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Determination species flying fishes (*exocoetidae*) in makassar strait

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Abstract. *Exocoetidae* have valid name 71 species, in Indonesia we found 18 species Makassar Strait is a potential area for catching flying fish. The purpose of this study was to determine the composition and distribution of flying fish species captured by *gillnet*. Flying fish data collection is conducted from March to May 2019. There are six species of flying fish collected. The results showed that in Makassar Strait, the species could be an identified of morphologic of flying fish is *Hirundichthys oxycephalus*, *Cypselurus poecilopterus*, *Cheilopogon abeia*, *Cheilopogon spilopterus*. Flyingfish was obtaining at latitude 117°45' - 118°30' BT and 4030'BT - 3005' LS during the study. There are expected to be reference literature as primary data for the management and sustainable use of flying fish in the Makassar Strait.

1. Introduction

Fish species distributed in tropical and subtropical regions as one of the small pelagic fish resources. Flying fish consists of 71 species consisting of the family *Exocoetidae*, composed of 6 genus, namely *Parexocoetus*, *Exocoetus*, *Hirundichthys*, *Prognichthys*, *Cypselurus*, and *Cheilopogon* [1,2]. *Exocoetidae* flying fish can be categorized as a crucial pelagic fish, because in addition to consumption fish, flying fish eggs are also an export commodity. On Indonesian ships, *Exocoetidae* flying fish it was found in the Malacca Strait, Maluku, Nusa Tenggara, Makassar Strait, and Papua. *Exocoetidae* flying fish it was also known by several local names, such as tuing-tuing (Bugis), torani (Makassar), or tourani (Mandar) [3,4,5].

The use of fly fish fisheries in Majene Regency (fishing base) with the location of catching parts of the Makassar Strait area is interesting to study because fishing activities are carried out throughout the year, and several years earlier it has been said to be declining, rare and expected to result in overfishing, but in recent years it has been found in large numbers.

Makassar Strait waters have a high diversity of fish that live in these waters. However, data on the distribution and identification of Flying fish species in the Makassar Strait are not available, so there is a need to study a morphological distribution and diversity of species of flying fish in the Makassar Strait. This paper aims to provide information regarding the distribution and identification of flying fish species in the Makassar Strait waters of Majene Regency and is an effort to support the interests of the



preservation of flying fish species. This research is expected to be able to represent the diversity of flying fish morphologically in the waters of the Makassar Strait, particularly Majene Regency, West Sulawesi [4]

2. Material and methods

This research was conducted in March - April 2019, sampling was collected out in the waters of the Makassar Strait in Majene Regency, and identification of fish samples was carried out in Brawijaya Ichthyologicum Depository, Faculty of Fisheries and Marine Science, Malang. *Exocoetidae* flying fish samples obtained from the location are were documented, and then the recorded samples were identified using the help of a fish identification manual [6]. The documented samples was determined by the type and then written a description of the kind of samples captured, classification of samples from family to species level along with the name of the region. Data collection is carried out by following a fisherman's fishing trip, then during the hauling, a latitude and longitude record is then overlaid into the ArcGIS software.

3. Result and discussion

During this research, we found six species of flying fish caught in the Makassar Strait waters. The types of flying fish that has been morphologically identified are as many as four species that represent three genera. The following types of fish were are found in Table 1:

Table 1. Species names, Genus and local names

No	Species	Genus	Local Name
1	<i>Cheilopogon spilopterus</i>	<i>Cheilopogon</i>	Tuing-tuing
2	<i>Cheilopogon abei</i>	<i>Cheilopogon</i>	Riri pani
3	<i>Cypselurus poecilopterus</i>	<i>Cypselurus</i>	Tuing-tuing
4	<i>Hirundichthys oxycephalus</i>	<i>Hirundichthys</i>	Torani

a) *Cheilopogon spilopterus*



Figure 1. *Cheilopogon spilopterus*

Maximum standarard length 25 cm. Pelagic fish on the surface close to the coast and neritic. Distribution of this type of fish in the East Indian Ocean and Western Pacific [7].

b) *Cheilopogon abei***Figure 2.** *Cheilopogon abei*

Maximum standard length is 22 cm. Pelagic fish on the surface close to the coast and neritic. Distribution of this type of fish in the Indian Ocean and West Pacific Ocean [7].

c) *Cypselurus poecilopterus***Figure 3.** *Cypselurus poecilopterus*

The maximum standard length is 21 cm. Including pelagic fish on the surface of neritic areas in broad waters in the tropics of India and the northwestern Pacific then also distributed this type of fish in Vietnam, Thailand, and Indonesia [7].

d) *Hirundichthys oxycephalus***Figure 4.** *Hirundichthys oxycephalus*

The maximum standard length is about 18 cm. Pelagic in nearshore and neritic surface waters. It is a small pelagic fish that is important for Vietnam, Indonesia, and the Philippines. Distributed in the Indian Ocean and the Western Pacific from the Arabian Sea to the southern Solomon Islands, and New South Wales (Australia) [7].

Morphological characters for both genera of *Cheilopogon*, *Cypselurus* and *Hirundichthys* are very similar namely [6] :

1. Lower jaw a little shorter than upper jaw and included beneath the latter; juveniles with a single barbel or not barbelled (*Cypselurus*).
2. Both jaws of equal length, or lower jaw a little longer than upper jaw; juveniles with paired barbels (*Cheilopogon*).
3. Origin of anal fin slightly before, under or not more than 2 rays behind origin of dorsal fin; dorsal fin usually with less, or equal number of rays than anal fin; juveniles not barbelled (*Hirundichthys*).
4. Origin of anal fin 3 rays or more behind origin of dorsal fin; dorsal fin usually with 2 to 5 rays more than anal fin; juveniles barbelled or not barbel.
5. Pelvic fins with a prominent black spot; cross band of pectoral fins usually yellow. (*Cheilopogon abei*).
6. Predorsal scales 24 to 28; pectoral fins with numerous dark spots arranged in regular transverse bands (*Cypselurus poecilopterus*).
7. Predorsal scales 28 to 35; pectoral fins dark brown. (*Cheilopogon spilonotopterus*)
8. Pelvic fins with a prominent black spot; cross band of pectoral fins usually yellow (*Cheilopogon abei*).
9. No palatine teeth; pectoral fin without distinct cross band. (*Hirundichthys oxycephalus*).
10. Origin of anal fin slightly before, under or not more than 2 rays behind origin of dorsal fin; dorsal fin usually with less, or equal number of rays than anal fin; juveniles not barbelled. (*Hirundichthys*).

The distribution of identified flying fish species is obtained from distributed fishing locations as presented in the image map below: Based on the results of the longitude-latitude analysis of the fly fishing area that we collected, then analyzed using Excel and ArcGIS software, the highest-flying fish distribution it was obtained at latitude 177045 ' - 118030' 'BT and 4030'BT - 3005' LS during the study.

4. Conclusion

The identification and naming of flying fish groups in Indonesian waters underwent several changes. The discovery of species and these changes are not a severe problem but goes according to time. For this reason, it is recommended to identify flying fish at this time should be followed by DNA analysis for certain species specificity. Also, research on flying fish fisheries in particular to determine the

diversity of species and distribution of their distribution in Indonesia is essential considering the impact of excessive egg exploitation can lead to failure in the recruitment of young fish.

5. References

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