



Mapping Demersal Fish Potential Fishing Areas with Training Vessels FV. Coelacanth in Bitung Waters, North Sulawesi

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Abstract

The waters of Bitung, located in North Sulawesi Province, have long been known for their rich underwater biodiversity, specifically unique and exotic creatures. They are a potential demersal fishing ground for coastal fishermen in Bitung City. However, information on demersal fishing grounds is limited, so it is necessary to conduct research and map demersal fishing grounds in Bitung waters. This study aims to obtain data on the geographical position of demersal fishing areas in Bitung waters to be mapped into a map of demersal fishing areas in Bitung waters and determine the types of catches from bottom fishing rods. Data was collected directly by following demersal fishing operations on the training ship FV. Coelacanth. The data were analyzed using survey methods and direct observation, which is an effort to collect information directly from a part of the population that is considered a specified population and has the nature of authentication or checking of existing theories. The study's results obtained geographical data on demersal fishing areas in Bitung waters at (1) 10°23.447' N, 125°06.934' E (Suar Batu Kapal area), (2) 10°23.483' N, 125°09.567' E (Karang Tanjung Merah area) (3) 10°23.283' N, 125°10.852' E (Batu Angus Area), (4) 10°30.393' N, 125°15.392' E (Menara Lampu Hijau Area), and (5) 10°32.706' N, 125°18.105' E (Dua Pulau area). The primary catches of bottom fishing consist of fish species: grouper, snapper, trevally fish, Gora fish, emperor fish and parrot fish.

Keywords: Fishing grounds, Demersal, Bitung waters

1. INTRODUCTION

Bitung is one of the fisheries advancement areas in North Sulawesi Province. Bitung waters have long been known for their rich underwater biodiversity, specifically unique and exotic creatures and are a potential demersal fishing area for Bitung city fishermen. Bottom fishing is a commonly used method, especially for catching demersal fish. Demersal fisheries in Indonesia are generally a multi-species type of fishery that is exploited using a variety of fishing gear, including bottom longlines [8].

Demersal fish is one of the potential fishery resources and become a target catch for fishermen. These fish generally live in the areas near the bottom of the water, where the space for movement is not far away and form groups that are not so large so that the distribution is relatively more evenly distributed compared to pelagic fish that form large groups (Nadia et al., 2014). Based on the bottom of the water that is the habitat of fish, demersal fish can grouped with reef fish, some of whose lives are found around the reef, and non-reef fish, whose lives are found far from the reef [2]. Demersal fish can be captured using fishing gear such as bottom hand line, mini long line and bottom gill net [4]. Deep-sea snapper (*Etelis radiosus*) is one of Indonesia's most important economic demersal fish resources; scientific information on this fish is still very scarce [5].

Exploration of demersal fish, especially reef fish, is still relatively limited compared to pelagic fish. Demersal fish species such as Yellowtail (*Caesio* sp.), Lencam (*Lethrinus* sp.), Grouper (*Epinephelus* sp.), and Kurisi (*Lutjanus* sp.), including Balinese Kurisi (*Etelis* sp.), have high economic value and are highly demanded for consumption both domestically and export [1].

Bitung Marine and Fisheries Polytechnic have a 28 GT training ship that often sails to do sea practice by carrying basic fishing gear because Bitung waters have potential demersal fish resources. This fishing with FV. Coelacanth is generally carried out in the afternoon until morning using bottom fishing rods. The bait used a cutlet of pelagic fish such as kite, tuna, mackerel, or whole fish such as sardine and squid.

This research aims to : (1) Obtain data on the geographic position of demersal fishing areas in Bitung waters by making a map of the distribution of Demersal fishing areas using the Geographic Information System (GIS) application. (2) Knowing the types of demersal fish catches that dominate bottom fishing, research into the mapping of possible demersal fish fishing grounds in Bitung waters is required.

2. METHODS

The tools used are 28 GT training vessels, GPS, an Echosounder, basic fishing gear, and GIS application version ArcMap 10.7. The materials used are ship logbook journals and demersal fish identification books. The research method uses a direct observation method of fishing at sea; the observation method is an activity of observing, recording, and recording something systematically with a predetermined purpose [3]—data analysis with a qualitative descriptive method. Analysis was carried out on fishing coordinate data, fishing techniques and types of catches. Fishing activities were carried out in February-November 2024 with FV. Coelacanth in Bitung Waters.

3. RESULTS AND DISCUSSION

Fleet Unit

Fishing vessels are ships, boats, or other floating devices used for fishing, supporting fishing operations, farming, transportation, processing, training, and research/exploration. FV. Coelacanth is a fleet of fishing vessels belonging to Bitung Marine and Fisheries Polytechnic with basic fishing gear. The specifications of the ship are the dimensions of the overall length of 18.00m, width of 4.25m, depth of 2.7m, a draft of 1.5m GT of the ship 28, the main material of the vessel (fiber), type of longline ship, sharp-shaped body shape (V-bottom) has a sharp and faster body shape.



Figure 1. FV. Coelacanth

Fishing Tools

A hand line is a very simple fishing tool. It does not use a reel but instead directly reels the string on a handle. Because of its simplicity, hand lines are often used for fishing small to medium fish [4].



Figure 2. Handline on FV. Coelacanth

The specifications of the handline fishing gear on FV. Coelacanth consists of a number 50-sized string, 1 roll of 200-m-long string, a 300-gram threaded pipe iron weight, a number 12-sized hook, and a medium plastic reel.

Fishing Technique

FV. Coelacanth makes preparations before sailing, namely document preparation, food/logistics preparation, fresh water, ice blocks, and fuel preparation. FV. Coelacanth headed to the fishing ground with the skipper, first looking at the weather conditions visually and using the Windy application to determine the direction and speed of the wind. Fishing ground activities with FV. Coelacanth, with a distance to the location of 60 to 90 minutes, the average ship speed is 6 knots, and the journey to the fishing ground is taken with a time of 30 minutes to 90 minutes depending on the destination of the Spot catching point that will be the destination. Fishing activities start from 16.00 in the afternoon to 10.00 in the morning; the average potential fishing depth in Bitung Waters is very likely at a depth of 40 meters to 80 meters by paying attention to the depth display on the GPS Echosounder screen, namely the Napo area or coral house is very good for anchoring. After arriving at the fishing area, the captain and crew will observe the underwater currents and wind and wave conditions so that it is suitable for fishing and the anchor can be lowered.



Figure 3. Echosounder depth display on GPS at FV. Coelacanth

There are four stages of basic fishing operation techniques on FV Coelacanth:

1. Rigging: Attach the bait to the hook (bait of choice is squid or fly fish).
2. Throwing: Open the string and throw it into the sea by looking at the direction of the current carried by the ship.

3. Waiting: After the bait reaches the bottom, leave it for a while. If a fish grabs it, you can feel the vibration or pull on the string.
4. Reeling: If a fish strikes, immediately pull and reel quickly with stability; do not pull too hard so that the fish does not escape; if the fish resists, give a little slack so that the string does not break.



Figure 4. Fishing activities onboard FV. Coelacanth.

Fishing Area

Coordinates potential demersal fishing grounds in Bitung waters based on catch data of each catching trip; there are five potential coordinates in Bitung waters processed using the GIS application ArcMap 10.7 version.

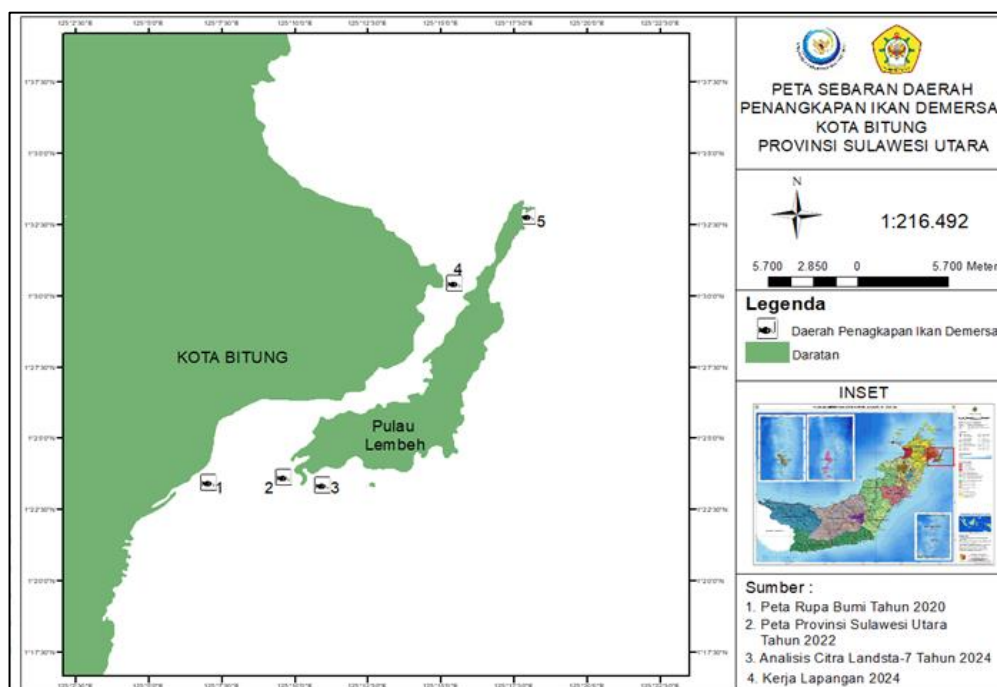


Figure 5. Map of demersal fishing grounds in Bitung waters

The following is Table 1. GPS points of the capture area based on the results of field research:

Table 1. GPS point of capture area

No	Location	GPS Point	Description
1	Location 1	1°23.447' N, 125°06.934' E	Located in the Batu Kapal area, close to the northern part of Lembeh Island



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2	Location 2	1°23,483' N, 125°09.567'E	Located around Batu Angus, close to Kasawari Village
3	Location 3	1°23,283' N, 125°10.852'E	Located in the waters in front of Tanjung Merah Village
4	Location 4	1°30,393' N, 125°15.392'E	Located around the Green Tower, South Lembeh area
5	Location 5	1°32,706' N, 125°18.105'E	Located on Pulau Dua, South Lembeh

At each point of the fishing position, the coordinate data can be stored on the GPS device on the FV. Coelacanth can be seen in the picture below:

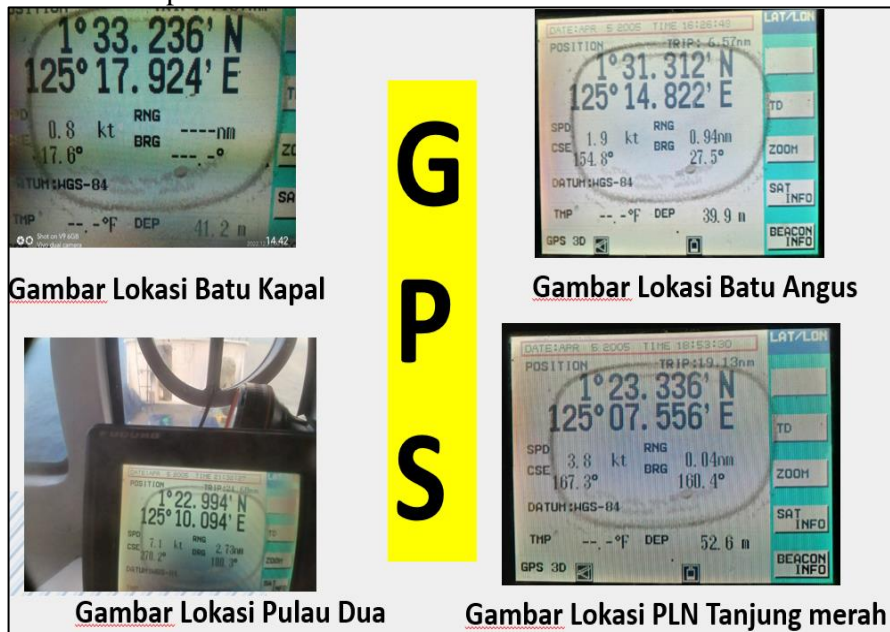


Figure 6. Coordinate display on the GPS of the FV. Coelacanth

The potential water depth of the five positions can be seen in the table below:

Table 2. The potential water depth

No	Trip	Coordinates GPS	Sea Depth	Fishing Ground Name	Total Catch
1	Trip 1	1°23.447' N 125°06.934'E	40 meter	Batu Kapal waters, North Lembeh	45 fishes
2	Trip 2	1°23.483' N 125°09.567'E	50 meter	Pulau Dua wates, South Lembeh	30 fishes
3	Trip 3	1°23.283' N 125°10.852'E	20 meter	Batu Angus waters	33 fishes
4	Trip 4	1°30.393' N 125°15.392'E	60 meter	Menara Hijau waters, South Lembeh	34 fishes
5	Trip 5	1°32.706' N 125°18.105'E	50 meter	Tanjung Merah waters	35 fishes

The dominant main catch fish from 5 fishing trips on KM. The coelacanth is a grouper, snapper, trevally fish, Gora fish, emperor fish and parrot fish. The types of bycatch fish are barracuda/popular fish, suruh fish, squid, Sako fish and kambing fish. For the bait used, the dominant bait is fly fish; this is by the capture of Balinese curry fish with long lines by fishermen in the coastal waters of Sario, Manado city, often using natural bait, namely fly fish, tuna, anchovies and squid attached to the fishing line [6]. Pictures of fish species can be seen in the photos below:

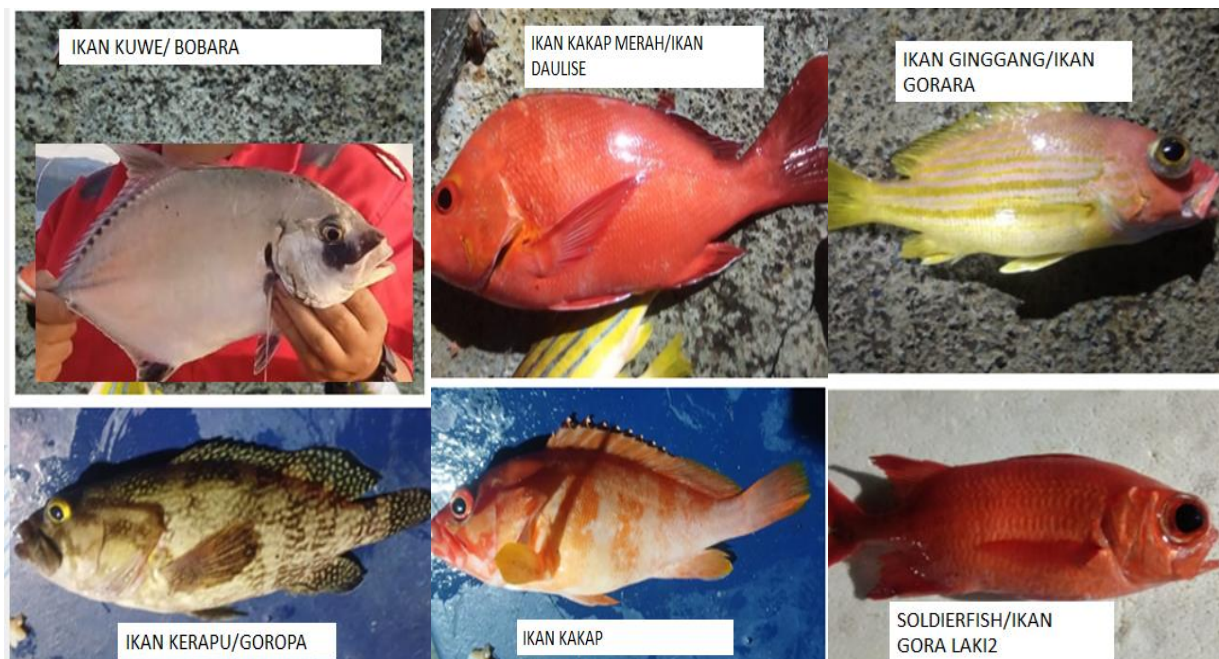


Figure 7. Types of catches of KM.Coelacanth in Bitung Waters

4. CONCLUSION

This study identifies five potential demersal fishing grounds in the waters of Bitung based on geographic coordinates obtained using KM Coelacanth, namely: (1) 10°23.447' N, 125°06.934' E, (2) 10°23.483' N, 125°09.567' E, (3) 10°23.283' N, 125°10.852' E, (4) 10°30.393' N, 125°15.392' E, and (5) 10°32.706' N, 125°18.105' E. The primary species captured using hand lines in these areas include grouper (*Serranidae*), snapper (*Lutjanidae*), trevally (*Carangidae*), Gora fish, emperor fish (*Lethrinidae*), and parrot fish (*Scaridae*). The identification of these fishing grounds is essential for formulating selective and environmentally sustainable fishing strategies to support ecosystem stability and ensure the long-term sustainability of fish stocks.

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