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Identification and composition of fish types in the Youtefa bay tourism area

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Abstract. This study aims to identify and determine the composition of fish species. Sampling was carried out from July 2019 to January 2020 in Youtefa Bay. Fish sampling was conducted by using gill nets. Fishes were caught once in each month during the research period. The result showed of 562 individuals in 53 species of 26 families. Hypothermia barnesi (14,77%); Mugil sp. (12,46%); Acanthurus auranticavus (6,23%); Hemirhamphus far (6,05%); Lutjanus carponotatus (4,09%) and Gerres erythrourus (3,92%). The number and type of fish caught are influenced by seagrass and mangrove ecosystems. The number of fish in each site was affected by the substrate, brightness, and the percentage of seagrass bed coverage; the higher percentage of brightness and seagrass coverage, the higher number of fish found.

1. Introduction
Youtefa Bay is included in the category of semi-closed bays so that the tidal process affects fluctuations in the physical-chemical variables of the waters. This bay has a seagrass area which is composed by four seagrass species, namely: *Thalassia hemprichii, Enhalus acoroides, Halophila ovalis,* and *H. minor* which are spread out Youtefa

Youtefa Bay has a high potential for fisheries resources, but there is still very little data on this. The development of residential, industrial, construction of the Youtefa bridge and ring road results in environmental degradation, which indirectly damages the development of habitat for aquatic organisms such as fish. Communities around the Youtefa bay area catch fish with methods and tools that are still simple, the catch is usually for personal consumption and if a lot of catches will be sold.

This study aims to explain the identification and composition of fish species in the waters of the Youtefa bay. The data and information obtained about the composition of fish species in the waters of the Youtefa bay are useful for the development of science and as a material for consideration for policymakers (stakeholders) related to the management of fish resources.

2. Material and Methods

2.1. Methods Of Data Collecting
This research was conducted in Agustus 2019-February 2020 in the Youtefa bay, Jayapura. Sampling was conducted in 5 stations, namely:

- ST 1. Kampung Tobati: Mangrove ecosystem near the residential area and part of the mangrove land was converted into a ring road bridge construction area, but now development has not continued
- ST 2. Enggros Village: The condition of mangroves is relatively natural, located along the Enggros village area
- ST 3. Kampung Nafri 1: Mangrove condition is relatively natural and is located in theYoutefa bay basin far from the settlement
- ST 3. Kampung Nafri 2: Mangrove Ecosystem is close to the settlement and part of the land is used as a residential area and road widening
- ST 4. Abe Pantai: Mangrove Ecosystem is close to a settlement and part of the land is used as a burial area
- ST 5 Youtefa Bay Jetty: is a Mangrove Rehabilitation Area development area

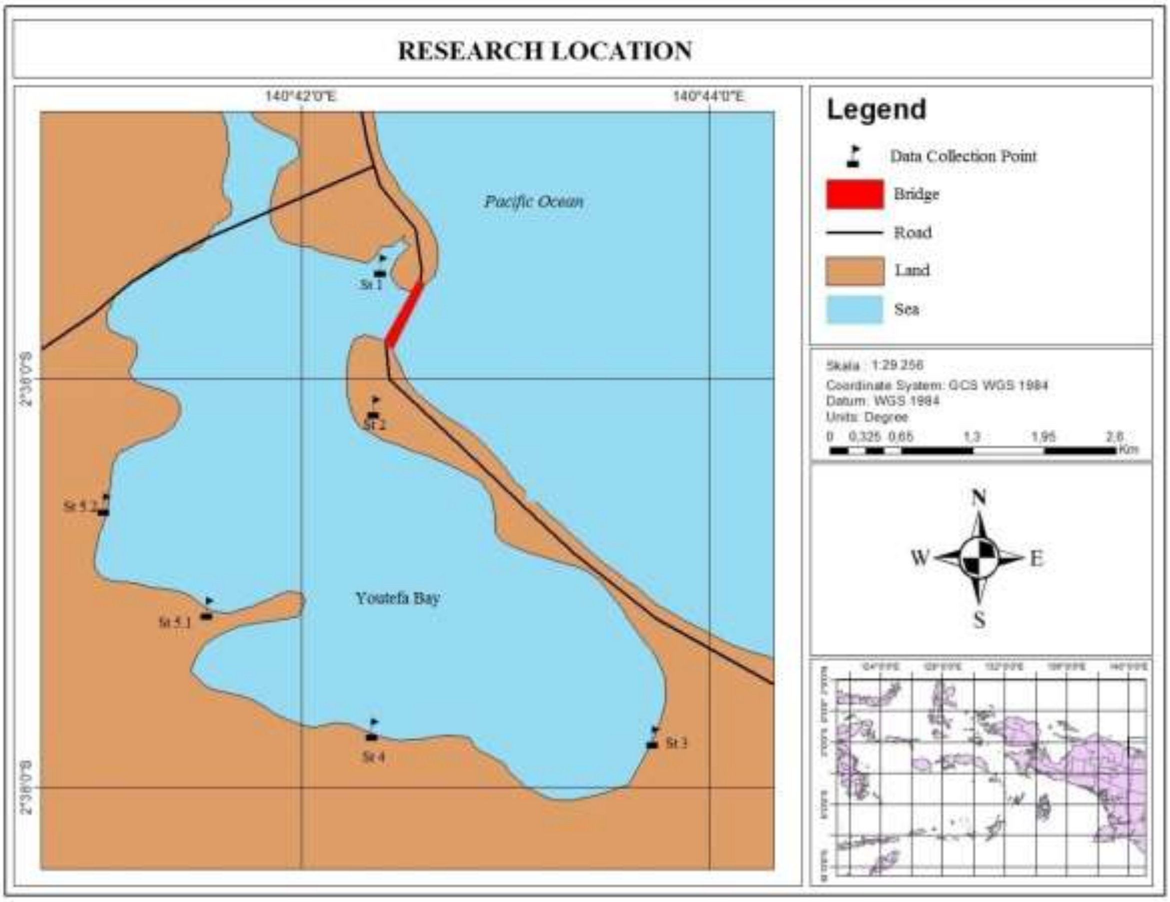

Figure 1. Research location

Observations are made during the day and night when the water recedes and moves to high tide. Fish are caught by using gill nets that are modified into pull nets and experimental beach nets. The net is operated sweeping from the sea to land or towards the coastline. Both of these fishing gear are operated two times of repetition at each point of observation between the tides and tides, day and night. The time needed for laying and pulling nets ranges from 1-2 hours per location. The fish caught are put into plastic bags and labeled as markers.

Fish were identified according to Allen et al. (2003), Kimura & Matsuura (2003), and Allen (2007). Then the fish are counted, separated by species, measured in length, and weighed.

2.2. Data Analysis

The data obtained in the form of primary data and secondary data. Primary data is data from observations and measurements of fish samples presented in tables and figures, then analyzed descriptively. Secondary data is data obtained from Government Agencies and local fishermen regarding Youtefa bay data.

The observed fish variable is relative abundance. Calculation of relative abundance (Cr) of each type of fish is carried out by the equation used [1] in :

$$Kr = \frac{n_i}{N} \times 100 \quad (1)$$

Where:
Cr: relative abundance (%), ni: number of individuals of each i-th fish species, N: number of individuals of all fish species.

3. Results and Discussion

3.1. Number and composition of fish species

The number of fish caught was 562 individuals belonging to 53 species grouped in 26 families from 7 orders (Table 1). The Apogonidae family consists of three species, Labridae five species, Lutjanidae and Siganidae four species, and families of one species such as Acanthuridae, Ambassidae, Mullidae, Terapontidae, Nemipteridae, Trichiuridae, Diodontidae, Ostraciidae, Mugilidae, Hemirhamphidae, Engraulidae.

The different types of fish that characterize each sampling location can be caused by differences in the type of base substrate and the types of seagrasses associated. Tobati and Engros locations are dominated by mud sand substrate and coral fracture, while Nafri I and II substrate locations consist of mud and sandy mud. Fish species found in Youtefa Bay are fish species that are commonly found in seagrass habitats. Based on research results [2] in Teluk Ambon Dalam there were as many as 288 individuals from 31 species and 19 families; while the results of the study [3] In the seagrass ecosystem in the waters of Kayupulo as a whole found 9 species of fish originating from 5 families namely 4 species of Siganidae, 2 species of Tetraodhontidae and 1 species each of Hemiramphidae, Apogonidae, Acanthuridae. In general, seagrass ecosystems function as feeding ground areas, nursery ground and fish shelter from predators. The presence of Scolopsis lineate and Parupeneus barbarous, is a group of carnivorous fish and its main habitat is coral. The abundance of coral fish in seagrass habitat is caused by the role of seagrasses as a place to look for food; this is because at night, many crustaceans are found, which are natural food for these fish.

Table 1. Composition of fish

Ordo	Family	Species	Stasiun					
			Tobati	Enggros	Nafri 1	Nafri 2	Abe pantai	Jetty
Perciforme	Pomacentridae	*Abudefduf vaigiensis (Qouy & Gaimard, 1825)*	√	√	√	—	√	—
		Chromis analis (Valenciennes)	√	√	—	√	—	—
	Acanthuridae	Acanthurus auranticavus Randall, 1956	√	√	√	√	√	—
	Ambassidae	Ambassis vachellii Richardson 1846	√	√	√	√	√	√
	Gobiidae	Amblygobius bynoensis (Richardson,1844)	√	√	√	—	√	—
		Sphaeramia orbicularis (Cuvier, 1828)	√	√	√	√	√	√
	Apogonidae	Cheilodipterus isostigmus, Schultz, 1940	√	√	√	√	√	√
		Apogon ceramensis Bleeker, 1852	√	√	—	√	√	√
		Choerodon anchorago (Bloch, 1791)	√	√	√	√	√	—
		Chorodon schoenleinii (Valenciennes, Blackspot, 1839)	√	√	√	√	—	—
	Labridae	Cirrhilabrus solorensis Bleeker, 1853	√	√	—	—	—	—
		Halichoeres scapularis (Bennett, 1832)	√	√	—	—	—	—
		Halichoeres nigrescens (Bloch&Schneider, 1801)	—	—	—	—	√	—
		Caranx papuensis Alleyne & Macleay, 1877	√	√	√	√	√	—
	Carangidae	Caranx secfasciatus Qouy & Gaimard, 1825	√	√	√	√	√	—
		Scomberoides lysan (Forsskal, 1775)	—	√	—	—	—	—
	Gerrenidae	Gerres erythourus (Bloch, 1791)	√	√	√	√	√	√
		Gerres filamentosus Cuvier, 1829	√	√	√	√	√	√

	Gerres oyena (Forsskal, 1775)	√	√	√	√	–	–
Kyphosidae	Kyphosus bigibbus Lacepede, 1801	√	√	√	√	√	–
	Kyphosus cinerascens (Forsskal, 1775)	√	√	√	√	√	–
Mullidae	Mulloidishtys flavolineatus (Lacepede, 1801)	√	√	√	√	√	–
	Platax boersii Bleeker, 1853	√	–	√	–	√	–
Ephippidae	Platax orbicularis, Forsskal, 1775	–	√	√	√	√	–
	Chaetodipterus faber (Broussonet, 1782)	√	–	–	–	–	–
Siganidae	Siganus canaliculatus (Park, 1797)	√	√	√	√	√	–
	Siganus fuscescens (Houttuyn, 1782)	√	√	√	√	√	–
Siganidae	*Siganus masgaritiferus* (Valensiennes, 1835)	√	√	√	√	√	–
	Siganus spinus (Linnaeus, 1758)	√	√	–	–	–	–
	Lutjanus carponotatus (Richcardson, 1842)	√	√	√	√	√	√
lutjanidae	Lutjanus erythropterus Bloch, 1790	√	–	–	–	√	–
	Lutjanus fulvus (Forster, 1802)	√	–	–	–	√	–
	Lutjanus gutatus	√	√	√	√	√	–
Terapontidae	Pelates quadrilineatus Bloch, 1790	–	√	–	–	–	–
Nemipteridae	Scolopsis lineata Quoy & Gaimard, 1824	√	√	√	√	√	–
Trishiridae	Trichurus lepturus Linnaeus, 1758	√	√	√	√	√	–
Tetraodontidae	Arothron hispidus (Linnaeus, 1758)	√	√	√	√	√	√
	Arothron reticularis (Bloch & Schneider, 1801)	√	√	√	√	–	√
Balistidae	Pseudobalistes fuscuc (Bioch & scneider, 1801)	√	√	√	√	√	–
	Pseudobalistes flavimarginatus (Ruppell, 1829)	√	√	√	√	√	–
Diodontidae	Diodon holocanthus Linnaeus, 1758	√	√	–	√	√	–
Ostraciidae	Lactoria diaphana (Bloch & Shneider, 1801)	√	√	√	√	√	–
Centriscidae	Aeoliscus strigatus (Gunther, 1861)	√	√	√	√	√	–
Fistulariidae	Fistularia commersonii Ruppell, 1838	√	√	√	√	√	√
Atherinidae	Atherinomorus lacunosus (Forster 1801)	√	√	√	√	√	√
	Hypoatherina barnesi Schultz, 1953	√	√	√	√	√	√
Mugilidae	Mugil belanak Bleeker, 1857	√	√	√	√	√	√
Hemirhampidae	Hemirhamphus far (Forsskal, 1775)	√	√	√	√	√	√
Engraulidae	Encrasicholina Heteroloba (Ruppell, 1837)	√	√	√	√	√	√

Source: data analysis, 2020
Keterangan : (√) : Found; (-) : Not Found

3.2. Relative abundance

Fish abundance in Youtefa bay waters shows *Hypoatherina barnesi* (14.77%); *Mugil* sp. (12.46%); *Acanthurus auranticavus* (6.23%); *Hemirhamphus far* (6.05%); *Lutjanus carponotatus* (4.09%) and *erres erythrourus* (3.92%) (Figure 2).

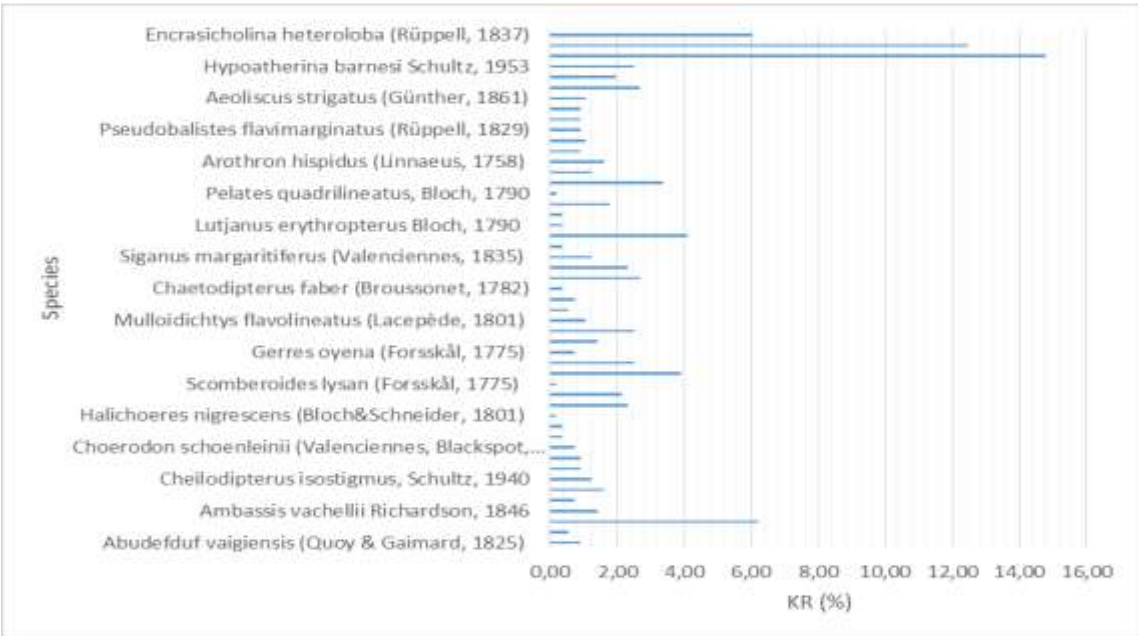

Figure 2. Relative abundance (%)

According to [4] The abundance of fish in waters maintains connectivity between coastal ecosystems and performs ontogenetic activities between the three ecosystems, which involve changes in food and behavior.

3.3. Conditions of Aquatic Quality Parameters

The results of measurements of several parameters of Youtefa bay water quality are shown in Table 2. Based on the results of the measurement of water quality parameters, all are still in the optimal conditions needed by fish to grow and develop.

Table 2. Conditions of Aquatic Quality Parameters

No	Parameter	Unit	Quality Book	Average measurements result					
				St 1	St 2	St 3	St 4	St 5	St 6
1	Temperature	°C	Coral 28-30; Mangrove 28-32; Lamun 28-30	24	24	24	24	24	26
2	Brightness	m	Coral > 5; Mangrove - Lamun > 3	2,5	2,8	0,7	0,75	1	0,6
3	pH	-	7-8,5	8,5	8,2	7,8	7,7	7,7	7,3
4	Dissolved Oxygen (DO)	mg/L	> 5	5,4	5,3	5,2	5,4	5,3	5,2
5	Nitrat (NO_3 N)	mg/L	0,008	1,1	0,08	0,2	0,07	0	0

Sumber : data analysis, 2020.

The observed water temperature value is 24-26 °C; this range is still the optimal range for fish life and organism distribution. Temperature greatly determines the abundance of fish in a location because the temperature affects the recruitment process and the temperature of the waters affects the metabolic activity of fish and is closely related to dissolved oxygen and oxygen consumption by fish. Some research results indicate that fish are very sensitive to temperature changes. The optimal temperature for *S.canaliculatus* fish is 25-34^{o}C (Lam 1974) in [5].

Brightness at the study site ranged from 0.7 to 2.5 m. Brightness supports the process of penetration of sunlight into the water column so that the process of photosynthesis can take place. Nafri, I and II locations have low brightness (0.7-0.75 m) due to high sedimentation in these waters. Low brightness value due to high TSS concentration. The effect of TSS is high on fish according to [6], namely the blockage of the gills by particles, changes in fish behavior in the form of fish's rejection of turbid water, flood barriers and increased shelter.

Dissolved oxygen concentration, which is between 5.2-5.4 mg / L, still meets the quality standard of> 5 mg / L. Waters designated for fisheries should have a dissolved oxygen level of not less than 5 mg / L because if the concentration is less than 2 mg / L it can result in fish death. According to [4] explained that Siganus canaliculatus fish are very sensitive to the dissolved oxygen content of less than 2 mg / l. Dissolved oxygen in Youtefa Bay when the research was in the optimal range in supporting the growth of fish in seagrasses.

The pH value during the study that showed a neutral range was within the range of thresholds for marine life. According to [2] pH value of 6.5 - 9.0 is the optimal pH range for fish growth. Water pH affects the level of water fertility because it affects the life of microorganisms. Acidic waters will be less productive due to low dissolved oxygen content, which results in increased fish breathing activity and decreased appetite [7].

Nitrate content in the study area ranged from 0-1.1 mg / L. This shows that the range of nitrate in Youtefa Bay has not caused eutrophication. Nitrate has a positive correlation with fish abundance. High nitrate levels cause a diversity of small organisms in the waters. [8] states that the nitrate content

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exceeds 0.05 mg L in a body of water can be toxic to sensitive aquatic organisms, while the content. Nitrates in excess of 0.2 mg/L can cause eutrophication.

4. Conclusion

Fish samples obtained as many as 53 species grouped in 26 families from 7 orders were found in Youtefa Bay. Type *S. canaliculatus, A. strigatus, A. ceramensis, S. fuscescens, P. barberinus*, and *S. lineata* are fish found at all locations and time of capture. Youtefa Bay is dominated by seagrass ecosystem which is an area of feeding ground, nursery ground and shelter from predators and the condition of the waters in the Youtefa bay area is still within the optimal range for the fish living places in these waters.

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