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## Study on Implementation of Limited Protection Rules For Banggai Cardinalfish (*Pterapogon kauderni*) Which Is Transported Through The Province of Bali

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**Abstract.** The Banggai cardinalfish (*Pterapogon kauderni*) is a species of ornamental fish endemic to the Banggai Archipelago, Central Sulawesi, Indonesia. The high level of exploitation has caused the population of the proud fish to decline. The government seeks conservation by issuing KEPMEN KP Number 49 of 2018 concerning the Protection Status of Banggai cardinalfish. The purpose of this study/research is to determine the effectiveness of implementation after the policy is issued. Bali is one of the exit points for the export trade of the Banggai cardinalfish commodity. Banggai cardinalfish export from Bali in 2019-2020 only reached 60 thousand, increasing to 111 thousand fish with a frequency of 303 export data in 2021. Export destinations are the United Kingdom, France, China, Taiwan, Hongkong, Denmark, Netherlands, Brazil, Poland, and Germany. Banggai cardinalfish in its trade must be free from disease infections, listed in the Minister of Maritime Affairs and Fisheries of the Republic of Indonesia No. 17 of 2021. Commodities must be examined by checking for types of quarantine fish diseases, namely Megalocytivirus infection. The prevalence value of Megalocytivirus or Banggai Cardinal Iridovirus (BCIV) from Banggai cardinalfish to exporters in Bali in 2020 was 1.49 and in 2021 it was 4.10. The current condition of the Banggai fishery in its utilization must meet the requirements attached to the Indonesian Minister of Maritime Affairs and Fisheries Decree No. 21 of 2021 regarding quotas, and Government Regulation Number 85 of 2021 regarding PNB rates.

**Keywords:** Exploitation; Export; Policy Implementation; Disease; Bali

### I. INTRODUCTION

The Banggai cardinalfish is a popular marine ornamental fish in the marine aquarium trade since 1995, and is considered at risk of extinction in the wild [1] throughout its very limited endemic area [2, 3]. The natural distribution of dragonflies in the Banggai Islands is about 23 km<sup>2</sup> in area. Its habitat is in coral reefs and seagrasses, associated with benthic organisms (microhabitats), especially sea urchins, and sea anemones, influenced by local human activities [4].

Locations with very abundant populations of Banggai cardinalfish are the villages of Bone Baru, Toado, and Toropot. The average density of BCF in each area is 6.35, 4.48, and 3.29 individuals/m<sup>2</sup> [5]. According to age class, the density of sea urchins and sea anemone density

showed a significant correlation, but it was seen that anemone abundance had a greater effect on Banggai cardinalfish density than sea urchin abundance. The average abundance of adult-sized Banggai cardinalfish was higher in 2018 than in 2017, but recruits and juveniles were more abundant in 2017 [5].

Significant distribution across all habitat types can increase the habitat potential of Banggai cardinalfish [6]. The distribution of the Banggai cardinalfish is highly dependent on benthic organisms that serve as microhabitats [4]. Frequency of association of Banggai cardinalfish with various sea anemone species [7], the most common as microhabitats for Banggai cardinalfish recruits and juveniles are *Actinodendron* spp., *Heteractis crispa*, *Styrodactyla gigantean*, and *Entacmea*

*quadricolor*. Apart from *Actinodendron* sp., clownfish (genera Amphiprion and Premnas) are also often observed living together with Banggai cardinalfish in host anemones [6].

Fully or partially bleached sea anemones inhabited by Banggai cardinalfish, with or without clownfish, were observed at Bone Baru in 2016, at Tolokibit in 2016 and 2018, and other sites in the Banggai Archipelago [8]. Despite the observed bleaching and possible growing impacts of global change, over-exploitation and direct anthropogenic damage are currently the main direct causes of habitat/microhabitat degradation of Banggai cardinalfish [4].

The high exploitation by fishermen who choose the Banggai cardinalfish as a target and relatively little cultivation has caused the population decline [6]. To ensure the sustainability of this fish, the Government has implemented various policies and actions, including limiting areas that are allowed to be harvested, developing cultivation efforts, conducting research on estimating wild populations, and formulating a national action plan.

The potential for the Banggai cardinalfish farming business has started to grow and is in demand by business actors, especially in Bali. The waters in North Bali resemble condition of the bioecological conditions of the natural habitat of the Banggai cardinalfish in the eastern part of Central Sulawesi which has shallow sea waters. The northern temperatures waters of Bali are higher than the southern, reaching a range of 27 to 29 °C [10].

However, the conservation efforts still need to be continued by the Government of Indonesia to ensure that both the population and trade of Banggai cardinalfish still in terms of preventing the spread of quarantine fish diseases to the waters as a result of the exploitation of Banggai cardinalfish. Referring to Ministerial Decree No. 17 of 2021 concerning the Determination of Quarantine Fish Disease Types, Causative Organisms, Groups, and Carrier Media which strengthens the implementation of the conservation of the Banggai cardinalfish that it remains sustainable in the future. This paper aims to examine the effectiveness of the implementation of KEPMEN KP No. 49 of 2018 concerning the Protection Status of the Banggai cardinalfish. Limited protection for exports of Banggai cardinalfish is proud of the CITES Appendix based on the results of a study of trade traffic data through the Province of Bali [11].

## II. METHODS

The method used in this research is the purposive sampling method. The purposive sampling criteria is a method researchers ensure citing illustrations by determining the identity of research sources that are by

research objectives so that it is hoped that the information obtained can respond to research cases [12]. Methods data collection by interviews and literature studies.

The data analyzed in this study is secondary data in the form of traffic data for the Banggai cardinalfish trade through the Province of Bali in 2019-2021. Secondary data was obtained from the Fish Quarantine and Inspection Agency of Denpasar (BKIPM Denpasar). Data analysis was carried out in a qualitative descriptive manner. This research was conducted in June 2021.

## III. RESULTS AND DISCUSSION

### *Limited Protection Status of Banggai Cardinalfish*

The Banggai cardinalfish is an endemic fish from Eastern Indonesia which is now the mascot of Indonesian ornamental fish [13]. The proposal to include the Banggai cardinalfish in Appendix II of CITES was announced at CITES COP 17 in Johannesburg (South Africa) in September 2016 [14]. In member countries of the European Union, Banggai cardinalfish can be traded with certain terms and criteria [15]. Considerable attention has been focused on the risk of extinction of the Banggai cardinal fish due to the marine aquarium trade [16].

Indonesia strives for conservation and strengthening efforts for the sustainable management of the Banggai cardinalfish [17]. Strengthening management is highly recommended to be carried out both locally and nationally. The Ministry of Maritime Affairs and Fisheries collaborated with local governments and stakeholders in issuing the document "Action Plan for Harvesting and Sustainable Management of Banggai Cardinalfish 2007-2012". The document covers issues of management, harvest levels, and sustainable trading of the Banggai cardinalfish.

The generally positive trend for sites 3-6 is typical of Banggai Island, where the most intensive conservation efforts are being carried out [5]. The only location on the island with a negative trend from 2017 to 2018 was Tolokibit, where a traditional subsistence-grade collection of sea urchins began to be commercialized around 2017, resulting in a drastic reduction of sea urchin microhabitat in 2018 as well as disturbances that tended to increase predation from BCF recruits [2].

The Ministry of Marine and Fisheries April 2018 issued Ministerial Decree No.49/KepMen KKP/2018 concerning the Limited Protection of Banggai Cardinal Fish to strengthen the conservation and management of Banggai cardinalfish. The decree was issued due to a decrease in population and a significant increase in utilization. The decree regulates the seasonal harvest of Banggai cardinalfish. Harvesting is not permitted during the closed season when the Banggai cardinalfish was in

the breeding season, which is in February-March and October-November. Attached is also a related harvest prohibition map, covering the sea under Central Sulawesi Province, Banggai Regency, Banggai Islands, and Banggai Ocean [11]

Following up on the Note of the Directorate General of Marine Spatial Management, Ministry of Marine Affairs and Fisheries, Indonesia No. 3438/DJPRL/PRL.430/XI/2021 about the convention for Utilization of Protected Fish Species, listed in the CITES Appendix and Look Alike Species, and refers to Letter Number 3452/DJPRL/PRL.430/ XI/2021 concerning the Issuance of Documents for the Transport of Protected Fish Species, CITES Appendix, and Look-Alike Species Recommendations. As a follow-up in implementing trade regulations for international trade for species that are feared to become extinct, such as the Banggai cardinalfish, the government has issued trade quota restrictions both locally and for exports to the Banggai cardinalfish group which has entered the CITES Appendix.

#### *Implementation of Fisheries Export Trade Policy and Activities*

Major changes in trade routes have taken place over the last 15 years or so [16]. Official Fish Quarantine Service figures from 2008-2018 show volumes of recorded (and thus legal) outbound shipments of Banggai cardinalfish from the Banggai Archipelago (Station Luwuk/Banggai) and other trade centers of Banggai cardinalfish (Figure 3). Most of these shipments are destined for export centers, especially Denpasar but also Jakarta [16].

Local anthropogenic activities pose an immediate threat, the future will bring increasingly complex challenges for the holistic and sustainable management of Banggai cardinalfish, its habitat, and its microhabitat [6]. Local and global drivers tend to act synergistically, reducing opportunities for rehabilitation or restoration of Banggai cardinalfish habitats and populations through natural microhabitat recruitment processes [6]. Actions to reduce or eliminate key threats, particularly those associated with fishing in shallow marine invertebrates unregulated, unreported, and destructive (overuse) are possible and potentially aligned with current government policies [8]. Conservation efforts are hampered by misunderstandings about key concepts (eg endemism) and a lack of regular and standardized monitoring of Banggai cardinalfish populations, fisheries, and trade [3].

The effectiveness of the implementation of the policies stated in Ministerial Decree No.49/KepMen KKP/2018 has not been optimal because some stakeholders do not understand it well. This is because the

socialization of these regulations has not been carried out thoroughly for the fishing community, wholesalers, and exporters. The trading frequency as evidence of the Kepmen-KKP implementation can be seen in Table I.

TABLE I  
 DATA ON TRAFFIC OF THE BANGGAI CARDINALFISH TRADE THROUGH THE PROVINCE OF BALI FOR 2019-2021

Year	Export Quantity (Frequency)	Number of Commodities (Tail)
2019	132	62.486
2020	182	60.940
2021	303	111.305

Source: [27]

Bali is one of the exit points for export trade for Banggai cardinalfish commodities through the Ngurah Rai International airport. In 2019, there were 4 importing countries, namely China, the United States, Malaysia, and Singapore. In 2020 it only consisted of 2 countries, namely China and United State. The country is on *lockdown*. The total of export countries will increase again in 2021 as 10 countries, namely the United Kingdom, France, China, Taiwan, Hong Kong, Denmark, Netherlands, Brazil, Poland, and Germany. The catch of fishermen in 2007 was still able to complete the market demand of 10 thousand-15 thousand per week [16]. Over-exploitation resulted in a decrease in the Banggai cardinalfish population until restrictions were imposed.

The Ministry of Maritime and Fisheries Decree which assign limited protection for Banggai's redeye has been in effect since 2018. However, if we look at the frequency of export trading listed in table I, there has been an increase in 2021. The frequency of exports in 2021 has increased sharply when compared to the past 2 years. Total exports in the previous year only reached 60 thousand, to 111 thousand head with a frequency of 303 export data.

The local trade network of Banggai cardinalfish has expanded since the 2000s [17]. The Banggai cardinalfish commodity traded is imported directly from the Banggai Archipelago as the Banggai cardinalfish endemic area and also from introduction/transit locations. Data on the traffic of Banggai cardinalfish in several areas of the Sulawesi Islands can be seen in Table II.

The province that traffics the Banggai cardinalfish in the Sulawesi Islands consists of 6 trading areas in Table 2. The trade with the highest volume was in the Southeast Sulawesi region in 2018 with 278.592 fishes. Trade traffic in the Sulawesi Islands was only recorded in 3 regions, North Sulawesi, Central Sulawesi, and Southeast Sulawesi. Meanwhile, in other is no recorded data recorded.

National scale protection regulations for Banggai cardinalfish are listed in Ministerial Decree no.

49/KepMen KKP/2018, about limited protection in the territorial waters of Central Sulawesi Province which is in the Banggai Islands region which includes the waters of Banggai Regency, Banggai Islands Regency, and Banggai Ocean Regency [24]. Referring to Table 2, in 2018 and 2019 there is still limited utilization in protected areas. After the enactment of the Ministerial Decree in 2019, trade data recorded as many as 2.335 fishes in Central Sulawesi.

TABLE II  
 DATA ON THE BANGGAI CARDINALFISH TRADE IN SULAWESI ARCHIPELAGO REGION

Province	Year (individual amount)		
	2018	2019	2020
North Sulawesi	-	468	263
Gorontalo	-	-	-
Central Sulawesi	16.130	2.335	-
West Sulawesi	-	-	-
South Sulawesi	-	-	-
Southeast Sulawesi	278.592	96.004	74.353

Source: [18-23]

Several rules related to the limited protection of the Banggai cardinalfish have been implemented and issued, but in reality, the implementation of existing policies still encounters obstacles. The success of regulation is determined by how the existing regulations are constructed by business actors. The relationship between policy and practice is greatly influenced by the relations of interested parties (stakeholders) and how to maintain existing relations, and social networks among these stakeholders in development [24].

#### Diseases of Banggai Cardinalfish

As a manifestation of efforts to preserve Banggai cardinalfish, in trade, it must be free from disease infection. Banggai cardinalfish is a commodity that must be inspected by checking for types of quarantine fish diseases, the name is megalocytivirus infection before being traded both for trade between areas within the territory of the Republic of Indonesia and for export purposes. This policy is regulated in the Decree of the Minister of Maritime and Fisheries of the Republic of Indonesia No. 17 of 2021 concerning the determination of types of quarantine fish diseases, causative organisms, classes, and carrier media.

Threatening disease infections are caused by parasites, fungi, bacteria, and viruses. Infection usually occurs after the capture and acclimatization period in rearing tanks. Cases of infection with Banggai Cardinal Iridovirus (BCIV) which has the genus *Megalocytivirus* is a new strain of iridovirus.

Examination of parasites, bacteria, and fungi was carried out at the Laboratory of the Fish Quarantine and Inspection Agency of Denpasar (BKIPM Denpasar), Bali. Qualitative identification to determine the presence or absence of *Megalocytivirus* in Banggai cardinalfish (*Pterapogon kauderni*). The results of examining the *Megalocytivirus* content in the Banggai cardinalfish can be seen in Table III.

TABLE III  
 DATA FOR TESTING THE MEGALOCYTIVIRUS IN BANGGAI CARDINALFISH (*Pterapogon kauderni*)

Year	Comodity	Samples	
		Positive	Negative
2020	<i>Pterapogon kauderni</i>	1	66
2021	<i>Pterapogon kauderni</i>	5	117

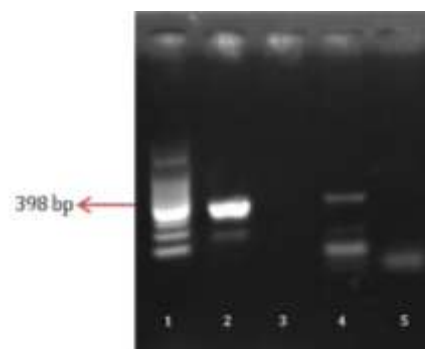


Figure 1. DNA banding pattern from PCR test results from Banggai redfish infected with *Megalocytivirus* at the exporter level. (1) marker, (2) positive control, (3) negative control, (4) positive sample, (5) negative sample). Source: BKIPM Denpasar Testing Laboratory data.

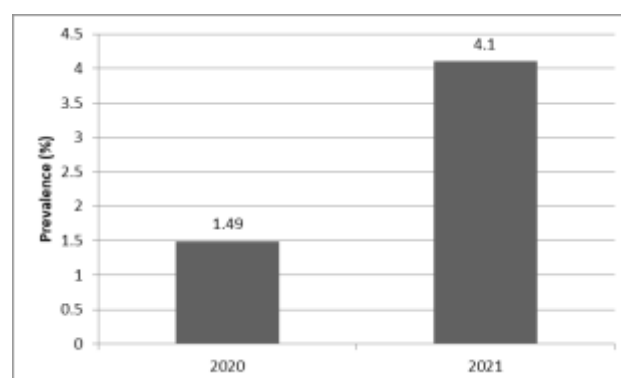


Figure 2. Prevalence value of *Megalocytivirus* or Banggai Cardinal Iridovirus (BCIV) from Banggai cardinalfish to exporters in Bali. Source: BKIPM Denpasar Testing Laboratory data.

*Megalocytivirus* infection caused by stressed fish. It caused pressure during transportation from collectors to exporters, as well as different maintenance conditions between collectors and exporters [25]. Based on the data in Table 3, all data tests with negative and positive results still cases in line.

Compared prevalence in the two years shows that with a large amount of data, the prevalence value is also high. The graph of the prevalence is shown in Figure 1. According to the results of previous analysis, Megalocytivirus (BCIV) also infects the Banggai cardinalfish in Bali and Manado exporter level with a respective prevalence of 20% (3/15) and 50% (5/10) of the total fish examined [25].

#### *Current Conditions of Banggai Cardinalfish*

Since the enactment of RI Minister of Maritime and Fisheries No. 21 of 2021 concerning Quotas Collection for Utilization of Limited Protected Fish Species Based on National Provisions and Fish Species in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora stipulates that the national quota for harvesting protected fish is limited to Banggai cardinalfish which can be taken only in the waters of Central Sulawesi province, Southeast Sulawesi and North Sulawesi with a total utilization quota of 63,380 heads which took effect on December 31, 2021. Furthermore, the Directorate General of Marine Spatial Management, Ministry of Marine Affairs and Fisheries, Indonesia issued a letter regarding adjustments to the issuance of traceability certificates. The trade-in protected fish species must be accompanied by a recommendation letter for the type of fish in accordance with the Official Note Number 3438/DJPRL/PRL.430/XI/2021.

Banggai cardinalfish as one of the protected fish species requires several documents for traffic, every business actor who will utilize protected fish species or those listed in the CITES appendix is required to have a fish species utilization permit (SIPJI). Listed in Appendix PP Number 85 of 2021, concerning the types and rates of Non-Tax State Revenue, there are 2 types of transport documents related to protected or restricted fish species, namely Domestic Fish Types of Transport (SAJI-DN) and Foreign Fish Types of Transport (SAJI-LN) [26]. Including levies for catching protected fish species per individual and levies for trade in protected fish species per individual. In addition, the quota for the number of commodities to be exported that can be submitted through the e-SAJI service is also a requirement that must be met by the exporters.

Banggai cardinalfish trade traffic is not recorded data until the end of November 2022. This is expected to occur due to the many requirements that must be attached as trade terms. The trade requirements that must be met concerning traceability information are provisions for obtaining quotas, monitoring and using quotas, and disease inspection. The entrepreneurs prefer to take advantage of commodities another than Banggai cardinalfish.

Through secondary data from Banggai cardinalfish business actors in the province of Bali, information was obtained that there is potential for Banggai cardinalfish to be obtained through cultivation. This potential has been seen from the existence of business actors in the North Bali region and its surroundings who can breed the Banggai cardinalfish to their economic size for trading. This is in line with the bioecological conditions of North Bali waters are similar to their natural habitat [10]. The stock to be traded does not originate from the exploitation of this biota from their natural habitat so business actors in the province of Bali have great hopes to return to exporting the Banggai cardinalfish type of marine ornamental fish resulting from cultivation, given the high market demand for one type of Indonesian mascot ornamental fish for both domestic trade and export purposes.

#### IV. CONCLUSION

The Government has carried out various policies and actions to ensure the preservation of Banggai cardinalfish (*Pterapogon kauderni*), KEPMEN KP No. 49 of 2018 concerning the Protection Status of the Banggai cardinalfish. Limited protection for the export of this species is proud of the CITES Appendix, Decree of the Minister of Maritime Affairs and Fisheries of the Republic of Indonesia No. 21 of 2021 concerning Collection Quotas for Utilization of Limited Protected Fish Species Based on National Provisions and Types of Fish in Appendix II of the Convention on International Trade In Endangered Species Of Wild Fauna And Flora, Note Office of the Director General of Marine Space Management Ministry of Maritime and Fisheries Number 3438/DJPRL/PRL.430/XI/2021 Concerning Provisions for Utilization of Protected Fish Species, listed in the CITES Appendix and *Look Alike Species*, and refers on Letter Number 3452/DJPRL/PRL.430/XI/2021 concerning Issuance of Documents for Transport of Protected Fish Species, CITES Appendices and Look Alike Species Recommendations with a document administration payment in accordance with Government Regulation Number 85 of 2021 concerning Types and Tariffs for Types of Non-Tax State Revenue Applicable to Marine and Fisheries Ministry.

Banggai cardinalfish is a commodity that must be inspected by checking for quarantine fish diseases, namely megalocytivirus infection, before being traded both for trade between areas within the territory of the Republic of Indonesia and for export purposes. Test results with a fairly low prevalence rate, namely 1.49 (2020) and 4.10 (2021). The number of positive cases in 2020 was only 1 sample out of a total of 66 tested, and 5

were positive in 2021 with sample data of 117 individuals.

The export frequency of Banggai cardinalfish until the end of 2021 has a positive trend. The frequency of exports in 2021 will increase sharply when compared to the past 2 years as 10 countries, namely the United Kingdom, France, China, Taiwan, Hong Kong, Denmark, Netherlands, Brazil, Poland, and Germany. Total exports in the previous year only reached 60 thousand, growing up 111 thousand head with a frequency of 303 export data. Trade in the Sulawesi archipelago with the highest volume was in the Southeast Sulawesi region in 2018, namely 278,592 heads. This for the period 2019–2021 is in line with data on the trade of Banggai cardinalfish in the province of Bali which has increased but has experienced a drastic decline in 2022 where there are no shipments of Banggai cardinalfish for export purposes from Bali, which is very closely related to the obligation of business actors to comply with the provisions of the Minister of Maritime and Fisheries of the Republic of Indonesia No. 21 of 2021 which takes effect no later than December 31, 2021.

There is great potential to increase the trading potential of the Banggai cardinalfish sustainably through the aquaculture business sector, especially in the province of Bali to support efforts to reduce the exploitation of this species in its natural habitat, while maintaining the natural preservation of this biota in Indonesian waters. The author realizes that further studies are still needed to review the extent to which the potential for Banggai cardinalfish cultivation can meet market demand for marine ornamental fish, both for domestic and export trade purposes.

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#### REFERENCE

[1] IUCN. 2019. Summary Statistics *IUCN Red List Threat. Species version 2019-1*.

- [2] Ndobe, S., A. Moore, I. Yasir, and J. Jompa. 2019. Banggai Cardinalfish Conservation: Priorities, Opportunities, and Risks. *IOP Conference Series: Earth and Environmental Science*, 253(012033): 1-13. Doi: 10.1088/1755-1315/253/1/012033.
- [3] Ndobe, S., Yasir, I., Moore, A.M., Biondo, M.V., and Foster, S.J. 2018. A study to assess the impact of international trade on the conservation status of *Pterapogon kauderni* (Banggai cardinalfish). Gland, International Union for Conservation of Nature.
- [4] Ndobe, S., A.M. Moore, and J. Jompa. 2017. Status of and threats to microhabitats of the endangered endemic Banggai Cardinalfish *Pterapogon kauderni* *Coast. Ocean. J.* 1: 73-82.
- [5] Wiadnyana, N.N., S.R. Suharti, S. Ndobe, S.Triharyuni, G.R. Lilley, S. Risuana, D. Wahyudi, and A.M. Moore. 2020. Population Trends of Banggai Cardinalfish in the Banggai Islands, Central Sulawesi, Indonesia. *IOP Conf. Series: Earth and Environmental Science* 420 (2020) 012033. doi:10.1088/1755-1315/420/1/012033.
- [6] Moore, A.M., A.C.M. Tassakka, R. Ambo-Rappe, I. Yasir, D.J. Smith, and J. Jompa. 2019. Unexpected Discovery of *Diadema clarki* in the Coral Triangle *Mar. Biodivers.* 49: 1-19.
- [7] Moore, A.M., S. Ndobe, and J. Jompa. 2017a. Fingerprints of the Anthropocene: the 2016 Coral Bleaching Event in an Equatorial Archipelago *Proc. 4th Int. Mar. Fish. Symp.* 66-86.
- [8] Moore, A.M., S. Ndobe, and J. Jompa. 2017b. A Site-Based Conservation Approach to Promote the Recovery of Banggai Cardinalfish *Pterapogon kauderni* Endemic Populations *Coast. Ocean. J.* 1: 63-72.
- [9] Soehartono, T.R. and A. Mardiatuti. 2020. Banggai Cardinalfish (*Pterapogon kauderni*) and the Attempt for the Inclusion of Cites Appendix II. *Jurnal Ilmu dan Teknologi Kelautan Tropis*, 12(2): 595-606.
- [10] Prayogo, L.M. and A.S. Natul. 2021. Pemetaan Suhu Permukaan Laut (SPL) dan Karakteristik Pasang Surut di Perairan Pulau Bali, Indonesia. *Jurnal Ilmu Kelautan* II(1): 1-12.
- [11] Keputusan Menteri Kelautan dan Perikanan Republik Indonesia (KEPMEN-KKP) Nomor 49 tahun 2018 tentang Penetapan Status Terbatas Ikan Capungan Banggai (*Pterapogon kauderni*).
- [12] Lenaini, I. 2021. Purposive and Snowball Sampling Techniques. *Journal of Historical Education Research & Development* 6(1): 33-39.
- [13] Decree of the Minister of Maritime Affairs and Fisheries of the Republic of Indonesia (KEPMEN-KKP) Number 21 of 2021 Concerning Collection Quotas for Utilization of Limited Protected Fish Species Based on National Provisions and Fish Species in Appendix II of the Convention On International Trade In Endangered Species Of Wild Fauna And Flora.
- [14] Convention on International Trade in Endangered Species (CITES). 2017. Consideration of proposals for amendment of Appendices I and II. Seventeenth

- Meeting of the Conference, 2018, Johannesburg, South Africa, 24 September - 5 October 2016.
- [15] European Commission on Environment. 2020. The European Union and trade in wild fauna and flora. Moore, A.M., S. Ndobe, and I. Yasir. 2021. Importance of Monitoring an Endangered Endemic Species -Intra-Species Biodiversity Perspectives on the Banggai Cardinalfish Conservation and Trade. *IOP Conf. Series: Earth and Environmental Science*. 681 (2021) 012120. doi:10.1088/1755-1315/681/1/012120.
- [16] Arbi, U.Y. S. Ndobe, and E. Juliyanto. 2022. Summary for Policy Maker: Population Status and Banggai Cardinalfish Management Strategy in Indonesia. Center for Oceanographic Research, National Research and Innovation Agency.
- [17] SKIPM Banggai. 2020. Data Lalu lintas Perdagangan Produk Teripang 2016-2020. Stasiun Karantina Ikan dan Pengendalian Mutu Hasil Perikanan Banggai. Banggai.
- [18] SKIPM Gorontalo. 2020. Data Lalu Lintas Perdagangan Produk Teripang 2016-2020. Stasiun Karantina Ikan dan Pengendalian Mutu Hasil Perikanan Gorontalo. Gorontalo.
- [19] SKIPM Mamuju. 2020. Data Lalu Lintas Perdagangan Produk Teripang 2016-2020. Stasiun Karantina Ikan dan Pengendalian Mutu Hasil Perikanan Mamuju. Mamuju.
- [20] BBKIPM Makassar. 2020. Data Lalu Lintas Perdagangan Produk Teripang 2016-2019. Balai Besar Karantina Ikan dan Pengendalian Mutu Hasil Perikanan Makassar. Makassar.
- [21] SKIPM Kendari. 2020. Data Lalu Lintas Perdagangan Produk Teripang 2016-2020. Stasiun Karantina Ikan dan Pengendalian Mutu Hasil Perikanan Kendari. Kendari.
- [22] BKIPM Manado. 2020. Data Lalu Lintas Perdagangan Produk Teripang 2018-2020. Balai Karantina Ikan dan Pengendalian Mutu Hasil Perikanan Manado. Manado.
- [23] Nurlaili. 2018. Socio-Cultural Problems in the Implementation of Regulations Concerning the Protection of Shark Species in Tanjung Luar, East Lombok, West Nusa Tenggara as Derivative Rules of the Nagoya Protocol. *Proceedings of the 2<sup>nd</sup> Indonesian Stingray Shark National Symposium* 2018: 205-214.
- [24] Adriany, D.T. and I. Koesharyani. 2017. Disease Infection of Banggai Cardinal *Capfish* (*Pterapogon kauderni*) in the Trade Chain. *Jurnal Riset Akuakultur*, 12(3): 283-294.
- [25] Peraturan Pemerintah Republik Indonesia (PP RI) Nomor 85 Tahun 2021 tentang Jenis dan Tarif Atas Jenis Penerimaan Negara Bukan Pajak yang Berlaku pada Kementerian Kelautan dan Perikanan. KKP. Jakarta.
- [26] BKIPM Denpasar. 2022. Data Lalu Lintas Perdagangan Ikan Capungan Banggai 2019-2022. Balai Karantina Ikan dan Pengendalian Mutu Hasil Perikanan Denpasar. Denpasar.