Performance and Underwater Stability according to the Giant Octopus Pot Shape off the East Coast of Korea

[Seonghun Kim](#) , Pyungkwan Kim , [Kyung-Jin Ryu](#) *

Posted Date: 28 June 2024

doi: 10.20944/preprints202406.1926.v1

Keywords: Giant octopus; Enteroctopus dofleini; net pot; pot shape; fishing performance



Preprints.org is a free multidiscipline platform providing preprint service that is dedicated to making early versions of research outputs permanently available and citable. Preprints posted at Preprints.org appear in Web of Science, Crossref, Google Scholar, Scilit, Europe PMC.

Copyright: This is an open access article distributed under the Creative Commons Attribution License which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Article

Comparative Study of Fishing Performance and Underwater Stability according to the Giant Octopus Pot Shape Off the East Coast of Korea

Seonghun Kim ¹, Pyungkwan Kim ² and Kyung-Jin Ryu ^{1,*}

¹ Division of Marine Production System Management, Pukyong National University, Busan 48513, Republic of Korea; seba@pknu.ac.kr (S.K.); tuna@pknu.ac.kr(K.J.R)

² Division of Fisheries Engineering, National Institute Fisheries Science, Busan 46083, Korea; trawl98@korea.kr (P.K.)

* Correspondence: tuna@pknu.ac.kr; Tel.: +82-51-629-5888

Abstract: The giant octopus caught off the east coast of Korea is an important fishery resource with the largest haul and is mostly caught using net pots. While giant octopus pots have different shapes, drum, rectangular, and cylinder pots are mostly used. However, these pots have not been thoroughly evaluated. Here, we evaluated the fishing performance of three giant octopus pots, their fluid resistance, and underwater movement. Six sea trials were conducted near the Hupo region in Gyeongsangbuk-do. In total, 163 individuals (62,724 g), 190 individuals (49,913 g), and 154 individuals (52,364 g) were caught using drum, rectangular, and cylinder pots, respectively. Drum pots showed significant differences in the amount of catch by weight (ANOVA test, $p < 0.05$). Moreover, the percentage of minimum conservation size was the lowest in cylinder pots (6.5%). Drum pots showed the highest stability in the underwater stability test, while underwater fluid resistance at 2.5 kt fluid speed was in the following order: drum pots (7.66 kgf) > rectangular pots (7.16 kgf) > cylinder pots (7.04 kgf). Therefore, drum pots showed excellent fishing performance. This study provides foundational data for developing managing systems for giant octopus resources and establishing the extent of fishing gear usage.

Keywords: giant octopus; *Enteroctopus dofleini*; net pot; pot shape; fishing performance

Key Contribution: This study aimed to evaluate the fishing performance of three giant octopus pots; their fluid resistance and underwater movement. This study provides foundational data for developing managing systems for giant octopus resources and establishing the amount of fishing gear usage

1. Introduction

Octopus is an important fishery resource with the largest haul on the east coast of Korea. Octopuses are caught by pot fishing on the east coast and by drift or trawl fishing near the coastline [1]. Of these methods, pot fishing produces the largest octopus amounts. Octopus is a precious fish species that has always been used in historically important events on the east coast of Korea, and octopus prices fluctuate significantly especially during the holidays [2].

Octopus species caught on the east coast of Korea include the giant Pacific octopus (*Enteroctopus dofleini*), webfoot octopus (*Octopus longispadiceus*), and common octopus (*Octopus vulgaris*), and of these, the giant octopus is the dominant species with significantly high commercial value [3]. The exact amounts of giant octopus caught cannot be known as the amount of octopus caught is not classified and totaled by species. The production trends for octopus have fluctuated in the past decade, while maintaining approximately 4,000 tons. The peak value of 4,729 tons was achieved in 2017, followed by a slightly decreasing trend (4,184 tons) in 2021 [4].

Giant octopus is a coastal benthic species that inhabits the continental slope to a depth of 200 m. During spawning season, octopuses are known to migrate to shallower coastal waters (depth of 50–60 m) to lay adhesive eggs on reefs and gravel before migrating back to deeper waters [5–7].

Pots with a metal frame covered with a net are used to catch octopuses on the east coast of Korea. However, different pot shapes, such as drum, rectangular, or cylinder, are used depending on the fishing area. While the reason for the different shapes of pots in different regions has not been clearly researched, fishermen have opined that they use different pots based on convenience and the seabed conditions. In particular, cylinder pots have the advantage of taking up less space on board the vessel as they can be folded for loading. Drum and rectangular pots have a larger volume due to the fixed frame. With respect to durability, drum pots have thick and sturdy frames, which means that they can be used for a relatively longer time than rectangular and cylinder pots. While it has been mentioned that there are significant differences in fishing performance according to pot shape for each region, but some regions are using mixture of different types of pots [8].

For resource management, catching giant octopus weighing ≤ 600 g is prohibited by relevant laws. In addition, the number of pots used is being controlled for sustained resource management, while various policies, such as a ban on pot fishing in spawning areas, have been implemented. The number of octopus pots that can be loaded on a fishing vessel varies depending on the pot size, and thus, it is difficult to uniformly adjust the number of pots.

In this study, sea trials were conducted on fishing performance using pots employed to catch giant octopuses; we assessed three different shapes to identify the fishing characteristics. The findings in the trials clearly demonstrated the differences in the amount of catch depending on the pot shape. Moreover, a circulating water channel was used to conduct an underwater behavior experiment aimed at identifying the stability of the pots. The findings of the study can be used to clarify the fishing characteristics based on octopus pot shape and generating foundational data for establishing relevant resource management systems in the future.

2. Materials and Methods

2.1. Sea trials on Fishing Performance by Pot Shape

Sea trials for comparison of fishing performance according to the giant octopus pot shape were conducted using three different net pots used on the east coast of Korea. The sea trials were conducted for a total of six times, between June and November 2020, at a depth of 79–92 m located 4–5 miles northeast of Port of Hupo in Uljin, Gyeongsangbuk-do, an area in Korea well known for giant octopus production. Figure 1 shows the trial site.

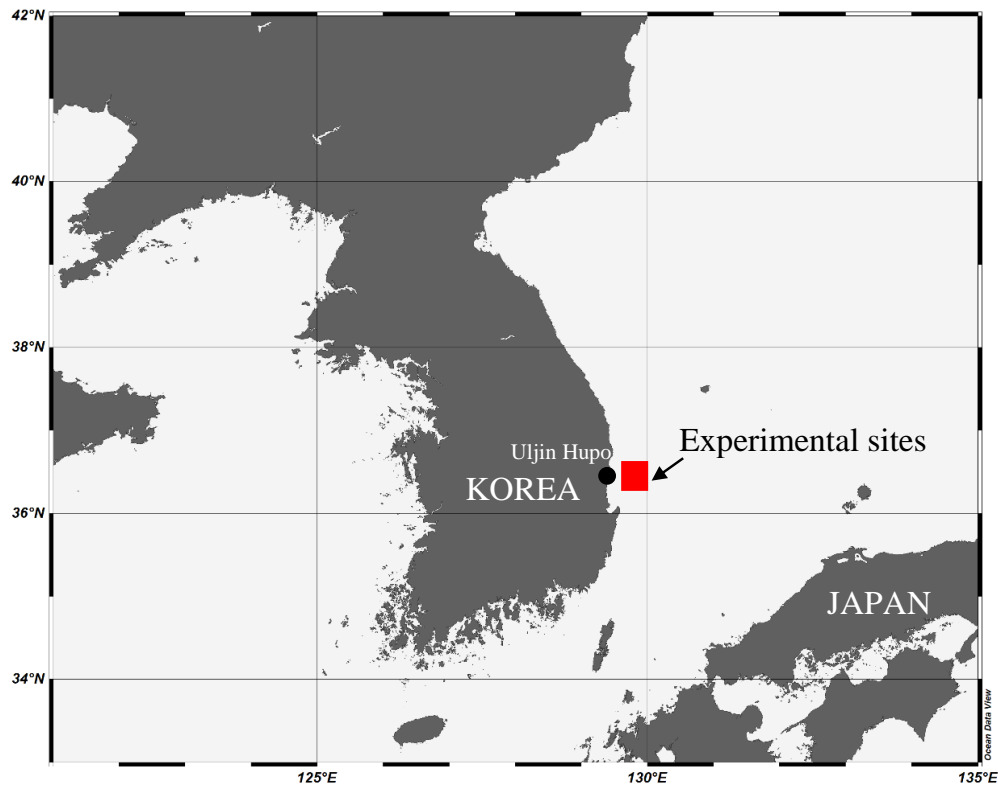


Figure 1. Location of the fishing performance experiments in the sea trials.

The pots used in the trials had three different shapes (commonly used to catch giant octopus on the east coast of Korea). The following fishing gear were used in the trials: drum pots (diameter 70 cm × height 27 cm) used in parts of Pohang, Gyeongsangbuk-do; rectangular pots (width 55 cm × height 39 cm × length 85 cm) used in parts of Uljin, Gyeongsangbuk-do; and cylinder pots (diameter 45 cm × length 82 cm) used in parts of Uljin, Gyeongsangbuk-do and Gangwon-do (Figure 2).

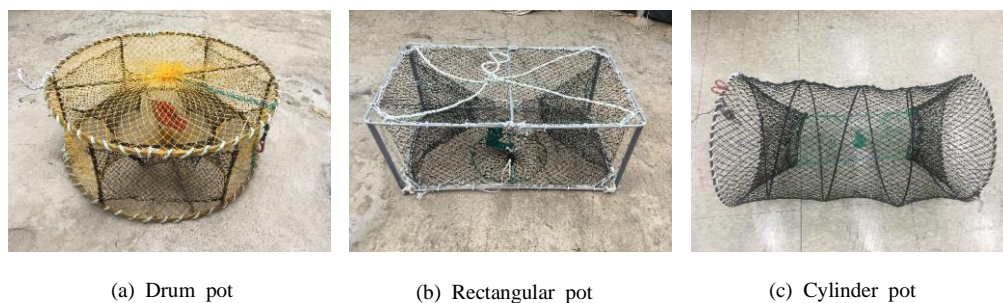


Figure 2. Three types of octopus pots used in sea performance trials.

The netting of the three types of pots was made of PE 210Td 21 ply and all pots had the same mesh size (35 mm). The experimental setup consisted of four sets with each set composed of 60 pots, with three different types of pots connected sequentially (Figure 3).

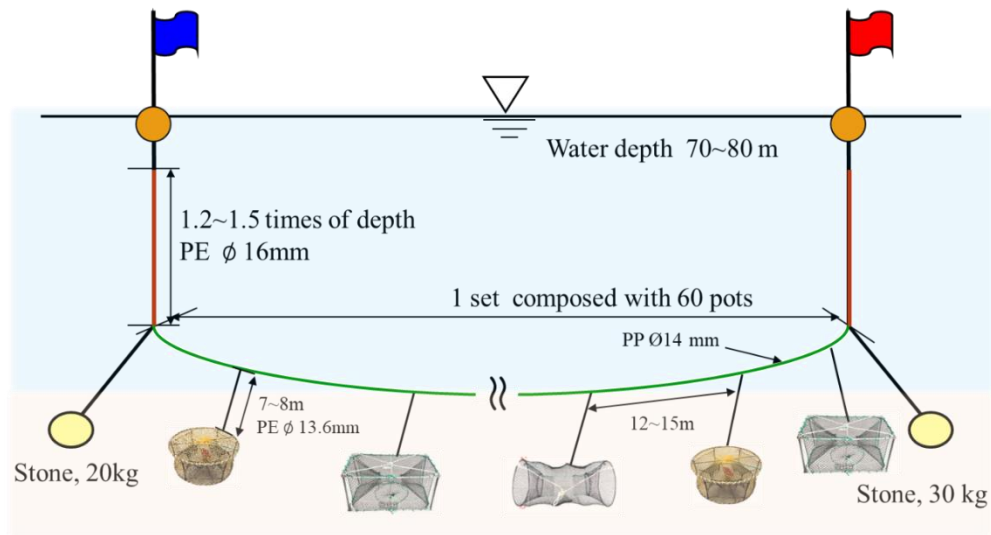


Figure 3. Arrangement of the experimental pots the fishing performance tests.

For the trial, the gear was hauled in sequentially to collect the catch, after which, bait was replaced and the gear was re-deployed. The gear soaking period was approximately 15 days, a time duration that is the same as that of commercial vessels.

All catches inside the gear were collected and measured. Catches were classified by the type of pot used to catch them. Representative body length was measured in unit of 1 mm and body weight was measured in unit of 1 g using an electronic scale (CAS, SW-1W, Korea). The catch data by type of pot consisted of number of individuals by fish species, body weight, catch rate, and catch per unit effort (CPUE). CPUE was calculated based on the number of individuals caught per pot (ind/pot) and body weight per pot (g/pot) in a single trial.

2.2. Experiment on Underwater Stability by Pot Shape

Octopuses are known to have the habit of moving into stable spaces such as seabed habitat (ref). In this study, an experiment was on movement of pots according to current speed in a circulating water channel to determine the underwater stability of pots by shape. The experiment was conducted in a circulating water channel (25 m × 4 m × 1.4 m, L×W×D/capacity; 280 ton) at the National Institute of Fisheries Science. The experimental flow speed was set at 0.5 kt increments (0, 0.5, 1.0, 1.5, 2.0, and 2.5 kt) to investigate fluid resistance and movement. For the experiment, the flow was set up at 0°, 45°, 90°, and 180° relative to the entrance of the pot and movement according to flow speed was investigated. The experiment was conducted five times for each angle. Fluid resistance was measured using a 10 kgf capacity underwater tension meter (SMM10k, Sentech, Co., Korea). An amplifier (AM-310, Sentech, Co., Korea) was used to store the data on a PC, after which, the mean value of each factor was derived and used in the analysis. The experimental setup is as shown in Figure 4.

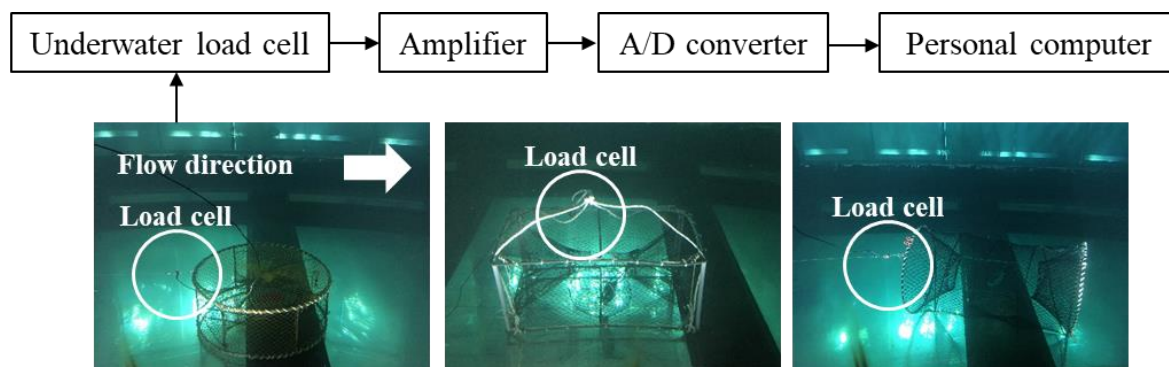


Figure 4. Experimental setup for underwater stability by pot shape.

3. Results

3.1. Sea Trials on Fishing Performance by Pot Shape

The sea trials for comparison of fishing performance according to three different giant octopus pots were conducted a total of six times. Excluding one trial that showed an imbalance in the amount of catch due to gear entanglement, the results from five trials were used in the analysis. The total amount of catch by pot shape was 163 individuals (62,724 g), 190 individuals (49,902 g), and 154 individuals (52,364 g) with drum, rectangular, and cylinder pots, respectively, with pot drums showing significant differences with respect to the amount of catch by weight (ANOVA test, $p < 0.05$). The fishing performance of drum pots was approximately 1.20 times higher than that of cylinder pots based on amount of catch by weight. Moreover, when SPSS statistics software (IBM SPSS statistics27, USA) was used to perform an analysis of variance (ANOVA) on three pot shapes based on catch weight, the results showed significant differences in fishing performance (ANOVA one-way test, $p < 0.05$). Furthermore, drum pots showed higher catch weight as compared to other pots (Tukey HSD test, $p < 0.05$).

A box plot of weight of giant octopus caught by each pot type is shown in Figure 5.

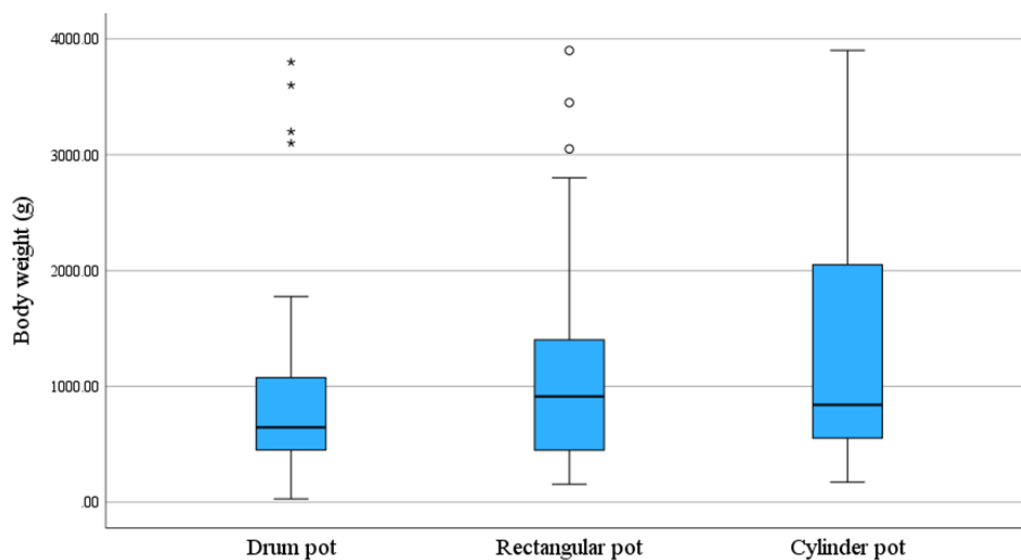


Figure 5. Box plot of the weights of giant octopuses caught by each pot type.

In the box plot in Figure 5, individuals weighing $\geq 3,000$ g were caught with drum and rectangular pots, causing outliers to appear in the weight distribution of all individuals caught.

With respect to giant octopus, the target species of this study, the amount of catch was 60 individuals (55,307 g), 36 individuals (42,413 g), and 31 individuals (43,029 g) with drum, rectangular, and cylinder pots, respectively, showing that drum pots had the highest amount of catch. The fishing performance of drum pots was approximately 1.29 times higher than that of cylinder pots based on amount of catch by weight. The by-catch rate, excluding giant octopus, was approximately 12, 15, and 13% with drum, rectangular, and cylinder pots, respectively, showing that rectangular pots had the highest by-catch rate by weight. The results from the comparative sea trials on fishing performance are summarized in Table 1. The number of octopus and individuals weighing ≤ 600 g, MCS for resource conservation, for each trial round is listed in Table 2. In the total of five trials, drum pots caught the most MCS individuals with an average of 5.4 individuals (9.0%), whereas cylinder pots showed the lowest percentage of small individuals caught with 6.5% (Table 2). ANOVA on the number of MCS individuals (≤ 600 g) caught with three different pots showed significant differences (ANOVA one-way test, $p < 0.05$). Among the three types of pots, cylinder pots had the lowest percentage of small individuals (Tukey HSD test, $p < 0.05$).

A box plot of MCS individuals by each pot type is as shown in Figure 6.

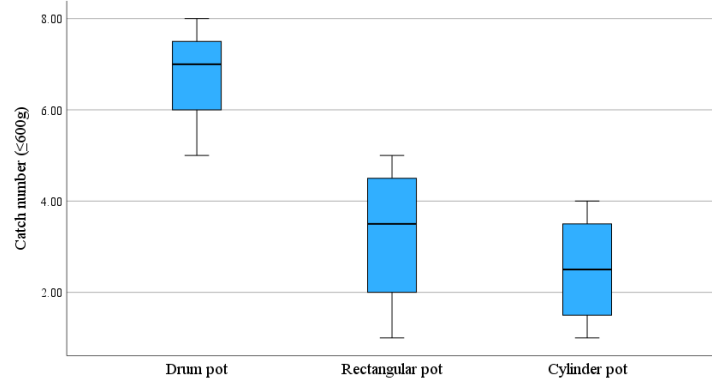


Figure 6. Box plot of MCS individuals based on each pot type.

Table 1. Sea trial results for fishing performance using three different pot types.

Species name	Scientific name	Drum pot						Rectangular pot						Cylinder pot						Total					
		Catch numbr	Catch rate(%) ¹⁾	Weig ht (g)	Catch rate(%) ²⁾	CPU E (ind) ₃₎	CPU E (g) ⁴⁾	Catch numbr	Catch rate(%) ¹⁾	Weig ht (g)	Catch rate(%) ²⁾	CPU E (ind) ₃₎	CPU E (g) ⁴⁾	Catch numbr	Catch rate(%) ¹⁾	Weig ht (g)	Catch rate(%) ²⁾	CPU E (ind) ₃₎	CPU E (g) ⁴⁾	Catch numbr	Catch rate(%) ¹⁾	Weig ht (g)	Catch rate(%) ²⁾	CPU E (ind) ₃₎	CPU E (g) ⁴⁾
Octopuses																									
North																									
Pacific giant octopus	<i>Enteroctopus dofleini</i>	60	36.81	55307	88.18	0.20	184.36	36	18.95	42413	84.97	0.12	141.38	31	20.13	43029	82.17	0.10	143.43	127	25.05	140749	85.30	0.42	469.16
Octopoda	<i>Octopus longispadiceus</i>	1	0.61	281	0.45	0.00	0.94							1	0.65	663	1.27	0.00	2.21	2	0.39	944	0.57	0.01	3.15
Fishes																									
Sculpin	<i>Alcichthys alcicornis</i>	48	29.45	1906	3.04	0.16	6.35	77	40.53	3388	6.79	0.26	11.29	68	44.16	3199	6.11	0.23	10.66	193	38.07	8493	5.15	0.64	28.31
Barfin flounder	<i>Verasper moseri</i>	6	3.68	605	0.96	0.02	2.02	7	3.68	833	1.67	0.02	2.78	6	3.90	631	1.21	0.02	2.10	19	3.75	2069	1.25	0.06	6.90
Pacific cod	<i>Gadus macrocephalus</i>													3	1.95	1510	2.88	0.01	5.03	3	0.59	1510	0.92	0.01	5.03
Conger eel	<i>Conger myriaster</i>	1	0.61	1286	2.05	0.00	4.29							1	0.65	194	0.37	0.00	0.65	2	0.39	1480	0.90	0.01	4.93
black edged sculpin	<i>Gymnocanthus herzensteini</i>	5	3.07	318	0.51	0.02	1.06	5	2.63	324	0.65	0.02	1.08	9	5.84	526	1.00	0.03	1.75	19	3.75	1168	0.71	0.06	3.89
Yellow goosefish	<i>Lophius litulon</i>													1	0.65	731	1.40	0.00	2.44	1	0.20	731	0.44	0.00	2.44

Rockfish	<i>Sebastes zonatus</i>												1	0.65	702	1.34	0.00	2.34	1	0.20	702	0.43	0.00	2.34	
Cubed snailfish	<i>Liparis tessellatus</i>	1	0.61	62	0.10	0.00	0.21	6	3.16	497	1.00	0.02	1.66	1	0.65	38	0.07	0.00	0.13	8	1.58	597	0.36	0.03	1.99
Atka mackerel	<i>Pleurogrammus azonus</i>	1	0.61	596	0.95	0.00	1.99												1	0.20	596	0.36	0.00	1.99	
Fat greenling	<i>Hexagrammos otakii</i>							4	2.11	461	0.92	0.01	1.54	2	1.30	127	0.24	0.01	0.42	6	1.18	588	0.36	0.02	1.96
Blackfin flounder	<i>Glyptocephalus stelleri</i>	6	3.68	210	0.33	0.02	0.70	8	4.21	297	0.60	0.03	0.99	2	1.30	50	0.10	0.01	0.17	16	3.16	557	0.34	0.05	1.86
Little mouth flounder	<i>Pleuronectes herzensteini</i>							2	1.05	148	0.30	0.01	0.49	1	0.65	27	0.05	0.00	0.09	3	0.59	175	0.11	0.01	0.58
Blackedged sculpin	<i>Gymnocanthus herzensteini</i>													1	0.65	112	0.21	0.00	0.37	1	0.20	112	0.07	0.00	0.37
Goldeye rockfish	<i>Sebastes thompsoni</i>	1	0.61	63	0.10	0.00	0.21													1	0.20	63	0.04	0.00	0.21
Shotted halibut	<i>Eopsetta grigorjewi</i>	1	0.61	20	0.03	0.00	0.07													1	0.20	20	0.01	0.00	0.07
Scalyeye plaice	<i>Acanthopsetta nadeshnyi</i>													1	0.65	13	0.02	0.00	0.04	1	0.20	13	0.01	0.00	0.04
Crustacean																									
Kuro shrimp	<i>Crangon lar</i>							2	1.05	18	0.04	0.01	0.06	1	0.65	10	0.02	0.00	0.03	3	0.59	28	0.02	0.01	0.09
Japanese spiny lobster	<i>Panulirus japonicus</i>													1	0.65	13	0.02	0.00	0.04	1	0.20	13	0.01	0.00	0.04

Gastropod

Finely- striate buccinu m	<i>Buccinum striatissimu m</i>	18	11.04	481	0.77	0.06	1.60	43	22.63	1534	3.07	0.14	5.11	21	13.64	578	1.10	0.07	1.93	82	16.17	2593	1.57	0.27	8.64
Aegista tenuissim a	<i>Neptunea constricta</i>	14	8.59	1589	2.53	0.05	5.30							1	0.65	167	0.32	0.00	0.56	15	2.96	1756	1.06	0.05	5.85
Oragon triton shell	<i>Fusitriton oregonensis</i>													1	0.65	44	0.08	0.00	0.15	1	0.20	44	0.03	0.00	0.15
Total		163	100	62724	100	0.54	209.0 8	190	100	49913	100	0.63	166.3 8	154	100	52364	100	0.51	174.5 5	507	100	16500 1	100	1.69	550.0 0
Number of species				13						10						20						23			

Table 2. Number of individuals caught and percentage of MCS individuals caught by each pot type for each trial round.

Trials	Drum pot			Rectangular pot			Cylinder pot		
	Catch number	MCS (≤600g,ind.)	MCS rate (≤600g, %)	Catch number	MCS (≤600g,ind.)	MCS rate (≤600g, %)	Catch number	MCS (≤600g,ind.)	MCS rate (≤600g, %)
Trial 1	11	8	13.3	9	4	11.1	4	2	6.5
Trial 2	10	5	8.3	4	1	2.8	5	4	12.9
Trial 3	14	7	11.7	5	3	8.3	6	1	3.2
Trial 4	6	0	0.0	5	0	0.0	5	0	0.0
Trial 5	19	7	11.7	13	5	13.9	11	3	9.7
Total	60	27	45.0	36	13	36.1	31	10	32.3
Average	12	5.4	9.0	7.2	2.6	7.2	6.2	2	6.5

In addition, distribution by weight class of giant octopus caught with each pot type is as shown in Figure 7.

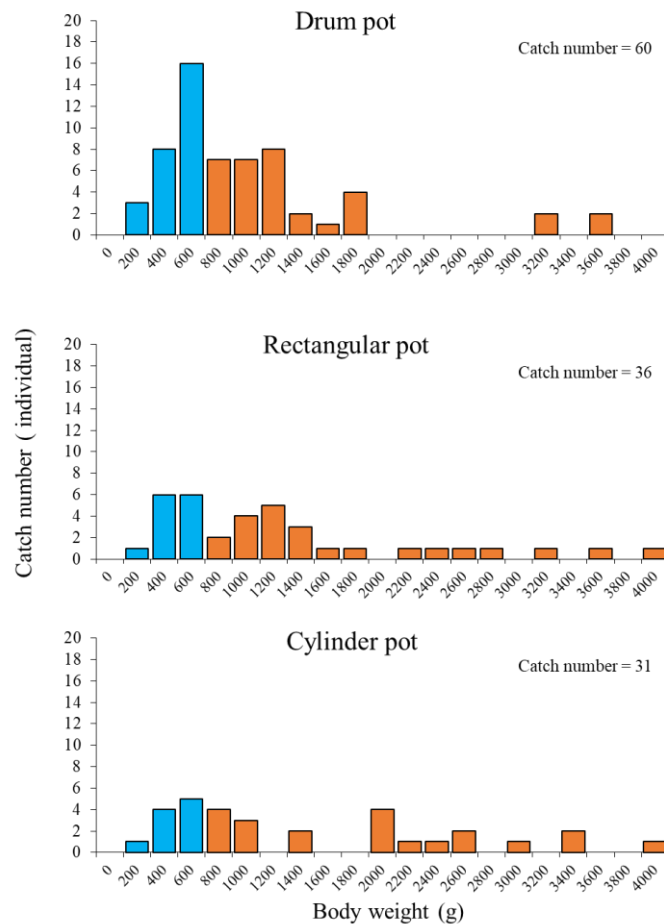


Figure 7. Distribution by weight class of giant octopus caught with each pot type. Blue and orange colors indicate number of individuals weighing ≤ 600 g and > 600 g, respectively.

The highest number of MCS individuals were caught with drum pots and those caught with drum pots were relatively larger in size than those caught with other pots. The weight distribution of all giant octopus caught showed a most likely value ranging between 600 and 1,600 g.

3.2. Underwater Stability by Pot Shape

In the experiment on underwater stability by pot shape, a circulating water channel was used with varying flow and flow angle relative to the pot entrance to observe fluid resistance and underwater movement. When the angle was altered according to flow, all three experimental pots moved at flow speed of ≥ 0.5 kt and rotated relative to the part connected to the branch line, aligning parallel to the flow. The experimental pots showed a rapid increase in fluid resistance from flow speed of ≥ 1 kt. The fluid resistance of drum pots was 0.128 ± 0.02 kgf at a flow speed of 0.5 kt and 7.040 ± 0.04 kgf at the fastest flow speed of 2.5 kt. The fluid resistance of rectangular pots was 0.177 ± 0.01 kgf at a flow speed of 0.5 kt and 7.163 ± 0.03 kgf at the fastest flow speed of 2.5 kt. The fluid resistance of cylinder pots was 0.183 ± 0.07 kgf at 0.5 kt and 7.658 ± 0.05 kgf at 2.5 kt. Cylinder pots weighed relatively less in air than other pots, but at flow speed of ≥ 1 kt, they floated from the bottom and the gravitational weight and resistance acted on the sensors to show a relatively large fluid resistance. Underwater tension of three different pots according to flow speed is shown in Figure 8.

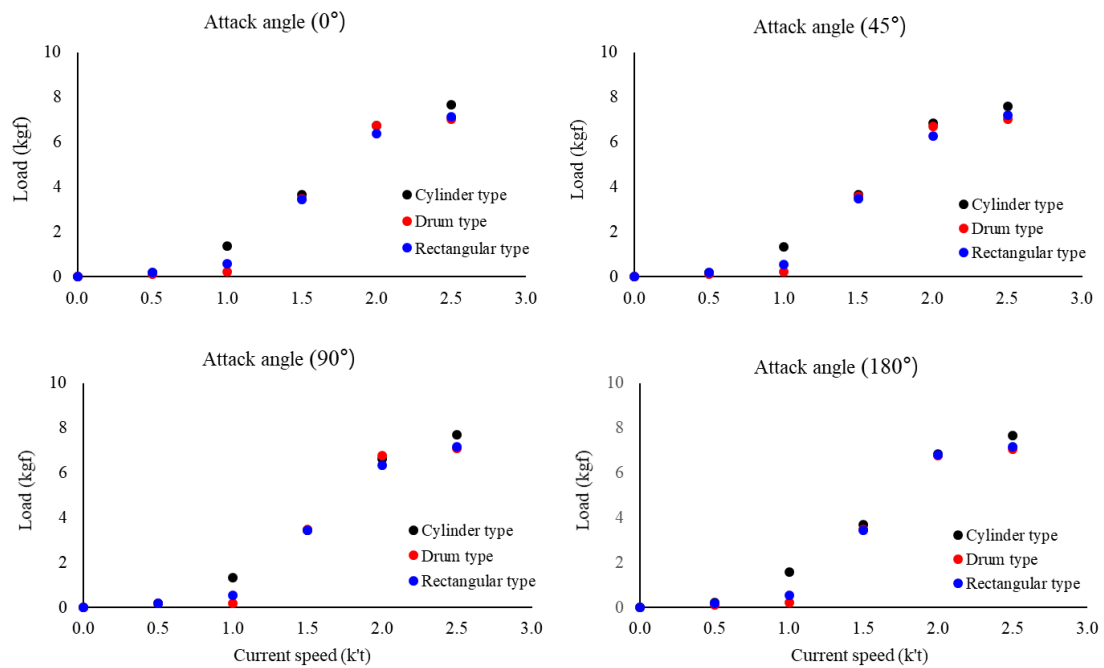


Figure 8. Fluid resistance by pot type according to change in current speed. The angle of attack represents the angle formed between the direction of fluid flow in the water tank and the entrance of the pot.

Underwater tension according to flow speed was relatively high in cylinder pot as compared to other pots, while drum pots showed the lowest tension. On the other hand, cylinder pots began moving as the current speed increased from 0 to 0.5 kt and was aligned in the direction of the flow. Drum pots showed the pattern of being pushed in the direction of the flow at 1.0–1.5 kt, while rectangular pots, which had the highest weight, began moving at 1.3 kt, and at 1.5 kt, the length of the branch line was fixed and the pots tipped over as they were pushed by the current (Figure 9).

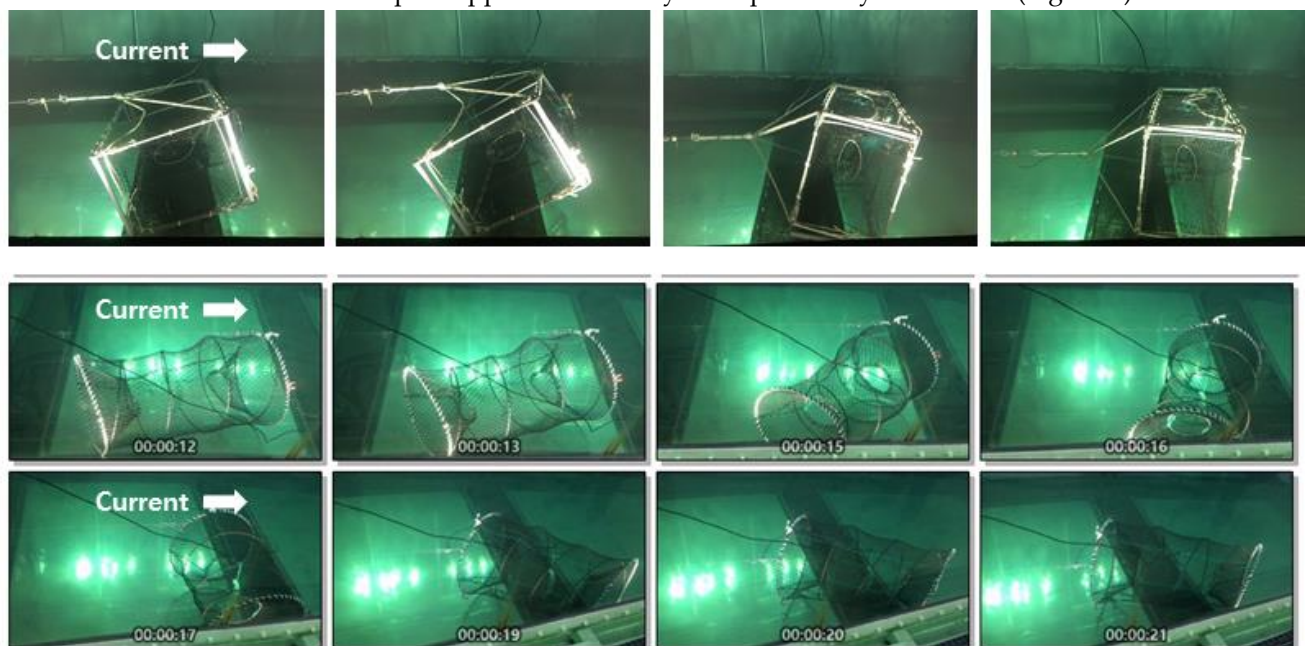


Figure 9. Underwater movement according to flow speed by giant octopus pot shape.

With respect to the underwater behavior of pots, the level of movement appeared differently depending on the weight and area of contact with the bottom surface. Cylinder pots, which have the smallest area of contact with the seabed, were found to move most freely. Considering that the actual underwater current speed of the sea trials is approximately ≤ 2 kt, the movement of three different pots can be indirectly predicted, while factors associated with seabed condition were not considered in the experiment.

4. Discussion

The amount of giant octopus caught off the east coast of Korea was approximately 4,000 tons in 2022, but there are significant fluctuations in the amount of catch from year to year [4]. Pots used to catch giant octopus have many shapes, but all are net pots surrounded by netting. For the size of net knots, the Enforcement Decree of the Fisheries Act prohibits the use of knots ≤ 35 m. In addition, recent relevant laws have increased the weight of aquatic animals not to be caught by fishing from 400 g to 600 g for the protection of fishery resources, and considering that the minimum landing size is 6–7 kg [2], government ministries are reviewing increasing the minimum landing size for protecting young individuals and efficiently using fishery resources.

Each region has its own preferred shape of pots used to catch giant octopus, while the amount of catch is known to be influenced by the seabed topography and current speed in the fishing ground. However, clear research findings and evidence are lacking. In recent years, pots used to catch giant octopus are remaining underwater for a longer period and fishermen have preemptively occupied fishing grounds to continuously deploy fixed fishing gears in the same waters. To manage giant octopus resources, ecological studies are continuing to be conducted [9]. However, there is a lack of quantitative studies on the fishing and physical characteristics of pots being used, while basic data regarding management of fishing gear are desperately needed.

This study compared and analyzed underwater stability through a water tank experiment and conducted sea trials on giant octopus pots with three different shapes.

The findings of this study showed that drum pots had relatively superior performance than other pots. However, fishermen have a high preference for cylinder pots that can be folded. This is because cylinder pots offer the advantages of taking up less space when the pots are loaded on the vessel, being inexpensive, and being more convenient to work with owing to being relatively lighter in weight. On the other hand, drum or rectangular pots have a fixed shape, and as a result, they take up much more space and are more difficult to handle due to the larger size.

With respect to underwater stability, drum and rectangular pots, which have larger area of contact with the seabed surface and are heavier, were found to be superior. Generally, octopuses are known to have a habit of entering stable space, believing it to be a habitat [10–13]. Because of this reason, octopus pots that settle stably with minimal sway in underwater will have higher likelihood of catching octopus. Fishermen are choosing pot shapes based on those that offer more favorable conditions with respect to convenience and performance.

For giant octopus resource management, studies on quantitative weights for fishing gear shape and size are needed. Since there are clear differences in CPUE and amount of gear that can be loaded on board the vessel depending on the pot shape, clear evidence is required when setting the intensity of fishing or appropriate amount of usage. In this respect, the findings of this study can be used as foundational data for establishing or improving related systems.

5. Conclusions

To test the fishing performance according to the shape of giant octopus pots, six sea trials were conducted on pots with three different shapes (drum, rectangular, and cylinder pots). The sea trial results showed that the total amount caught was 163 individuals (62,724 g), 190 individuals (49,902 g), and 154 individuals (49,341 g) with drum, rectangular, and cylinder pots, respectively, with drum pots showing significant differences with respect to the amount of catch by weight. The fishing performance of drum pots was approximately 1.27 times higher than that of cylinder pots based on amount of catch by weight. With respect to giant octopus, the target species of this study, drum pots

had the highest amount of catch among the three types of pots with 60 individuals. For fishery resource protection, giant octopus weighing ≤ 600 g must be released, and among the three types of pots, cylinder pots had the lowest percentage of MCS individuals caught with 6.5%.

In the water tank experiment for underwater stability based on pot shape, drum pots showed the highest stability, while underwater fluid resistance at actual current speed of 2.5 kt appeared in the following order: drum pots (7.66 kgf) > rectangular pots (7.16 kgf) > cylinder pots (7.04 kgf). The experimental pots appeared to slip from the seabed starting from a flow speed of ≥ 1 kt, while cylinder pots showed poor stability as they floated at approximately 1.3 kt. Among giant octopus pots, drum pots were found to be relatively superior with respect to fishing performance, whereas cylinder pots that can be folded when loading and weigh the least were found to be superior with respect to convenience of use.

Supplementary Materials: The following supporting information can be downloaded at the website of this paper posted on Preprints.org, Figure S1: title; Table S1: title; Video S1: title.

Author Contributions: S.K. conceived and designed the experiments, analyzed the data, prepared the experiments, authored and reviewed drafts of the paper, and approved the final draft. H.K. contributed to the experimental design and supervision, provided editorial reviews of the manuscript, and approved the final draft. K.J.R. conceived and performed the experiments, analyzed the data, authored or reviewed drafts of the paper, and approved the final draft. All authors have read and agreed to the published version of the manuscript.

Funding: This research was supported by Korea Institute of Marine Science & Technology Promotion (KIMST) funded by the Ministry of Oceans and Fisheries (20210549) and the Pukyong National University Industry-university Cooperation Research Fund in 2023(202311600001)

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: The data used to support the findings of this study are available from the corresponding author upon request.

Acknowledgments: The authors are grateful Korea Institute of Marine Science & Technology Promotion (KIMST) funded by the Ministry of Oceans and Fisheries (20210549) and the Pukyong National University Industry-university Cooperation Research Fund in 2023(202311600001). They would like to thank Jeong-Hwan Oh, captain of F/V Samchang, and his crew for their help and assistances onboard the vessel.

Conflicts of Interest: The authors declare no conflicts of interest.

References

1. Seo, Y.I.; Lee, S.J. Catch status of the giant Pacific octopus, *Enteroctopus Dofleini*, by drift line fishery in the Central East Coast of Korea, Korea. *J Korean Soc Fish Ocean Technol* **2022**, *58*, 310–316.
2. Lee, S.I.; Yang, J.H.; Lee, H.W.; Kim, J.B.; Cha, H.K. Maturity and spawning of the giant Pacific octopus, *Octopus Dofleini* in the coast of Gangwondo, East Sea. *J. Korean Soc. Fish. Technol.* **2014**, *50*, 154–161, doi:10.3796/ksft.2014.50.2.154.
3. Kim, J.B.; Yang, J.-H.; Lee, S.J. First record of octopus *Longispadiceus* (Cephalopoda: Octopodidae) from Korea. *Korean J. Malacol.* **2016**, *32*, 221–229, doi:10.9710/kjm.2016.32.3.221.
4. Fisheries information portal service (FIPS). Available online: <https://www.fips.go.kr/p/S020304> (accessed on 20 June 2024).
5. Fukuda, T. Ecology of *Octopus Dofleini* in the Tsugaru Strait. *The Aquaculture* **1995**, *271*, 2–15.
6. Sato, K. Survey of sexual maturation in *Octopus Dofleini* in the coastal waters off Cape Shifuya, Shimokota Peninsula. Aomori Precenture. *Nippon Suisan Gakkaishi* **1996**, *62*, 355–360.
7. National Fisheries Research and Development Institute (NFRDI). *Commercial Cephalopods of the World*; Yemoon Press: Busan, 2005;
8. Yang, J.H.; Lee, S.; Kim, J.; Jung, P.; Kim, J.M. A study on the status of octopus pot fishery in the coastal seas of Gyeongbuk, Korea. *Korea. J Korean Soc Fish Ocean Technol* **2022**, *58*, 95–105.
9. Sano, M.; Bando, T. Seasonal migration of North Pacific giant octopus *Enteroctopus Dofleini* in the Soya/La Pérouse Strait. *Nippon Suisan Gakkai Shi* **2015**, *81*, 27–42, doi:10.2331/suisan.81.27.
10. Kim, P.; Seo, Y.; Jeong, S.J.; Yang, J.H. Behavioural experiments of Pacific giant octopus (*Enteroctopus Dofleini*) to Wooden Octopus Pot in the Tank. *J Korean Soc Fish Ocean Technol* **2022**, *58*, 199–204.

11. Kim, S. An experimental study on the application of escape device in a net pot for protecting of small giant octopus (*Octopus Dofleini*). *J Korean Soc Fish Ocean Technol* **2022**, *58*, 193–198.
12. Kwon, I.Y.; Kim, T.H. Entering behavior and fishing capacity on pot for *Octopus Minor* by mesh size. *J Korean Soc Fish Ocean Technol* **2021**, *57*, 185–193, doi:10.3796/KSFOT.2021.57.3.185.
13. Nagano, K.; Miura, T.; Sakurai, Y. Escape openings reduce the catch of small North Pacific giant octopus, *Enteroctopus Dofleini* from fishing basket, Aomori, Japan. *Fish Engin* **2019**, *56*, 27–33.

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.