Global Scientific JOURNALS

GSJ: Volume 8, Issue 9, September 2020, Online: ISSN 2320-9186

www.globalscientificjournal.com

SUITABILITY OF WATERS FOR IMPORTANT ECONOMICAL FISH MARICULTURE (TIGER GROUPER, RED SNAPPER, ABALONE) IN KELABAT DALAM BAY, WEST BANGKA REGENCY

Wisnu Prasetyo Utomo *), Iskandar **), Sri Astuty *), Sunarto *)

*) *Department of Marine Sciences, Faculty of Fisheries and Marine Sciences, Padjadjaran University, Indonesia*
**) *Department of Fisheries, Faculty of Fisheries and Marine Sciences, Padjadjaran University, Indonesia*

Email: wisnuprasetyo39@gmail.com

Key Words
Abalone, Mariculture, Red Grouper, Red Snapper, Tiger Grouper.

ABSTRACT

Suitability of Waters for Important Economical Fish Mariculture (Tiger Grouper, Red Snapper, Abalone) in Kelabat Dalam Bay, West Bangka. The potential of West Bangka Regency's marine waters for mariculture has yet to be utilized, including in the Kelabat Dalam Bay. The suitability of the waters for the life of the cultivated biota is one of the success factors of the mariculture business. This research was carried out with the aim of analyzing the suitability of waters for economically important fish (tiger grouper, red snapper, and abalone) in the waters of the Kelabat Dalam Bay, as well as mapping the appropriate locations for each commodity. The research method uses a survey method with seven stations. The measured water parameters include, temperature, salinity, degree of acidity (pH), dissolved oxygen (DO), brightness, depth, and current speed. The research results obtained the highest suitability value for mariculture in tiger grouper commodity at station 1 and station 6 with a suitability value of 58.82, covering an area of 182.2 ha; red snapper commodity the highest suitability value at station 3 and station 5 with a value of 60.42, covering an area of 144.3 ha; abalone commodity, the highest suitability value at station 4 and station 7 with a value of 57.65 covering an area of 129.4 ha.

Introduction

West Bangka Regency is one of the districts of the Bangka Belitung archipelago province which has the potential for capture fisheries and marine cultivation (mariculture) which can be developed to improve the welfare of the people in its region. The marine potential of the West Bangka Regency for mariculture has not been utilized. Research results from LIPI (2003, 2007) state that the waters in West Bangka Regency are sufficiently rich and diverse in natural resources and that the water conditions are still considered suitable for mariculture. Research results from LIPI (2003, 2007) state that the waters in the West Bangka Regency have sufficient wealth and diversity of natural resources and that the water conditions are still classified as suitable for mariculture. Related to the development of the government of the district tourism. West Bangka has also conducted a study on the construction of the Marine Fish Seed Center (BBI) in collaboration with the Faculty of Fisheries and Marine Sciences, Padjadjaran University in 2017. The selection or location determination for mariculture is one important factor to consider to provide high production yields. Several considerations need to be considered in determining the location of cultivation, namely technical conditions consisting of location position and water quality including physical, chemical, and biological parameters as well as non-technical in the form of market share, security, and human resources (Raharjo 2008). Analysis of the suitability of water parameters for cultivated commodities needs to be carried out so that the level of suitability for cultivated commodities is known (Radiarta et al., 2004; Purnawan et al., 2015). Therefore, it is necessary to research the suitability of waters in the Kelabat Dalam Bay area for marine cage mariculture systems. The marine biota commodities that will be studied are tiger grouper, red snapper, and abalone, which have high economic value and have become export commodities. Moving on from this, this research aims to analyze the level of suitability of waters for economically important fish mariculture, to identify and map the appropriate location for each commodity in the waters of Kelabat Dalam Bay, West Bangka Regency.

Materials and Methods

Place and Time

The research station is located in the waters of Kelabat Dalam Bay, Parittiga District, West Bangka Regency, Bangka Belitung Province. The sampling station was determined based on a field survey conducted in October 2017. The number of sampling stations was 7 (seven) stations (Figure 1). Primary data collection (seawater samples) was carried out in October 2017 and secondary data collection and data processing were carried out since early 2018. Analysis of the suitability of aquatic land for mariculture and spatial map making will be carried out in November-December 2018.

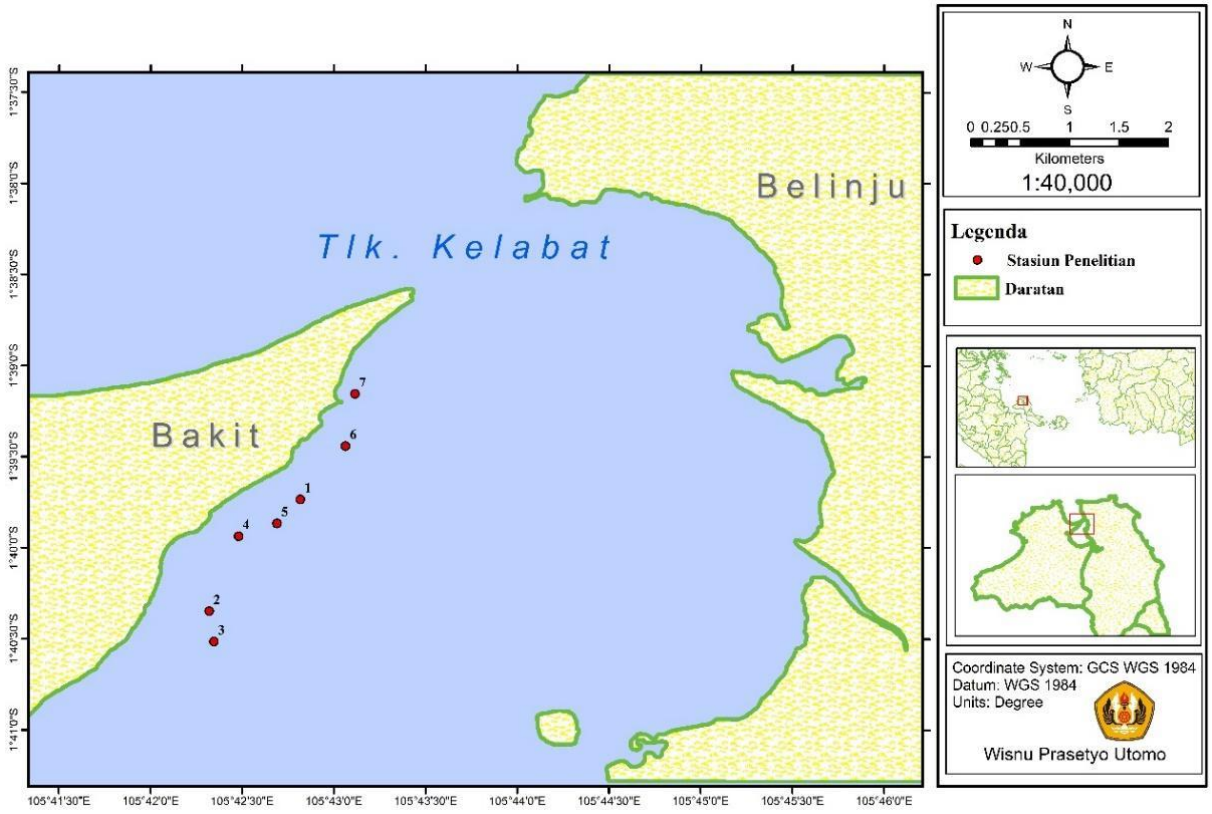

Figure 1. Map of Kelabat Dalam Bay Waters Research Locations

Tools and Materials

The equipment used during field surveys and data processing include mini-disks, refractometers, pH meters, thermometers, DO meters, GPS, computer devices, outboard motorboats. The research material is in the form of data used to support this research, taken from the website in which open access includes primary data, secondary data, data of RT RW Desa Bakti, and maps of the appearance of the Indonesian earth.

Research Stages

Stages in this research include the preparation stage for primary and secondary data collection, data processing, and water suitability analysis.

Result and Discussion

Kelabat Bay Waters Condition in Kelabat Dalam

Bay is a semi-closed estuary which is natural. This is characterized by the presence of several rivers that empties into Kelabat Dalam Bay. Kelabat Dalam Bay has a relatively shallow depth than Kelabat Luar Bay. This is due to the influence of the existence of 7 river estuaries and tributaries that enter Kelabat Dalam Bay, two of which are relatively large, namely the Layang River in the south and the Antan River in the west. At the time of data collection in Kelabat Dalam Bay it was in the rainy season, so at that time data collection was carried out after the rain stopped. This is thought to affect the water quality parameters to be taken. The parameters taken are physical and chemical parameters including temperature, salinity, degree of acidity (pH). Dissolved oxygen (DO), water transparency, depth, and current velocity. The parameter values that have been obtained are compared with the seawater quality standards for seawater biota (Kep No.51 / MENLH / the Year 2004). The results of the water quality parameters of Kelabat Dalam Bay which were measured at 7 research stations, can be seen in Table 1.

Table 1. Value of Water Quality Parameters in the Kelabat Dalam Bay

Parameter	St 1	St 2	St 3	St 4	St 5	St 6	St 7	Quality Standards *)
Temperature (°C)	29	29	29	28	29	29	28	28 - 30
Salinity (ppt)	21	23	22	23	23	22	23	33 - 34
pH	9.1	9	9.2	9	9.2	9.5	9.1	7 – 8.5
Dissolve Oxygen (mg/L)	8	6.3	5.8	5.6	6	5.5	5.7	>5
Brightness (m)	1.75	1.5	1.75	1.2	1.65	2	1.2	>3
Depth (m)	4	2	5	1.2	5	10	1.2	>3
Flow Velocity (m/s)	0.0053	0.0048	0.0047	0.0051	0.0052	0.0054	0.0056	0.15 – 0.3

Water Quality Parameters Distribution

- **Sea surfaces**

  Temperature Surface temperature is measured using a thermometer at 7 stations research to describe conditions in Kelabat Dalam Bay. The results of sea surface temperature measurements are in the range of 28°C - 29°C. The value of each station is not much different, this is because the temperature on the surface tends to be homogeneous. Stations 4 and 7 get a value of 28°C, while at stations 1, 2, 3, 5, and 6 get a value of 29°C. In general, the average sea surface temperature in the waters of Kelabat Dalam Bay shows a supportive value for mariculture. Tiger grouper, red snapper, and abalone.

- **Salinity**

  The waters of Kelabat Dalam Bay range from 21 ppt to 23 ppt. The lowest salinity range is at station 1 with a value of 21 ppt and the highest salinity is at stations 2, 4, 5, and 7 with a value of 23 ppt. In general, the salinity values obtained in Kelabat Dalam Bay show an unfavorable range for tiger grouper, red snapper, and abalone mariculture. This is because when data collection is in the rainy season or when the rainfall is high. Because the higher the rainfall, the lower the salinity value, and vice versa. This is supported by Nontji (1993).

- **Degree of acidity (pH)**
  Measurements *In situ* of the pH variable in the waters of Kelabat Dalam Bay show a value range of 9 to 9.5. The lowest pH value is found at stations 2 and 4 with a value of 9 and the highest value is at station 6 with a value of 9.5. The difference in pH value in the waters is thought to be caused by differences in measurement time. Changes in pH concentration in waters have a daily cycle.

- **Dissolved Oxygen (DO)**
  The results of measurements *in situ* of dissolved oxygen in the waters of Kelabat Dalam Bay show a value range of 5.5 mg / L to 8 mg / L. The lowest value is at station 6 with a value of 5.5 mg / L and the highest value is at station 1 with a value of 8 mg / L. The variation in dissolved oxygen content is thought to be due to the movement and mixture of water masses and the daily cycle of this variable. The average value of dissolved oxygen is not different from that stated by the Ministry of Environment Number 51 of 2004 with a value> 5. The results of measurements of dissolved oxygen in the waters of Kelabat Dalam Bay show a suitable range and support for mariculture for tiger grouper, red snapper, and abalone.

- **Water**
  Brightness The water transparency in Kelabat Dalam Bay ranges from 1.2 meters to 2 meters. The highest brightness distribution is at station 6 with a value of 2 meters and the lowest brightness distribution is at stations 4 and 7 with a value of 1.2 meters. The difference in brightness in the waters of Kelabat Dalam Bay at each sample location is thought to be related to the depth of the location and the time of observation. Hutabarat (2000) states that light decreases in intensity with greater depth. Another estimate from the researchers is the difference in the time the observations were made. Effendi (2003) states that light reflection has an intensity that varies according to the angle of the light. According to the Ministry of Environment Number 51 of 2004 with a value of> 3, so the brightness of the waters in the waters of Kelabat Dalam Bay shows a lower range of values.

- **Water Depth**
  The Results of measuring the depth of the waters at the station point in the waters of Kelabat Dalam Bay range from 1.2 meters to 10 meters. The highest depth value is at station 6 with a value of 10 meters, while the lowest depth value is at stations 4 and 7 with a value of 1.2 meters. The difference in the depth of the waters of Kelabat Dalam Bay at the data collection location is thought to be caused by different seabed reliefs, this is supported by Wibisono 2005 that the seabed relief affects the depth of the waters. The water depth above shows a favorable range of values for mariculture, especially for tiger grouper and abalone with floating net cage systems. But for red snapper it is less supportive, especially at stations 1, 2, 4, and 7.

- **Flow Velocity**
  The measurement results for the current velocity in the waters of Kelabat Dalam Bay vary between 0.0047 m / s to 0.0056 m / s. The lowest current velocity is at station 3 with a value of 0.0047 m / s, while the highest value is located at station 7 with a value of 0.0056 m / s. The results of current velocity measurements in the waters of Kelabat Dalam Bay are no longer supportive of the tiger grouper, red snapper and abalone mariculture.

Analysis of Water Suitability for Mariculture

- **Tiger Grouper Mariculture**
  The results of the spatial analysis of the suitability of waters for tiger grouper mariculture were divided into three levels of feasibility, namely very suitable (S1), appropriate (S2), and unsuitable (N). It is known that the condition of Kelabat Dalam Bay waters at the time of data collection can be classified into one category for mariculture, namely suitable (S2) and unsuitable (N) (Table 2).
  The level of suitability of waters for tiger grouper mariculture using floating net cages with the highest value was found at stations 1 and 6 with a suitability level of 58.82%, while the lowest values were at stations 4 and 7 with a conformity level of 47.06%. Stations 1 and 6 are recommended for tiger grouper mariculture because the suitability value of this station is the highest when seen in Table 2. However, these stations have significant boundaries so it is necessary to take into account the cultivation system that will be applied. For example, the salinity value that is in the inappropriate category, even though it is very influential in the osmoregulation process.

Table 2. Conformance Value of Each Station for Tiger Grouper Mariculture

St	Depth (m)	Brightness (m)	Temperature (°C)	Dissolve Oxygen (mg/L)	Salinity (ppt)	pH	Flow Velocity (m/s)	Suitability (%)
1	4	1.75	29	8	21	9.1	0.0053	58.82
2	2	1.5	29	6.3	23	9	0.0048	52.94
3	5	1.75	29	5.8	22	9.2	0.0047	52.94
4	1.2	1.2	28	5.6	23	9	0.0051	47.06
5	5	1.65	29	6	23	9.2	0.0052	52.94
6	10	2	29	5.5	22	9.5	0.0054	58.82
7	1.2	1.2	28	5.7	23	9.1	0.0056	47.06

- **Red snapper Mariculture**

The results of spatial analysis of the suitability of waters for red snapper mariculture were divided into three levels of feasibility, namely Very Fit (S1), Suitable (S2), and Unsuitable (N). It is known that the condition of Kelabat Dalam Bay waters when data collection can be classified into one category for mariculture, namely Appropriate (S2) and Unsuitable (N) (Table 3).

The water suitability level for red snapper mariculture using KJA with the highest value is at station 6 with a 60.42% suitability level, while the water suitability level for red snapper mariculture with the lowest value is at stations 1, 2, 4, and 7 with a conformity level of 54, 17%. Stations 3, 5, and 6 are recommended for red snapper mariculture because the suitability value of this station is the highest when seen in Table 3. Similar to tiger grouper, the recommended stations also have significant barriers, so it is necessary to take into account the cultivation system will be applied.

Table 3. Conformance Value of Each Station for Red Snapper Mariculture

St	Depth (m)	Brightness (m)	Temperature (°C)	Dissolve Oxygen (mg/L)	Salinity (ppt)	pH	Flow Velocity (m/s)	Suitability (%)
1	4	1.75	29	8	21	9.1	0.0053	54.17
2	2	1.5	29	6.3	23	9	0.0048	54.17
3	5	1.75	29	5.8	22	9.2	0.0047	60.42
4	1.2	1.2	28	5.6	23	9	0.0051	54.17
5	5	1.65	29	6	23	9.2	0.0052	60.42
6	10	2	29	5.5	22	9.5	0.0054	58.33
7	1.2	1.2	28	5.7	23	9.1	0.0056	54.17

- **Abalone Mariculture**

The results of the spatial analysis of the suitability of waters for Abalone mariculture were divided into three levels of feasibility, namely Very Fit (S1), Appropriate (S2), and Unsuitable (N). It is known that the condition of Kelabat Dalam Bay waters when data collection can be classified into one category for mariculture, namely Appropriate (S2).

The water suitability level for Abalone mariculture using KJA with the highest value was at stations 4 and 7 with a suitability level of 57.65%, while the water suitability level for Abalone mariculture with the lowest value was at station 2 with a suitability level of 48.24%. The value of the suitability of waters for abalone mariculture can be seen in Table 4.

Table 4. Conformance Value of Each Station for Abalone Mariculture

St	Depth (m)	Brightness (m)	Temperature (°C)	Dissolve Oxygen (mg/L)	Salinity (ppt)	pH	Flow Velocity (m/s)	Suitability (%)
1	4	1.75	29	8	21	9.1	0.0053	52.94
2	2	1.5	29	6.3	23	9	0.0048	48.24
3	5	1.75	29	5.8	22	9.2	0.0047	52.94
4	1.2	1.2	28	5.6	23	9	0.0051	57.65
5	5	1.65	29	6	23	9.2	0.0052	52.94
6	10	2	29	5.5	22	9.5	0.0054	52.94
7	1.2	1.2	28	5.7	23	9.1	0.0056	57.65

Water Suitability for Mariculture

Based on the results of the Geographical Information System (GIS) processing, there are areas suitable for economically important fish (tiger grouper, red snapper, abalone). The results of the visualization of areas suitable for economically important fish mariculture can be seen in Figure 2.

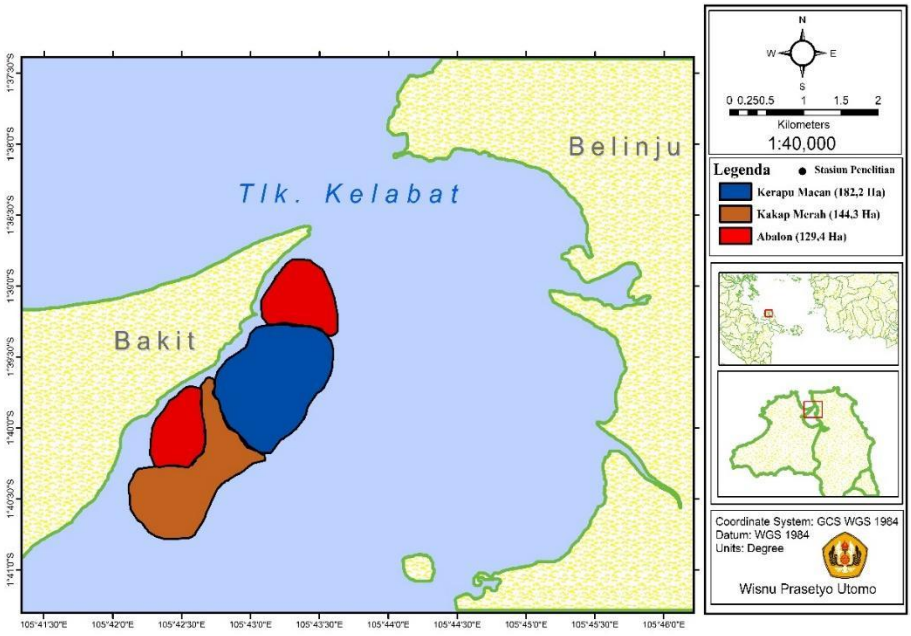

Figure 2. Economical Fish Aquatic Suitability Map Important

The blue color indicates the suitable area for tiger grouper with an area of 182.2 Ha. This area is about 203 m from the mainland, this area is also in the existing tiger grouper KJA and around Pasir Harbor. The brown color indicates an area suitable for red snapper with an area of 144.3 Ha. This area is about 290 m from the mainland, then located around Karang Telayang, Kambing Island, and to the south of the tiger grouper KJA. The red color indicates an area suitable for abalone with an area of 129.4 ha. The southern part is 109 m from the mainland and the northern part is 132 m from the mainland. This area is also located near the Nalang River (north), and the Buta River (south).

Conclusion

The obtained area for tiger grouper mariculture is 182.2 Ha. This area is about 203 m from the mainland, this area is also in the existing tiger grouper KJA and around Pasir Harbor. For red snapper with an area of 144.3 ha. This area is about 290 m from the mainland, then located around Karang Telayang, Kambing Island, and to the south of the tiger grouper KJA. For abalone with an area of 129.4 ha. The southern part is 109 m from the mainland and the northern part is 132 m from the mainland. This area is also located near the Nalang River (north), and the Buta River (south).

Acknowledgments

The authors would like to thank the parents who always supported them in completing the research and writing of this manuscript. Thank you also to the supervisors who have helped in the completion of the research and writing of this manuscript. Thank you also to fellow writers who always entertain and provide support to complete the research and writing of this manuscript. Do not forget that the author also wants to thank other related parties who cannot be written down one by one who has helped a lot in the completion of this research. Hopefully, what has been given to the Author, get a reward in kind from God Almighty.

References

[1] Raharjo, S. (2008). *Pemilihan Lokasi Budidaya Rumput Laut.* Takalar: Departemen Kelautan dan Perikanan Direktorat Jendral Perikanan Budidaya, Balai Budidaya Air Payau.
[2] Radiarta et al. (2004). Pemetaan Kelayakan Lahan Untuk Pengembangan Usaha Budidaya Laut di Teluk Saleh, Nusa Tenggara Barat. *Jurnal Penelitian Perikanan Indonesia*, 10(5): 19-32.
[3] Purnawan S, Z. M. (2015). Studi Penentuan Lokasi Budidaya Kerapu Menggunakan Keramba Jaring Apung di Perairan Timur Simeulue. 4(1) : 40-48.
[4] Hutabarat, S. (2000). *Peranan Kondisi Oseanografi Terhadap Perubahan Iklim, Produktivitas dan Distribusi Biota Laut.* Semarang: UNDIP.
[5] Effendi, H. (2003). *Telaah Kualitas Air Bagi Pengelolaan Sumberdaya dan Lingkungan Perairan.* Yogyakarta: Penerbit Kanisius.
[6] Wibisono, M. S. (2005). *Pengantar Ilmu Kelautan.* Jakarta: PT. Gramedia Widiasarana Indonesia.