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Effect of Different Types of Use of Food on the Catching of Folding Train on the Catching of Mangrove Crab (*Scylla serrata*) in Kampung Laut Waters

Efek Perbedaan Penggunaan Jenis Umpan pada Alat Tangkap Bubu Lipat terhadap Hasil Tangkapan Kepiting Bakau (Scylla serrata) di Perairan Kampung Laut

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Abstract

Mangrove crab (*Scylla serrata*) catching activities generally use collapsible traps. Folding traps can be operated using bait and not using bait, but the catch is less effective if it does not use bait. The purpose of this study was to determine the effect of using different types of bait (fresh stingray, salted stingray, fresh eel, and salted eel) on the catch of Mangrove crab in Kampung Laut waters. The material of this research is the catch of mangrove crabs using fresh stingrays, salted stingrays, fresh eels, and salted eels as bait. The research method used is experimental fishing. The collected data includes environmental parameters, the number of catches, and the trap size. Data analysis used a Completely Randomized Design (CRD) and Duncan's follow-up test. The results showed that the different types of bait used affected the number of catches, catch weight, and catch size. This study concludes that the catch of mangrove crabs with salted stingray bait gets the most catches, namely 16 fish, and on salted eel bait gets 13 catches, while in fresh stingray bait treatment, it only gets seven catches and on fresh eel gets five catches.

Keywords: Mangrove Crab, Bait, Fiber, Collapsible Traps, Kampung Laut.

Abstrak

Kegiatan penangkapan Kepiting Bakau (*Scylla serrata*) pada umumnya menggunakan bubu lipat (*collapsible trap*). Bubu lipat dapat dioperasikan menggunakan umpan dan tidak menggunakan umpan tetapi hasil tangkapan kurang efektif jika tidak menggunakan umpan. Tujuan dari penelitian ini adalah untuk mengetahui efek penggunaan jenis umpan yang berbeda (ikan pari segar, ikan pari asin, belut segar, dan belut asin) terhadap hasil tangkapan Kepiting Bakau di perairan Kampung Laut. Materi penelitian ini adalah hasil tangkapan kepiting bakau menggunakan umpan ikan pari segar, ikan pari asin, belut segar, dan belut asin. Metode penelitian yang digunakan adalah metode experimental fishing. Data yang dihimpun meliputi parameter lingkungan, jumlah total hasil tangkapan, ukuran hasil tangkapan. Analisis data menggunakan Rancangan Acak Lengkap (RAL) dan uji lanjut Duncan. Hasil penelitian menunjukkan bahwa perbedaan penggunaan jenis umpan memberikan efek terhadap jumlah hasil tangkapan, berat hasil tangkapan, dan ukuran hasil tangkapan. Kesimpulan penelitian ini adalah hasil tangkapan kepiting bakau dengan umpan pari asin mendapatkan hasil tangkapan terbanyak yaitu 16 ekor dan pada umpan belut asin mendapatkan hasil tangkapan 13 ekor sedangkan pada perlakuan umpan pari segar hanya mendapatkan hasil tangkapan 7 ekor dan pada belut segar

mendapatkan hasil tangkapan 5 ekor.

Kata kunci: Kepiting Bakau, Umpan, Bubu Lipat, Kampung Laut

1. Introduction

East Tanjung Jabung Regency has quite a significant natural resource potential in the marine and fisheries sector, with a coastline of 191 km that stretches from the border with West Tanjung Jabung Regency to the border of South Sumatra Province, which has marine capture fisheries potential with an area of 77,752 hectares. Based on fish production, according to the East Tanjung Jabung Regency Fisheries Service sub-sector, the production of capture fisheries, consisting of marine fishing, reached 23,491.54 tons, public waters reached 130.86 tons, and aquaculture products reached 120.4 tons. Of the various types of waters in East Tanjung Jabung Regency, the most significant production of marine waters is in Mendahara District, Nipah Panjang District, Sadu District, Kuala Jambi District, and Muara Sabak Timur District (BPS, 2018).

Most of the residents in Kampung Laut waters are fishermen. Fishing activities in Kampung Laut waters use several traditional fishing tools, including nets, splints, sondong, and longlines. According to Martasuganda (2003), catching mud crabs can be done using traps; a type often used to catch mud crabs, namely folding traps (traps). Folding traps are used because they are relatively easy to make, cheap, and operate. The catch is in living conditions and environmentally friendly and can be folded so that one boat can carry many traps.

The fishing gear widely used by fishermen in Kampung Laut waters to catch mangrove crabs is the folding trap, and the local community knows this fishing gear as a pentor. Based on survey results, the number of fishermen who use folding traps in the waters of Kampung Laut is three people, each with 24 folding catches (Tinambunan et al., 2021). Fishermen start fishing activities in the morning, and the operation begins with installing traps and immersion. After the afternoon, the fishermen lifted (hauled) the folding trap fishing tool.

Bait is critical in fishing operations because it is one of the factors in the success of fishing operations. Folding traps can be operated using bait or not, but the fishing results are less effective if you don't use bait. Previously, fishermen in Kampung Laut waters operated folding traps without using bait. However, as time progressed, fishermen in Kampung Laut waters finally realized that using bait in functioning folding traps could increase catches. Fishermen in Kampung Laut waters usually use various types of appeal, from by-catch, which has a low economic value, can be used as bait for fishing, and is relatively easy to find. However, they do not yet know the best type of bait for catching mud crabs, so based on the description above, the author is interested in researching the effect of different kinds of bait used in folding trap fishing equipment on the catch of mud crabs (*Scylla serrata*) in the waters of Kampung Laut.

This research used fresh stingrays, salted stingrays, and salted eel as bait. Fishermen often use fresh stingrays as bait because only some people consume them; salted stingrays are a bait treatment carried out by practitioners because, according to Adlina et al. (2014), the salty type of fish is long-lasting in the water. Its texture does not break or decompose quickly, while fresh bait has properties that are easy to release and easily damaged by water movement during fishing operations. The use of fresh stingrays is based on research by Sihotang (2017), the use of fresh stingray fish resulted in the highest catch with 17 fish, compared to other types of bait, namely sugar fish, which caught ten fish, and chicken heads, which caught eight fish. Based on research by Andora (2018), salted stingrays resulted in the highest catch, seven fish, compared to other types of bait, namely trash fish, which gets two nets, and fresh stingrays, which bring the choice of fresh eel bait was based on the fact that it is a fishery commodity that is relatively easy to find in shallow waters, and is also the bait commonly used by fishermen in Kampung Laut waters because it has no economic value. According to Soim (1999), Adult crabs can be said to be omnivorous and scavengers. Therefore, the treatment of salted eel bait can also be used as a comparison.

This research aimed to determine the effect of different types of bait used in folding trap fishing gear on mud crab catches in the waters of Kampung Laut.

2. Material and Method

2.1. Time and Place

This research was carried out at Peraanan Kampung Laut from April 11 to April 26, 2022.

2.2. Methods

The method used in this research is experimental fishing. Data collection for this research was obtained directly by conducting fishing operations with local fishermen using folding trap fishing equipment. Sampling in this study was repeated ten times to get maximum results. The placement of folding trap fishing equipment in each bait treatment was carried out randomly and given a maximum distance of 5 m. Each time it is repeated, a

different randomization is carried out so that each bait gets the same chance. This research uses a folding trap operated with four different types of bait (salted stingray, fresh stingray, salted eel, and fresh eel).

2.3. Procedure

2.3.1. Operation of Fishing Gear

The preparatory stage in operating a folding trap is preparing the bait. The bait used is salted stingrays, fresh stingrays, salted eels, and fresh eels; each bait is weighed at 40 g. In one day, I spent 800 g of bait. Traps are used in as many as 20 units; each five units is given treatment marks. Head to the fishing ground at 09.00 WIB using a motorboat, then install the trap by sticking the folding trap into the water to a depth of 1.5 m. Each treatment is given a distance of 2-5 m. All traps are immersed in water for 6 hours. At 14.30 WIB, return to the place where the traps were installed to lift the traps (hauling). Lifting the trap is done by lifting a wooden stick stuck in the water to be lifted onto the boat; if there are crabs in the trap, the trap fishing gear is removed from the stick, and the time needed to raise all the fishing gear is around 30 minutes. The next stage is to make observations by weighing and measuring mangrove crabs.

2.3.1. Environmental Parameters Measurement

Water temperature is measured using a thermometer by placing it in the water for approximately 3 minutes and then reading the temperature value while the thermometer is still in the water so that the air temperature does not influence the measured temperature value. pH measurements are carried out using a pH meter, dipping the pH meter into water, then reading the pH value recorded on the pH meter. To get the value for calculating the current speed, you can use a tool that you assemble yourself, namely a 1 m rope, a plastic bottle tied to the rope, and placed on the surface of the water, let the plastic bottle flow, then turn on the stopwatch, calculate the current speed using a formula. The measurement results are recorded before the process.

2.4. Data Analysis

This research data uses analyzed variance (ANOVA) following a Completely Randomized Design (CRD). If there is a significant difference ($p<0.05$) between treatments regarding the diversity of experimental data, then proceed with the Duncan test (Steel and Torrie, 1995). Data were analyzed manually using Microsoft Excel 2010 software.

3. Result and Discussion

3.1. Environmental Parameters

Environmental parameters are indicators that can be measured to see the quality of certain waters. The water quality greatly influences the existence of mangrove crabs in their aquatic habitat, namely in mangrove forests. According to Ulqodry et al. (2010), Mangrove ecosystems have ecological functions that benefit organisms in coastal environments. Besides that, mangroves also serve as nutrients; their ecosystem is a spawning ground, nursery grounds, and feeding grounds for various types of fish, shrimp, and other marine biota (Bengen, 2004).

The mangrove ecosystem is a unique form of coastal ecosystem because there are physical, chemical and biological elements of land and sea in this area. This combination creates a complex ecosystem between marine and terrestrial ecosystems. During this research, environmental parameter measurements were always carried out by measuring physical and chemical elements, where the physical characteristics included measuring water temperature and current speed. In contrast, the chemical elements included measuring pH or degree of acidity. The measurement results can be seen in Table 1.

Table 1. Results of environmental parameter measurements

Repetition to-	Environmental Parameters		
	Temperature (^oC)	pH	Current speed (m/s)
1	30	6,9	0,16
2	30	7,2	0,14
3	31	6,8	0,16
4	29	7,1	0,25
5	30	6,8	0,15
6	30	7,2	0,14
7	29	7,3	0,14
8	31	7,4	0,25
9	30	6,9	0,14
10	31	7,4	0,14
Rate-rate	30,1	7,1	0,167
Range	29-31	6,8-7,4	0,14-0,25

Temperature significantly affects fish, shrimp, and other marine biota. If the temperature is too high, it will cause stress in the fish's body (Mainassy, 2017). According to Shelley (2011); Siringoringo et al. (2017), temperature is the factor that most influences the growth of mud crabs; the optimal temperature for the development of mangrove crabs is 25-35^{o}C. Based on Table 1, the results of measuring environmental parameters, the water temperature of the mud crab fishing area is in the range of 29-31^{o}C with an average of 30.1^{o}C; this shows that the mud crab habitat in Kampung Laut waters is still suitable for the optimal temperature for the growth of mangrove crabs.

The optimum degree of acidity (pH) will have a maximum growth impact on mud crabs because it is related to the degree of acidity and alkalinity in the water; the pH in the water will have a significant influence on the survival of mangrove crabs (Hastuti et al., 2016). Based on pH measurements in the waters of Kampung Laut, the results were 6.8-7.4, with an average of 7.1. This indicates that the degree of acidity in the seas of Kampung Laut is still good for the mangrove crab habitat. This is the opinion of Kordi (2007), who states that mud crabs have a pH tolerance range of 6.5 to 9. This means that mangrove crabs can live in slightly acidic to alkaline waters (pH 6.5-9).

The bait emits an odor that comes out of the gaps in the mesh and is carried by the current. The current is needed to deliver the smell of the bait to the water; for the current speed in the waters of Kampung Laut, namely in the fishing ground for mud crabs, during the research, the results obtained are range of 0.14-0.25 m/s, current speed can be divided into four categories, namely current speed of 0-0.25 m/s which is called slow current, current speed of 0.25-0.50 m/s which is called slow current. A moderate current speed of 0.50-1 m/s is called a fast current, and a current speed above 1 m/s is reached very fast (Sari and Usman, 2012). So, the current Speed in Kampung Laut waters is the slow current category, and the current speed in this study can be said to be good because of the opinion of Nando et al. (2015), who said that there is a tendency that the slower the current, the greater the catch. In slow currents, the odor can last longer around the trap, increasing the opportunity for the crab to find the source. According to Sampurno et al. (2017), the process of catching mud crabs using folding trap fishing gear is that at high tide, the crab will come out of hiding and look for food on land. When the crab is aware of or stimulated by the presence of bait, the crab will try to find a food source. When they see the start of stimulation, the crab approaches and enters the trap to eat the bait.

3.2. Composition of the Fish Fold Fish Catch

Folding trap fishing equipment in Kampung Laut waters is usually operated to catch mangrove crabs. Still, it does not make it possible for other types of fish to be caught in the folding trap because there is bait to stimulate fish to enter the folding trap. To see the composition of the catches of folding traps during the research, see Table 2.

Table 2. Composition of folded traps catches in Kampung Laut Waters during the research

Composition of folded trap catches during the research	Bait Treatment				Total
	Fresh Stingray	Salt Priest	Fresh Eel	Salted Eel	
Scylla serrata (fish)	7	16	5	13	41
Scylla serrata (g)	1254	3551	1046	2661	8512
Hemibagrus nemurus (fish)	5	9	4	6	24
Hemibagrus nemurus (g)	559	830	398	570	2357
Macrobrachium rosenbergii (fish)	11	14	8	12	45
Macrobrachium rosenbergii (g)	241	352	225	340	1158

Based on Table 2, the composition of the catches of folded traps in Kampung Laut waters during the research shows that there were three types of net, namely mangrove crabs, baung, and giant prawns. In the bait treatment, the highest net was still found in salted stingray bait, where 16 mud crabs were caught with a total weight of 3551 g, nine baung with a total weight of 830 g, and 14 giant prawns with a total weight of 352 g. The lowest catch results were in the fresh eel bait treatment, where you caught five mud crabs with a total weight of 1046 g, four baung with a total weight of 398 g, and eight giant prawns with a total weight of 225 g. This is thought to be because the treatment of salted stingray bait gives off a very strong or unpleasant odor, which causes fish to come near or enter the folding trap and eat the bait. This is the opinion of Susanto et al. (2012), who said that the type and size of bait used must stimulate the target fish to approach and eat the bait. This is further clarified by the opinion of Siswoko et al. (2013), who say that the use of bait in a fishing gear operation functions to invite or stimulate fish so that the operating system implemented will be more effective.

It is also known that the use of salted bait in this study attracted large numbers of mangrove crabs, giant prawns, and baung compared to the use of fresh bait. According to Adlina et al. (2014), salty bait attracts crabs to the trap because salted fish bait has a longer-lasting aroma than fresh fish bait.

3.3. Mud Crab Catch Result based on Number (Fish)

Mud crab catches based on the number (fish) in each different bait treatment during the study can be seen in Table 3.

Table 3. Number of mud crab catches with different bait

Treatment	To the track
PS (Fresh Stingray)	$0,7^{ab} \pm 0,483$
PA (Salt Priest)	$1,6^{a} \pm 0,699$
BS (Fresh Eel)	$0,5^{b} \pm 0,527$
BA (Salted Eel)	$1,3^{a} \pm 0,948$

Based on the results of the analysis of variance, it shows that different bait treatments have a very significant effect ($P < 0.05$) on the number (heads) caught by mud crabs. The highest average catch of mud crabs was found in salted stingray bait, namely 1.6 days/fish, followed by salted eel bait, namely 1.3 days/fish, fresh stingray bait, namely 0.7 days/fish, and the lowest average catch was in fresh eel bait, namely 0.5 days/fish. So, salted stingray bait provides the best net regarding the number of mangrove crabs caught. It can be seen in Figure 2.

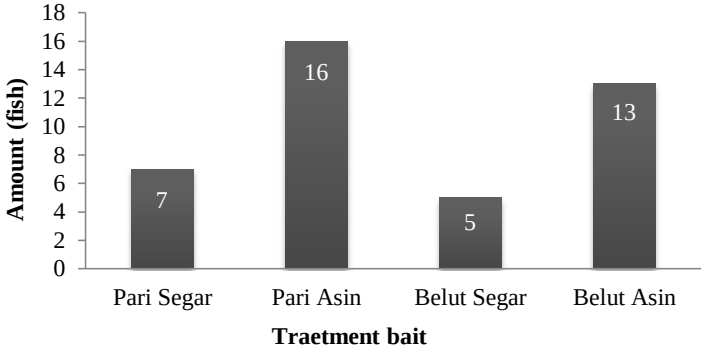

Figure 2. Number of mangrove crab catches

Figure 2 shows that the catch results when using salted stingray and salted eel baits are higher than when using other bait treatments. It is suspected that mangrove crabs prefer salty bait. According to Permana et al. (2022), the amount of bubu caught is greatly influenced by the smell of the bait, texture, durability, and speed of dispersion of the scent of the bait in the waters. Fresh-type bait emits a very pungent smell, but the odor is not enough to stimulate the mangrove crab's sense of smell because the texture and durability of the bait are not long-lasting. But the salty type of bait is durable in the waters and emits a very pungent smell that can stimulate the mangrove crab's sense of smell. This follows the opinion of Adlina et al. (2014) who said that salted fish is often used because its texture is not easily broken or decomposed and emits a smell that can last for a long time.

3.4. Size of Mangrove Crab Catch

The size of the mud crab catch can be seen from the weight and width. The growth in carapace width influences the body weight of the mud crab. Hardiyanti et al. (2018) said that the greater the carapace width, the greater the body weight. Based on the results of catches of folding traps with different bait treatments, the total weight of mud crab catches during the research can be seen in Table 4.

Table 4. Total weight of mud crab catches with different baits

Treatment	Mean (g/day)
PS (Fresh Stingray)	$125,4^{ab} \pm 98,513$
PA (Salt Priest)	$355,1^{a} \pm 158,136$
BS (Fresh Eel)	$104,6^{b} \pm 115,889$
BA (Salted Eel)	$266,1^{a} \pm 189,817$

The analysis of variance showed that different bait treatments had a very significant effect ($P < 0.05$) on the weight of mud crab catches. The highest average catch of mud crabs was found in salted stingray bait, namely 355.1 g/days, followed by salted eel bait, namely 266.1 days/gr, fresh stingray bait, namely 125.4 g/days, and the lowest average catch was found in fresh eel bait, 104.6 g/days. So, salted stingray bait also provides the best catch results regarding the weight (g) of mangrove crab catches. It can be seen in Figure 3 as follows.

Based on Figure 3, it can be seen that the weight (g) of the catch using salted stingray bait and salted eel is higher than other bait treatments, namely 3551 g for salted stingray bait and 2661 g for salted eel. This occurs because of the number (fish) in the catch. with salted stingrays and salted eels as bait, they got the largest number of catches. This is in accordance with the opinion of Rahmad (2019), who states that the greater the number of catches, the greater the weight of the catch. The weight of mud crabs can also be differentiated from

the grade sizes that apply to mud crab collectors, and in this study the grade sizes that were most commonly caught using different baits can be seen in Table 5.

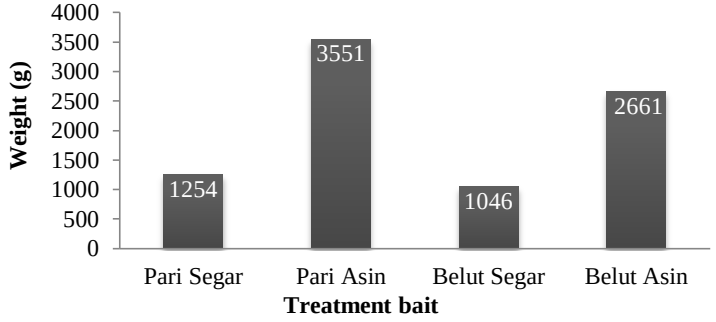

Figure 5. Weight of mangrove crab catch

Table 5. Grade of mangrove crab catch results

Grade	Size (g)	Treatment				Amount (fish)
		Fresh Stingray	Salt Priest	Fresh Eel	Salted Eel	
Jumbo	> 1000	0	0	0	0	0
SP	700-999	0	0	0	0	0
A	500-699	0	0	0	0	0
B	350 - 499	0	0	0	0	0
C	200 - 349	2	8	2	6	18
KS	< 199	5	8	3	7	23

Based on Table 5, it can be seen that the grade that was most caught was the KS grade, namely the size < 199 g with the number of catches in different bait treatments being 23, while the C grade was 200 - 349 gr with the number of catches being 18. There are no catches of that grade size in grades Jumbo, SP, A, and B. This is thought to be due to the low abundance of natural food related to the decreasing carrying capacity of the mangrove ecosystem in the waters of Kampung Laut, resulting in no mangrove crabs with grades Jumbo, SP, A, B being found when conducting this research. This is the opinion of Siahainenia (2008), who said that sizeable individual mud crabs will move to areas with abundant natural food.

Regulation of the Minister of Maritime Affairs and Fisheries of the Republic of Indonesia, Number 12/Permen-Kp/2020, concerning the Management of Lobsters (*Panulirus* spp.), crabs (*Scylla* spp.), and crab (*Portunus* spp.) in the Territory of the Republic of Indonesia in article 7 paragraph (1b), states that the weight of mangrove crabs suitable for catching is above 150 gr/fish. Based on Table 5, the catch grade for mud crabs (Scylla serrata) that are mostly seen is the catchable size because only a few sizes below catchable are caught from the total catch. Measures below catchable in this study are still recorded because according to the Regulation of the Minister of Maritime Affairs and Fisheries of the Republic of Indonesia Number 12/Permen-Kp/2020 concerning the management of lobsters (*Panulirus* spp.), crabs (*Scylla* spp.) and crabs (*Portunus* spp.) in the Territory of the Republic of Indonesia in article 7 paragraph (2) states that the provisions for catching and releasing Crabs (Scylla spp.) as intended in paragraph (1) are excluded for activities providing education, research, development, study, or application in within the territory of the Republic of Indonesia.

The analysis of variance showed that different bait treatments had a significant effect ($p<0.05$) on the size of the carapace width caught by mud crabs. The highest average catch of mud crabs was found in salted stingray bait, namely 105.22 days/mm, followed by salted eel bait, namely 89.14 days/mm, fresh stingray bait, namely 68.79 days/mm, and the lowest average catch was found in Fresh eel bait is 53.44 days/mm. The carapace width range for mud crabs during this study was 77.5-135.8 mm; the range of carapace widths in this study was more significant than the research by Kasril et al. (2017), namely the mangrove crabs observed during the research in Kuala Baru District ranged from between 62-150 mm, Singkil District ranges between 61-125 mm and North Singkil ranges between 66-151 mm. According to Tahmid et al. (2015), mangrove crabs mature on average when the carapace width measures 80-120 mm.

Table 6. Size of carapace width of mangrove crab catches

Treatment	Mean ±std.deviation
PS (Fresh Stingray)	$68,79^{a} \pm 47,865$
PA (Salt Priest)	$105,22^{a} \pm 12,482$
BS (Fresh Eel)	$53,44^{ab} \pm 56,716$
BA (Salted Eel)	$89,14^{a} \pm 33,287$

It can be seen from the size of the mud crab catch that there is a correlation between weight and carapace width; there is a tendency for the heavier the mud crab, the wider the size of the carapace. In the case study, catching mangrove crabs in Kampung Laut waters has met the requirements of the Regulation of the Minister of Maritime Affairs and Fisheries of the Republic of Indonesia Number 12/Permen-Kp/2020 concerning the Management of Lobsters (*Panulirus* spp.), crabs (*Scylla* spp.), and crab (*Portunus* spp.) in the Territory of the Republic of Indonesia in article 7 paragraph (3d) which states that catching Crabs (Scylla spp.) must be carried out using static or passive fishing equipment; and in the waters of Kampung Laut, fishing for mangrove crabs uses passive fishing gear, namely folding traps, which local people often call penthor

4. Conclusions

Based on the research results, it can be concluded that using different types of bait affects the catch of mangrove crabs, with the net using salted stingray bait getting the highest trap, namely 16, and the salty eel bait getting 13. In contrast, the fresh stingray bait was only treated with 13 fish. Get a catch of 7 fish, and fresh eels get a catch of 5 fish.

5. Suggestion

Based on research that has been carried out, researchers suggest that folding trap fishermen in Kampung Laut waters use salty bait, namely salted stingrays and salted eels, to get optimal catches of mangrove crabs.

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