Report Code: AR_713_120820

Length-Based Stock Assessment Of A Species Complex In Deepwater Demersal Fisheries Targeting Snappers In Indonesia Fishery Management Area WPP 713

DRAFT - NOT FOR DISTRIBUTION. TNC-IFCP Technical Paper

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AUGUST 12, 2020

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1 Introduction

This report presents a length-based assessment of multi-species and multi gear demersal fisheries targeting snappers, groupers, emperors and grunts in fisheries management area (WPP) 713, covering the Makassar Strait in between Kalimantan and Java in the West, and Sulawesi and the Flores Sea in the East (Figure 1.1). The most important gear types in these fisheries include drop lines, bottom long lines, deep set fish traps and bottom gillnets, sometimes used as single gears and sometimes used in combination. The target fisheries operate from the deeper parts of the Eastern Java Sea shelf and along the Kalimantan coastline in the West to the deep slopes dropping into the Makassar Strait, Bali Sea and Flores Sea, all around this WPP. The majority of fleets and vessels on the fishing grounds in WPP 713 originate from Sulawesi, Kalimantan, the North coast of Java and Sumbawa. These fleets generally fish at depths ranging from 50 meters on the shelf areas to hundreds of meters down the deep slopes in this region.

Drop line, long line, fish trap and deep demersal gillnet vessels operate in WPP 713 alongside a number of other gear types including bottom dragging gear such as Danish seines, locally known as "cantrang", on the Eastern Java Sea shelf and in shallower waters on the coast of South Sulawesi. Danish seine catches includes a different species spectrum than what we find in our target fisheries but gear interactions are a common problem. The use of "cantrang" seems to be spreading actively from Java to South Sulawesi in recent years. Drop Line and bottom long line are by far the most important gear types in the fisheries targeting snappers, groupers, emperors and grunts in this area. Bottom long line vessels fish on the shelf areas as well as on the top of the slopes, with important fishing grounds located around the border between WPP 712 and WPP 713, where the Java Sea meets the Makassar Strait (Figure 1.2). Drop liners fish deep reefs on the shelf as well as deep slopes dropping into the Makassar Strait and the Bali and Flores Seas. The drop line fishery is an active vertical hook and line fishery operating at depths from 50 to 500 meters, whereas long lines are set horizontally along the bottom at depths usually ranging from 50 to 150 meters only.

The fishing grounds in WPP 713 form a continuous habitat with the shelf area of the Java Sea in the West and the deep slope fishing grounds of the Flores Sea and Banda Sea in the East. The fisheries on those neighbouring fishing grounds will be assessed separately under WPP 712 (Java Sea) and WPP 714 (Banda Sea). Several fleets operate in at least 2 of the 3 adjacent fisheries management areas and will cross boundaries sometimes within a single fishing trip. Java-based vessels fishing on the boundary between WPP 712 and WPP 713 utilize the same fishing grounds and fish stocks as vessels originating from Galesong in South Sulawesi. The current report only analyses catches from fishing grounds within WPP 713 boundaries, regardless of the origin of the fishing vessels.

The Indonesian deep demersal fisheries catches a large number of species, and stocks of 100 of the most common species are monitored on a continuous basis through a Crew Operated Data Recording System (CODRS). The current report presents the top 50 most abundant species of fish in CODRS samples (Tables 1.1 and 1.2) in WPP 713, and analyses length frequencies of the 50 most important species in the combined deep demersal catches in this fisheries management area. For a complete overview of the species composition with images of all 100 target species, please refer to the ID guide prepared for these fisheries[1]. For further background on species life history characteristics, and data-poor length based assessment methods, as applied in this report, please refer to the

[1] http://72.14.187.103:8080/ifish/pub/TNC_FishID.pdf

assessment guide that was separately prepared for these fisheries[2].

Data in this report represent catches realized within WPP 713 boundaries by fishing boats from the above described fleets. Captured fish were photographed on measuring boards by fishing crew participating in our Crew Operated Data Recording System. Images were analysed by project staff to generate the species specific length frequency distributions of the catches which served as the input for our length based assessment. Fishing grounds were recorded with SPOT tracers placed on contracted vessels.

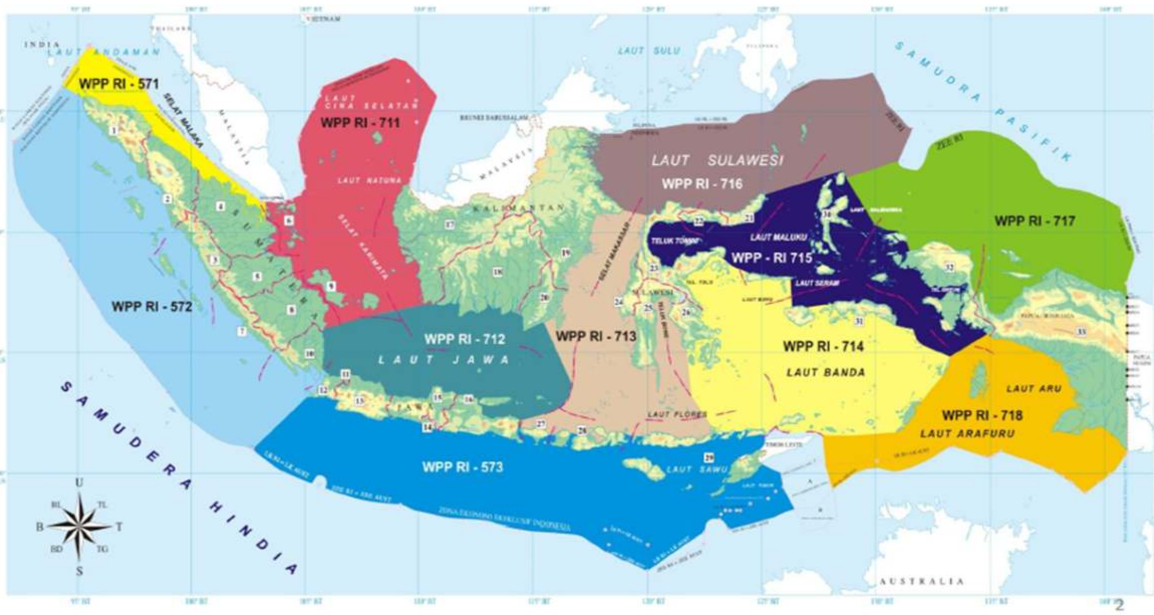


Figure 1.1: Fisheries Management Areas (*Wilayah Pengelolaan Perikanan* or WPP) in Indonesian marine waters.

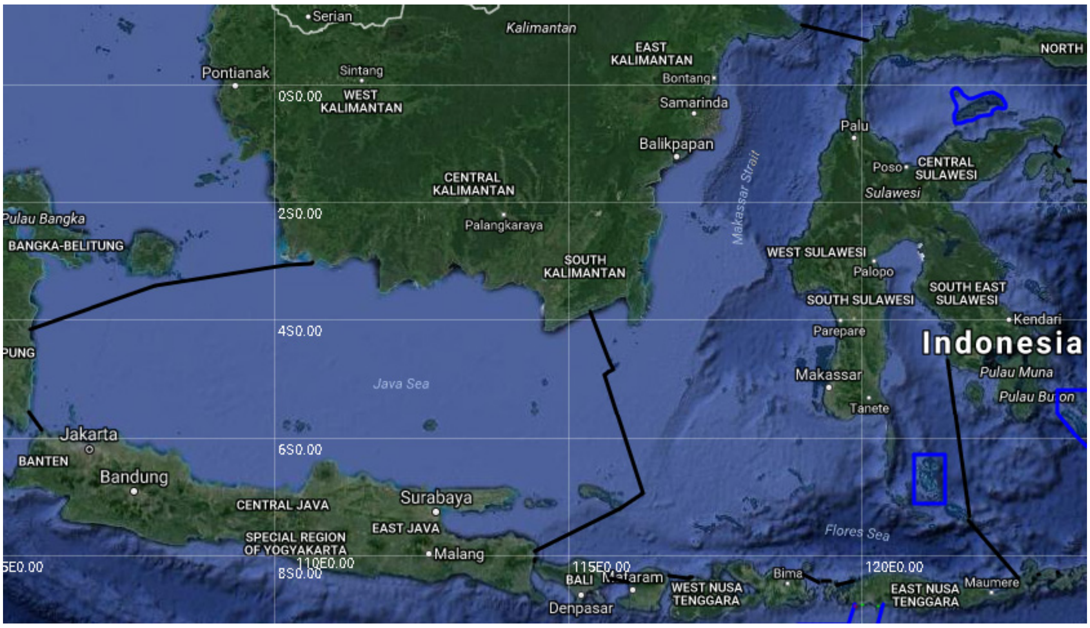


Figure 1.2: Bathymetric map of the Java Sea and the Makassar Strait, WPP 712 and WPP 713, in Central Indonesia. Black lines are WPP boundaries, blue lines are MPAs.

[2]http://72.14.187.103:8080/ifish/pub/DeepSlopeSpeciesAssessmentTool.pdf

Table 1.1: Length-weight relationships, trading limits and total sample sizes (including all years) for the 50 most abundant species in CODRS samples from deep water demersal fisheries in 713

Rank	#ID	Species	Reported Trade Limit Weight (g)	$W = a\ L^b$ a	b	Length Type for a & b TL-FL-SL	Converted Trade Limit L(cm)	Plotted Trade Limit TL(cm)	Sample Sizes
1	45	Epinephelus areolatus	300	0.011	3.048	FL	28.18	28.77	51422
2	17	Lutjanus malabaricus	500	0.009	3.137	FL	33.11	33.11	51168
3	27	Lutjanus vitta	300	0.017	2.978	FL	26.72	27.64	48705
4	7	Pristipomoides multidens	500	0.020	2.944	FL	31.18	34.92	39798
5	90	Diagramma pictum	500	0.014	2.988	FL	33.08	36.71	17965
6	18	Lutjanus sebae	500	0.009	3.208	FL	29.97	31.26	15905
7	1	Aphareus rutilans	1000	0.015	2.961	FL	42.20	49.61	13799
8	63	Lethrinus lentjan	300	0.020	2.986	FL	25.16	26.35	11941
9	21	Lutjanus erythropterus	500	0.024	2.870	FL	31.79	31.79	11642
10	70	Gymnocranius grandoculis	500	0.032	2.885	FL	28.43	30.53	11168
11	8	Pristipomoides typus	500	0.014	2.916	TL	36.16	36.16	10606
12	19	Lutjanus timorensis	500	0.009	3.137	FL	33.11	33.34	9156
13	80	Caranx sexfasciatus	2000	0.032	2.930	FL	43.43	49.51	9056
14	61	Plectropomus leopardus	500	0.012	3.060	FL	32.56	33.38	7609
15	75	Carangoides chrysophrys	1000	0.027	2.902	FL	37.68	42.12	6403
16	22	Pinjalo lewisi	300	0.014	2.970	FL	28.42	29.64	5796
17	23	Pinjalo pinjalo	300	0.014	2.970	FL	28.42	31.16	5622
18	66	Lethrinus olivaceus	300	0.029	2.851	FL	25.49	27.50	4259
19	39	Cephalopholis sonnerati	300	0.015	3.058	TL	25.78	25.78	3946
20	16	Lutjanus bohar	500	0.016	3.059	FL	29.70	31.31	3678
21	50	Epinephelus coioides	1500	0.011	3.084	TL	46.94	46.94	3282
22	28	Lutjanus boutton	300	0.034	3.000	FL	20.75	21.56	3100
23	15	Lutjanus argentimaculatus	500	0.034	2.792	FL	31.22	31.78	2901
24	5	Etelis radiosus	1000	0.056	2.689	FL	38.05	43.15	2868
25	37	Cephalopholis miniata	300	0.026	2.864	TL	26.35	26.35	2626
26	67	Lethrinus amboinensis	300	0.029	2.851	FL	25.49	28.06	2534
27	6	Etelis coruscans	500	0.041	2.758	FL	30.28	37.85	2514
28	20	Lutjanus gibbus	500	0.015	3.091	FL	28.87	31.09	2328
29	62	Variola albimarginata	300	0.012	3.079	FL	26.68	30.44	2291
30	60	Plectropomus maculatus	500	0.016	3.000	FL	31.76	31.76	2277
31	4	Etelis sp.	500	0.022	2.950	FL	30.16	32.84	2159
32	9	Pristipomoides filamentosus	500	0.038	2.796	FL	29.70	33.27	2134
33	86	Argyrops spinifer	300	0.055	2.670	TL	25.11	27.87	2030
34	84	Seriola rivoliana	2000	0.006	3.170	FL	54.23	60.03	1936
35	71	Gymnocranius griseus	500	0.032	2.885	FL	28.43	30.56	1654
36	76	Carangoides gymnostethus	1000	0.046	2.746	FL	37.88	41.55	1621
37	72	Carangoides coeruleopinnatus	1000	0.032	2.902	FL	35.35	40.12	1578
38	94	Sphyraena forsteri	500	0.005	3.034	FL	43.51	49.16	1453
39	25	Lutjanus russelli	300	0.020	2.907	FL	27.28	28.49	1441
40	81	Caranx tille	2000	0.032	2.930	FL	43.43	49.51	1434
41	98	Rachycentron canadum	1000	0.003	3.088	FL	60.67	67.28	1373
42	78	Caranx ignobilis	2000	0.027	2.913	FL	46.78	54.36	1361
43	73	Carangoides fulvoguttatus	1000	0.033	2.808	FL	39.51	43.62	1299
44	53	Epinephelus heniochus	300	0.061	2.624	FL	25.59	25.59	1270
45	33	Paracaesio xanthura	300	0.023	3.000	SL	23.64	27.39	1222
46	82	Elagatis bipinnulata	1000	0.013	2.920	FL	46.53	55.37	1091
47	46	Epinephelus bleekeri	300	0.009	3.126	TL	28.09	28.09	1015
48	2	Aprion virescens	1000	0.023	2.886	FL	40.49	45.90	1011
49	10	Pristipomoides sieboldii	300	0.022	2.942	FL	25.52	29.21	875
50	31	Symphorus nematophorus	1000	0.015	3.046	FL	38.63	40.18	838

Table 1.2: Sample sizes over the period 2016 to 2024 for the 50 most abundant species in CODRS samples of deepwater demersal fisheries in WPP 713

Rank	Species	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
1	Epinephelus areolatus	6184	7875	14296	16437	6630	0	0	0	0	51422
2	Lutjanus malabaricus	3973	7208	17175	16171	6641	0	0	0	0	51168
3	Lutjanus vitta	1002	3930	17716	18814	7243	0	0	0	0	48705
4	Pristipomoides multidens	13451	13318	8664	3126	1239	0	0	0	0	39798
5	Diagramma pictum	391	1958	6513	5826	3277	0	0	0	0	17965
6	Lutjanus sebae	771	2664	5549	4994	1927	0	0	0	0	15905
7	Aphareus rutilans	11	120	4242	4214	5212	0	0	0	0	13799
8	Lethrinus lentjan	173	1228	4214	4534	1792	0	0	0	0	11941
9	Lutjanus erythropterus	58	960	3952	5246	1426	0	0	0	0	11642
10	Gymnocranius grandoculis	832	2439	3366	3224	1307	0	0	0	0	11168
11	Pristipomoides typus	2172	2529	2147	2711	1047	0	0	0	0	10606
12	Lutjanus timorensis	405	1286	2531	3239	1695	0	0	0	0	9156
13	Caranx sexfasciatus	7	48	2637	3504	2860	0	0	0	0	9056
14	Plectropomus leopardus	153	213	1832	3317	2094	0	0	0	0	7609
15	Carangoides chrysophrys	63	288	2013	2550	1489	0	0	0	0	6403
16	Pinjalo lewisi	1	342	2834	1807	812	0	0	0	0	5796
17	Pinjalo pinjalo	8	104	2153	1917	1440	0	0	0	0	5622
18	Lethrinus olivaceus	165	322	1307	1560	905	0	0	0	0	4259
19	Cephalopholis sonnerati	383	549	1228	1325	461	0	0	0	0	3946
20	Lutjanus bohar	71	227	1352	1371	657	0	0	0	0	3678
21	Epinephelus coioides	13	133	974	1108	1054	0	0	0	0	3282
22	Lutjanus boutton	32	357	1270	872	569	0	0	0	0	3100
23	Lutjanus argentimaculatus	51	245	793	1122	690	0	0	0	0	2901
24	Etelis radiosus	0	17	810	1692	349	0	0	0	0	2868
25	Cephalopholis miniata	3	84	873	1218	448	0	0	0	0	2626
26	Lethrinus amboinensis	25	324	1333	487	365	0	0	0	0	2534
27	Etelis coruscans	0	16	1600	608	290	0	0	0	0	2514
28	Lutjanus gibbus	20	191	1048	668	401	0	0	0	0	2328
29	Variola albimarginata	27	139	766	781	578	0	0	0	0	2291
30	Plectropomus maculatus	1	16	212	553	1495	0	0	0	0	2277
31	Etelis sp.	0	13	694	1006	446	0	0	0	0	2159
32	Pristipomoides filamentosus	56	182	685	754	457	0	0	0	0	2134
33	Argyrops spinifer	92	291	630	683	334	0	0	0	0	2030
34	Seriola rivoliana	33	55	677	763	408	0	0	0	0	1936
35	Gymnocranius griseus	324	419	556	182	173	0	0	0	0	1654
36	Carangoides gymnostethus	14	128	374	396	709	0	0	0	0	1621
37	Carangoides coeruleopinnatus	4	42	591	676	265	0	0	0	0	1578
38	Sphyraena forsteri	0	33	831	388	201	0	0	0	0	1453
39	Lutjanus russelli	21	155	426	557	282	0	0	0	0	1441
40	Caranx tille	8	8	273	528	617	0	0	0	0	1434
41	Rachycentron canadum	58	185	434	448	248	0	0	0	0	1373
42	Caranx ignobilis	37	127	458	500	239	0	0	0	0	1361
43	Carangoides fulvoguttatus	47	21	235	587	409	0	0	0	0	1299
44	Epinephelus heniochus	224	599	200	213	34	0	0	0	0	1270
45	Paracaesio xanthura	0	8	510	374	330	0	0	0	0	1222
46	Elagatis bipinnulata	2	2	406	469	212	0	0	0	0	1091
47	Epinephelus bleekeri	41	139	287	298	250	0	0	0	0	1015
48	Aprion virescens	86	120	338	305	162	0	0	0	0	1011
49	Pristipomoides sieboldii	3	2	543	141	186	0	0	0	0	875
50	Symphorus nematophorus	180	203	235	169	51	0	0	0	0	838

2 Materials and methods for data collection, analysis and reporting

2.1 Frame Survey

A country-wide frame survey was implemented to obtain complete and detailed information on the deep demersal fishing fleet in Indonesia, using a combination of satellite image analysis and ground truthing visits to all locations where either satellite imagery or other forms of information indicated deep demersal fisheries activity. During the frame survey, data were collected on boat size, gear type, port of registration, licenses for specific FMAs, captain contacts and other details, for all fishing boats in the fleet. Following practices by fisheries managers in Indonesia, we distinguished 4 boat size categories including "nano" (<5 GT), "small" (5-< 10 GT), "medium" (10-30 GT), and "large" (>30 GT). We also distinguished 4 gear types used in these fisheries, including vertical drop lines, bottom set long lines, deep water gillnets and traps. A 5th category of gear classification was needed to record operations using "mixed gear" when 2 or more of the gear types were used on the same trip and catches were not separated.

Frame survey data are continuously updated to keep records of the complete and currently active fishing fleet in the deep demersal fisheries. Fleet information is summarized by registration port and home district (Table 2.14), while actual fishing grounds are determined by placing SPOT Trace units on all fishing boats participating in the program. By late 2019, most (over 80%) of the Indonesian coastline had been surveyed and a majority of the fleet was on record. The total fleet in each WPP is a dynamic number, as boats are leaving and being added to the local fleet all the time, and therefore the fleet survey data need to be updated continuously.

2.2 Vessel Tracking and CODRS

Vessel movement and fishing activity as recorded with SPOT data generates the information on fleet dynamics. When in motion, SPOT Trace units automatically report an hourly location of each fishing boat in the program, and when at rest for more than 24 hours, they relay daily status reports. Data on species and size distributions of catches, as needed for accurate length based stock assessments, are collected via Crew Operated Data Recording Systems or CODRS. This catch data is georeferenced as the CODRS works in tandem with the SPOT Trace vessel tracking system. Captains were recruited for the CODRS program from across the full range of boat size and gear type categories.

The CODRS approach involves fishers taking photographs of the fish in the catch, displayed on measuring boards, while the SPOT tracking system records the positions. Data recording for each CODRS fishing trip begins when the boat leaves port with the GPS recording the vessel tracks while it is steaming out. After reaching the fishing grounds, fishing will start, changing the track of recorded positions into a pattern that shows fishing instead of steaming. During the fishing activity, fish is collected on the deck or in chiller boxes on deck. The captain or crew will then take pictures of the fish, positioned over measuring boards (Figure 2.1), before moving the fish from the deck or from the chiller to the hold (to be stored on ice) or to the freezer. The process is slightly different on some of the "nano" boats (around 1 GT), where some crew take pictures upon landing instead of at sea. In these situations, the timestamps of the photographs are still used as an indication of the fishing day, even though most fishing may have happened on the day before.

At the end of the trip, the storage chip from the camera is handed over for processing of the images by expert staff. Processing includes ID of the species and measurement of the length of the fish (Figure 2.2), double checking by a second expert, and data storage in the IFish data base. Sets of images from fishing trips with unacceptable low quality photographs were not further processed and not included in the dataset. Body weight at length could be calculated for all species using length-weight relationships to enable estimation of total catch weights as well as catch weights per species for individual fishing trips by CODRS vessels. Weight converted catch length frequencies of individual catches could therewith be verified against sales records of landings. These sales receipts or ledgers represent a fairy reliable estimate of the total weight of an individual catch (from a single trip, and including all species) that is independent from CODRS data.

2.3 Data Quality Control

With information from sales records we verified that individual catches were fully represented by CODRS images and we flagged catches when they were incomplete, judging from comparison with the weight converted catch size frequencies. When estimated weights from CODRS where above 90% of landed weights from receipts, they were considered complete and accepted for use in length-based analysis and calculations of CpUE. CpUE is calculated on a day by day basis, in kg/GT/day, using only those days from the trip when images were actually collected. Medium size and larger vessels (10 GT and larger) do trips of at least a week up to over a month. There may be some days on which weather or other conditions are such that no images are collected, but sufficient days with images, within those trips usually remain for daily CpUE estimates and to supply samples for length-based analysis. For boats of 10 GT and above, incomplete data sets with 30% to 90% coverage were still used for analysis, using only those days on which images were collected. For boats below 10 GT (doing day trips or trips of just a few days) only complete data sets are used for CpUE calculations. All data sets on catches with less than 30% coverage were rejected and were not used in any analysis.

2.4 Length-Frequency Distributions, CpUE, and Total Catch

By the end of 2019, more than 400 boats participated in the CODRS program (Figure 2.3) across all fishing grounds in Indonesia, with close to 40 boats enrolled in each WPP (Table 2.1). Recruitment of captains from the overall fleet into the CODRS program was not exactly proportional to composition of the fleet in terms of vessel size, gear type and the FMA where the boat normally operates. Actual fleet composition by boat size and gear type, and activity in terms of numbers of active fishing days per year for each category, are therefore used when CODRS data are used for CpUE and catch calculations. Species composition in the catch is also not exactly the same as species composition in the CODRS samples. Catch information by WPP and by fleet segment from CODRS samples needs to be combined with fleet composition and activity information to obtain accurate annual catch information and species composition for each segment of the fleet.

Converted weights from catch size frequencies on individual fishing days, in combination with activity data from onboard trackers were used to estimate catch per unit of effort (CpUE) by fleet segment (boat size * gear type), by FMA, by species, and over time. Plotted data show clear differences between CpUE values for different gear types and different boat size categories (Figure 2.4) and we therefore work with separated gear types and boat size categories to generate CpUE values for each distinct segment of the fleet (Table 2.2 and Table 2.3). Activity data from onboard trackers on more than 400 fishing boats were used to estimate the number of active fishing days per year for each segment of the fleet (Table 2.4) and the total (hull) Gross Tonnage in each fleet segment was combined with fleet activity to establish a measure of effort. With this information, CpUE could be precisely defined in kg per GT per active fishing day for each type of gear and each category of boat size in each FMA. Annual averages of CpUE by fleet segment were plotted for the top 7 species in each FMA (Figures 2.5 through 2.11), as indicators for stock health, and to compare with indicators from length-based analysis (i.e. Spawning Potential Ratio and percentage of immature fish in the catch).

Information on fleet activity, fleet size by gear type and boat size, and average size frequencies by species (per unit of effort) are used to estimate total catch. Fishing effort in terms of the average number of active fishing days per year for each gear type and boat size category (Table 2.4), was derived from SPOT data looking at movement patterns. Fleet size by gear type and boat size category (Table 2.5) was obtained from field surveys, where each vessel was recorded in a data base with estimated GT. Average size frequency distributions by fleet segment and species for each FMA, in combination with the information on effort by fleet segment, were thus used to estimate CATCH LFD (over the entire fleet) from average CODRS LFD by fleet segment. Only annual sample sizes larger than 200 fish per species and 50 fish per fleet segment were used for further calculations. Numbers per size class for each species in the catch were multiplied with weights per size class from length-weight relationships, to calculate catches by fleet segment (Table 2.7), species distribution in the total catch (Table 2.8), as well as catch by species for each gear type separately (Tables 2.9 through 2.13).

As the CODRS program is still in development, some parts for the fleet ("fleet segments", a combination of WPP, gear type, and boat size category) are not yet represented. For those missing fleet segments, we applied the following approach to estimate annual catch. First, within each WPP, we estimated the total catch and the total effort for all fleet segments where we had representation by CODRS. We expressed annual effort as "tonnage-days", ie, the GT of each vessel times the annual number of fishing days. Then, we calculated the average catch-per-unit-effort, over all fleet segments that have CODRS representation within each WPP (in metric tons per tonnage-day). This resulted in one catch-per-unit-effort estimate for each WPP (CPUE-estimate-per-WPP). Then, we calculated the effort, in tonnage-days, for the fleet segments where we did not have CODRS representation, and we multiplied this effort with CPUE-estimate-per-WPP to get the estimated total annual catch for that fleet segment. This means that, within each WPP, fleet segments that do not have CODRS representation all have the same CPUE estimate-per-WPP, but their total catch estimates vary because effort between those fleet segments vary. We applied this approach for total catch as well as total catch by species.

Trends in CpUE by species and by fleet segment (Figures 2.5 through 2.11) can be used as indicator for year-on-year changes in status of the stocks, for as far as time series are available within each fleet segment. Note, however, that these time series sometimes are incomplete or interrupted. This is due to variations in the presence of fleet segments between years in each WPP, and sometimes the CODRS vessels representing a fleet segment may disappear from one WPP and show up in another WPP. This may happen due to problems with processing permits at local authorities, but also due to the emerging differences in efficiencies between gear types and boat size categories, as well as due to perceptions on opportunities in other WPPs.

Figure 2.1: Fishing crew preparing fish on a measuring board.

Figure 2.2: Fish photographed by fishing crew on board as part of CODRS.

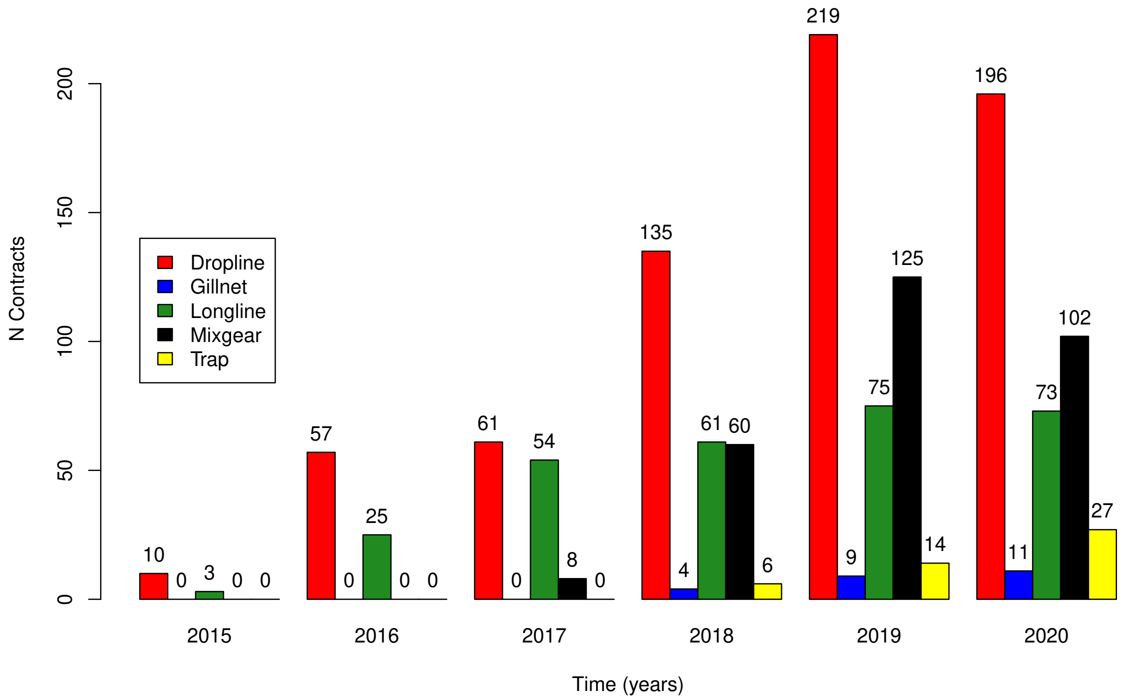


Figure 2.3: Number of CODRS contractors by gear type actively fishing in Indonesian waters.

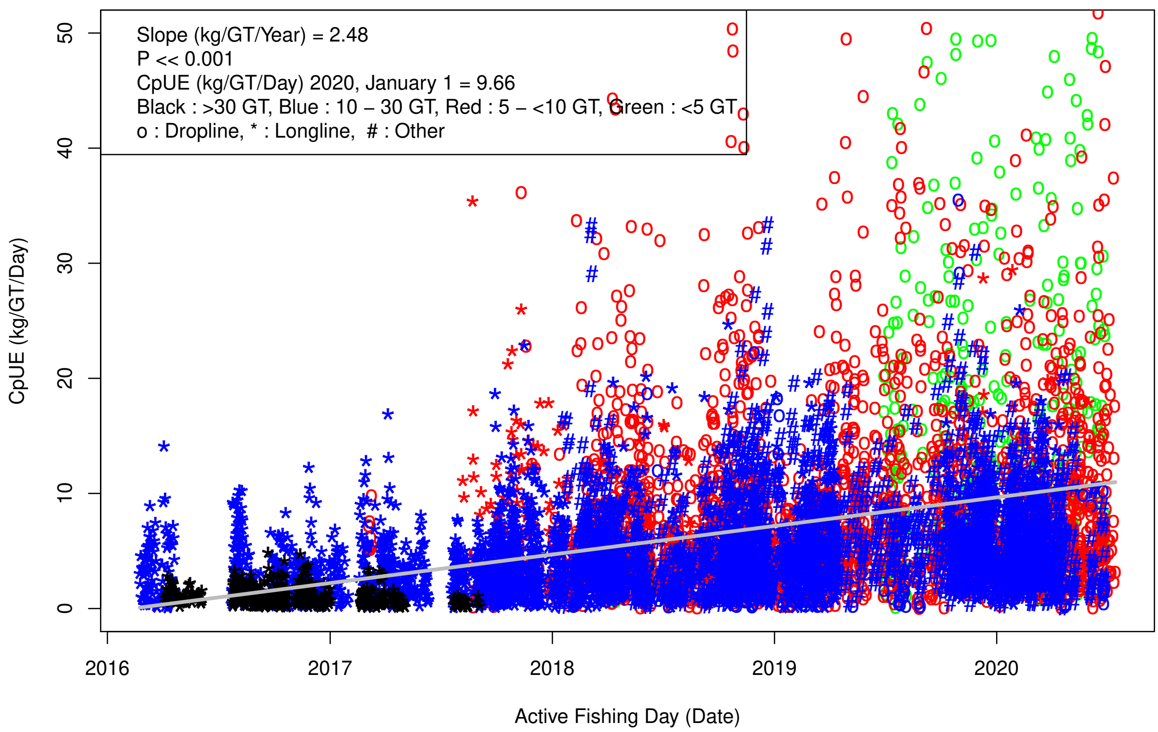


Figure 2.4: Catch per Unit of Effort in WPP 713.

Table 2.1: Number of CODRS deployed by gear type and boat size category in WPP 713

N	Dropline	Longline	Gillnet	Trap	Mix Gear	Total
Nano	3	0	NA	0	0	3
Small	13	0	NA	0	0	13
Medium	2	13	5	5	NA	25
Large	0	0	NA	NA	NA	0
Total	18	13	5	5	0	41

Nano less than 5 GT. **Small** 5 - <10 GT. **Medium** 10 - 30 GT. **Large** >30 GT.

Table 2.2: CpUE by fishing gear and boat size category
in WPP 713 for the most recent 365 days

kg/GT/Day	Dropline	Longline	Gillnet	Trap	Mix Gear
Nano	35.79	12.06	NA	12.06	12.06
Small	12.08	12.29	NA	12.06	12.06
Medium	6.69	6.36	11.60	5.14	NA
Large	12.06	12.06	NA	NA	NA

Nano less than 5 GT. **Small** 5 - <10 GT. **Medium** 10 - 30 GT. **Large** >30 GT.

Table 2.3: Number of CODRS observations that contribute to CpUE value
in WPP 713 for the most recent 365 days

N	Dropline	Longline	Gillnet	Trap	Mix Gear
Nano	307	2398	NA	2398	2398
Small	877	53	NA	2398	2398
Medium	52	592	300	217	NA
Large	2398	2398	NA	NA	NA

Nano less than 5 GT. **Small** 5 - <10 GT. **Medium** 10 - 30 GT. **Large** >30 GT.

Table 2.4: Average active-fishing days per year by fishing gear and boat size category in all WPP

Days / Year	Dropline	Longline	Gillnet	Trap	Mix Gear
Nano Dedicated	201	235	224	194	265
Nano Seasonal	100	118	112	97	133
Small Dedicated	213	258	247	277	241
Small Seasonal	107	129	124	139	121
Medium Dedicated	204	213	258	219	202
Medium Seasonal	102	107	129	110	101
Large Dedicated	166	237	151	185	185
Large Seasonal	83	119	75	92	92

Nano less than 5 GT. **Small** 5 - <10 GT. **Medium** 10 - 30 GT. **Large** >30 GT.

Table 2.5: Current number of boats in the fleet by fishing gear and boat size category in WPP 713

Number of Boat	Dropline	Longline	Gillnet	Trap	Mix Gear	Total
Nano Dedicated	139	341	0	1	0	481
Nano Seasonal	208	60	0	0	395	663
Small Dedicated	61	11	0	54	17	143
Small Seasonal	25	25	0	0	0	50
Medium Dedicated	49	81	8	5	0	143
Medium Seasonal	0	2	6	0	0	8
Large Dedicated	1	3	0	0	0	4
Large Seasonal	0	0	0	0	0	0
Total	483	523	14	60	412	1492

Nano less than 5 GT. **Small** 5 - <10 GT. **Medium** 10 - 30 GT. **Large** >30 GT.

Table 2.6: Current total gross tonnage of all boats in the fleet by fishing gear and boat size category in WPP 713

Total GT	Dropline	Longline	Gillnet	Trap	Mix Gear	Total
Nano Dedicated	246	400	0	3	0	649
Nano Seasonal	410	70	0	0	508	988
Small Dedicated	362	68	0	274	85	789
Small Seasonal	147	184	0	0	0	331
Medium Dedicated	731	1010	118	64	0	1922
Medium Seasonal	0	20	97	0	0	117
Large Dedicated	34	130	0	0	0	164
Large Seasonal	0	0	0	0	0	0
Total	1930	1882	215	341	593	4961

Table 2.7: Total catch in metric tons per year by fishing gear and boat size category in WPP 713 for the most recent 365 days

Total Catch	Dropline	Longline	Gillnet	Trap	Mix Gear	Total
Nano Dedicated	1767	1134	0	7	0	2908
Nano Seasonal	1468	100	0	0	815	2383
Small Dedicated	932	215	0	916	247	2310
Small Seasonal	190	292	0	0	0	482
Medium Dedicated	997	1369	353	72	0	2792
Medium Seasonal	0	14	145	0	0	159
Large Dedicated	68	372	0	0	0	440
Large Seasonal	0	0	0	0	0	0
Total	5422	3495	498	995	1062	11472

Nano less than 5 GT. **Small** 5 - <10 GT. **Medium** 10 - 30 GT. **Large** >30 GT.

Table 2.8: Top 20 species by volume in deepwater demersal fisheries with % immature fish in the catch in WPP 713 for the most recent 365 days.

Species	Weight MT	Weight %	Cumulative % Weight	Immature % Number	Immature % Weight	Risk Immature
Aphareus rutilans	3549	31	31	53	24	High
Lutjanus malabaricus	1216	11	42	56	27	High
Pristipomoides multidens	831	7	49	33	14	High
Etelis sp.	578	5	54	57	25	High
Caranx sexfasciatus	459	4	58	35	10	High
Pristipomoides typus	367	3	61	39	19	High
Lutjanus argentimaculatus	310	3	64	12	5	Med
Diagramma pictum	310	3	66	7	2	Low
Gymnocranius grandoculis	230	2	68	36	13	High
Epinephelus areolatus	223	2	70	2	0	Low
Lutjanus sebae	211	2	72	88	61	High
Etelis radiosus	187	2	74	65	32	High
Caranx tille	186	2	75	18	5	Med
Lethrinus olivaceus	171	1	77	5	1	Low
Lutjanus vitta	158	1	78	6	3	Low
Lutjanus bohar	141	1	80	37	12	High
Lutjanus erythropterus	137	1	81	55	33	High
Carangoides chrysophrys	136	1	82	38	14	High
Epinephelus coioides	125	1	83	7	2	Low
Lutjanus timorensis	124	1	84	44	24	High
Total Top 20 Species	9649	84	84	36	21	High
Total Top 100 Species	11472	100	100	34	20	High

Table 2.9: Top 20 species by volume in Dropline fisheries with % immature fish in the catch in WPP 713 for the most recent 365 days.

Species	Weight MT	Weight %	Cumulative % Weight	Immature % Number	Immature % Weight	Risk Immature
Aphareus rutilans	2270	42	42	55	26	High
Etelis sp.	387	7	49	57	24	High
Pristipomoides multidens	316	6	55	38	17	High
Lutjanus malabaricus	267	5	60	64	34	High
Caranx sexfasciatus	251	5	64	39	13	High
Pristipomoides typus	188	3	68	38	19	High
Lutjanus argentimaculatus	141	3	70	15	7	Med
Epinephelus areolatus	122	2	73	2	0	Low
Caranx tille	109	2	75	22	9	Med
Etelis radiosus	83	2	76	77	49	High
Plectropomus leopardus	66	1	77	4	1	Low
Carangoides chrysophrys	66	1	79	41	17	High
Lutjanus timorensis	63	1	80	42	24	High
Lutjanus vitta	62	1	81	7	3	Low
Pristipomoides filamentosus	60	1	82	99	97	High
Elagatis bipinnulata	58	1	83	6	1	Low
Lutjanus erythropterus	56	1	84	58	37	High
Pinjalo lewisi	56	1	85	26	13	Med
Lutjanus bohar	48	1	86	70	29	High
Diagramma pictum	46	1	87	13	4	Med
Total Top 20 Species	4715	87	87	38	23	High
Total Top 100 Species	5422	100	100	36	23	High

Table 2.10: Top 20 species by volume in Longline fisheries with % immature fish in the catch in WPP 713 for the most recent 365 days.

Species	Weight MT	Weight %	Cumulative % Weight	Immature % Number	Immature % Weight	Risk Immature
Lutjanus malabaricus	718	21	21	50	24	High
Aphareus rutilans	535	15	36	10	2	Low
Pristipomoides multidens	357	10	46	26	10	Med
Diagramma pictum	165	5	51	7	2	Low
Gymnocranius grandoculis	144	4	55	38	14	High
Lutjanus sebae	140	4	59	86	58	High
Pristipomoides typus	116	3	62	39	19	High
Lutjanus argentimaculatus	104	3	65	5	2	Low
Caranx sexfasciatus	99	3	68	6	1	Low
Etelis sp.	81	2	70	NA	NA	
Lethrinus olivaceus	69	2	72	3	1	Low
Lutjanus vitta	68	2	74	6	2	Low
Epinephelus areolatus	61	2	76	1	0	Low
Aprion virescens	60	2	78	5	1	Low
Lethrinus lentjan	55	2	79	1	0	Low
Lutjanus erythropterus	54	2	81	40	23	High
Caranx ignobilis	48	1	82	7	3	Low
Lutjanus bohar	48	1	84	36	15	High
Carangoides chrysophrys	42	1	85	20	5	Med
Epinephelus coioides	39	1	86	5	1	Low
Total Top 20 Species	3002	86	86	31	17	High
Total Top 100 Species	3495	100	100	30	16	High

Table 2.11: Top 20 species by volume in Gillnet fisheries with % immature fish in the catch in WPP 713 for the most recent 365 days.

Species	Weight MT	Weight %	Cumulative % Weight	Immature % Number	Immature % Weight	Risk Immature
Aphareus rutilans	129	26	26	5	1	Low
Diagramma pictum	45	9	35	0	0	Low
Etelis radiosus	44	9	44	4	1	Low
Lethrinus olivaceus	40	8	52	0	0	Low
Caranx sexfasciatus	30	6	58	1	0	Low
Seriola rivoliana	23	5	63	9	3	Low
Lutjanus bohar	20	4	67	3	1	Low
Caranx tille	16	3	70	0	0	Low
Pristipomoides multidens	15	3	73	5	1	Low
Caranx ignobilis	14	3	76	11	4	Med
Erythrocles schlegelii	13	3	78	0	0	Low
Lutjanus argentimaculatus	11	2	81	2	1	Low
Gymnocranius grandoculis	11	2	83	2	1	Low
Etelis sp.	10	2	85	50	35	High
Lutjanus timorensis	7	1	86	1	0	Low
Pinjalo pinjalo	7	1	88	1	0	Low
Carangoides gymnostethus	7	1	89	1	0	Low
Lutjanus malabaricus	7	1	90	11	5	Med
Lutjanus sebae	6	1	92	69	42	High
Carangoides fulvoguttatus	6	1	93	1	0	Low
Total Top 20 Species	462	93	93	5	2	Low
Total Top 100 Species	498	100	100	5	2	Low

Table 2.12: Top 20 species by volume in Trap fisheries with % immature fish in the catch in WPP 713 for the most recent 365 days.

Species	Weight MT	Weight %	Cumulative % Weight	Immature % Number	Immature % Weight	Risk Immature
Aphareus rutilans	285	29	29	NA	NA	
Lutjanus malabaricus	112	11	40	76	43	High
Pristipomoides multidens	67	7	47	NA	NA	
Etelis sp.	46	5	51	NA	NA	
Caranx sexfasciatus	37	4	55	NA	NA	
Epinephelus coioides	37	4	59	7	2	Low
Pristipomoides typus	30	3	62	NA	NA	
Diagramma pictum	26	3	64	19	5	Med
Lutjanus argentimaculatus	25	3	67	NA	NA	
Gymnocranius grandoculis	18	2	69	NA	NA	
Epinephelus areolatus	18	2	71	1	0	Low
Lutjanus sebae	17	2	72	NA	NA	
Plectropomus maculatus	15	2	74	13	4	Med
Etelis radiosus	15	2	75	NA	NA	
Caranx tille	15	2	77	NA	NA	
Plectropomus leopardus	15	1	78	2	1	Low
Lethrinus olivaceus	14	1	80	39	17	High
Lutjanus erythropterus	14	1	81	88	78	High
Lutjanus vitta	13	1	83	20	9	Med
Lutjanus bohar	11	1	84	NA	NA	
Total Top 20 Species	833	84	84	41	15	High
Total Top 100 Species	995	100	100	39	15	High

Table 2.13: Top 20 species by volume in Mixgears fisheries with % immature fish in the catch in WPP 713 for the most recent 365 days.

Species	Weight MT	Weight %	Cumulative % Weight	Immature % Number	Immature % Weight	Risk Immature
Aphareus rutilans	329	31	31	NA	NA	
Lutjanus malabaricus	113	11	42	NA	NA	
Pristipomoides multidens	77	7	49	NA	NA	
Etelis sp.	53	5	54	NA	NA	
Caranx sexfasciatus	42	4	58	NA	NA	
Pristipomoides typus	34	3	61	NA	NA	
Lutjanus argentimaculatus	29	3	64	NA	NA	
Diagramma pictum	29	3	66	NA	NA	
Gymnocranius grandoculis	21	2	68	NA	NA	
Epinephelus areolatus	21	2	70	NA	NA	
Lutjanus sebae	19	2	72	NA	NA	
Etelis radiosus	17	2	74	NA	NA	
Caranx tille	17	2	75	NA	NA	
Lethrinus olivaceus	16	1	77	NA	NA	
Lutjanus vitta	15	1	78	NA	NA	
Lutjanus bohar	13	1	80	NA	NA	
Lutjanus erythropterus	13	1	81	NA	NA	
Carangoides chrysophrys	13	1	82	NA	NA	
Epinephelus coioides	12	1	83	NA	NA	
Lutjanus timorensis	12	1	84	NA	NA	
Total Top 20 Species	893	84	84	NA	NA	NA
Total Top 100 Species	1062	100	100	NA	NA	NA

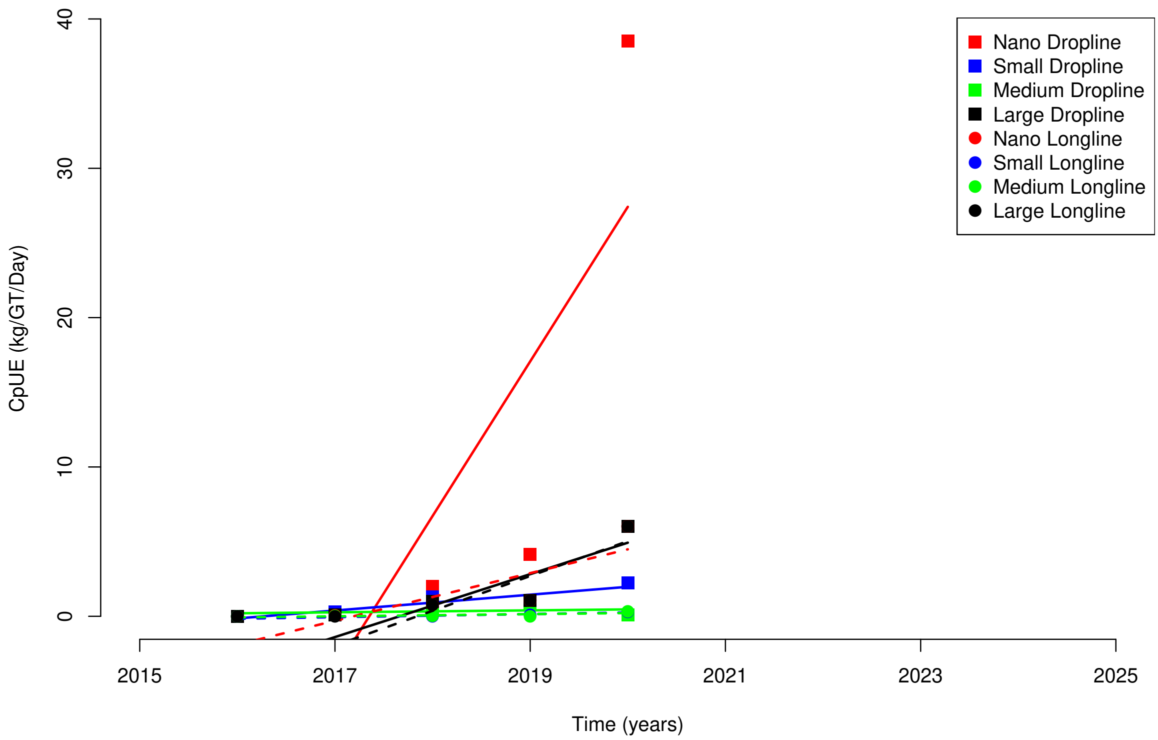


Figure 2.5: Catch per Unit of Effort per calendar year for Aphareus rutilans in WPP 713 for Dropline and Longline catches by fleet segment.
Solid lines and dashed lines for trends in Dropline CpUE and Longline CpUE respectively.

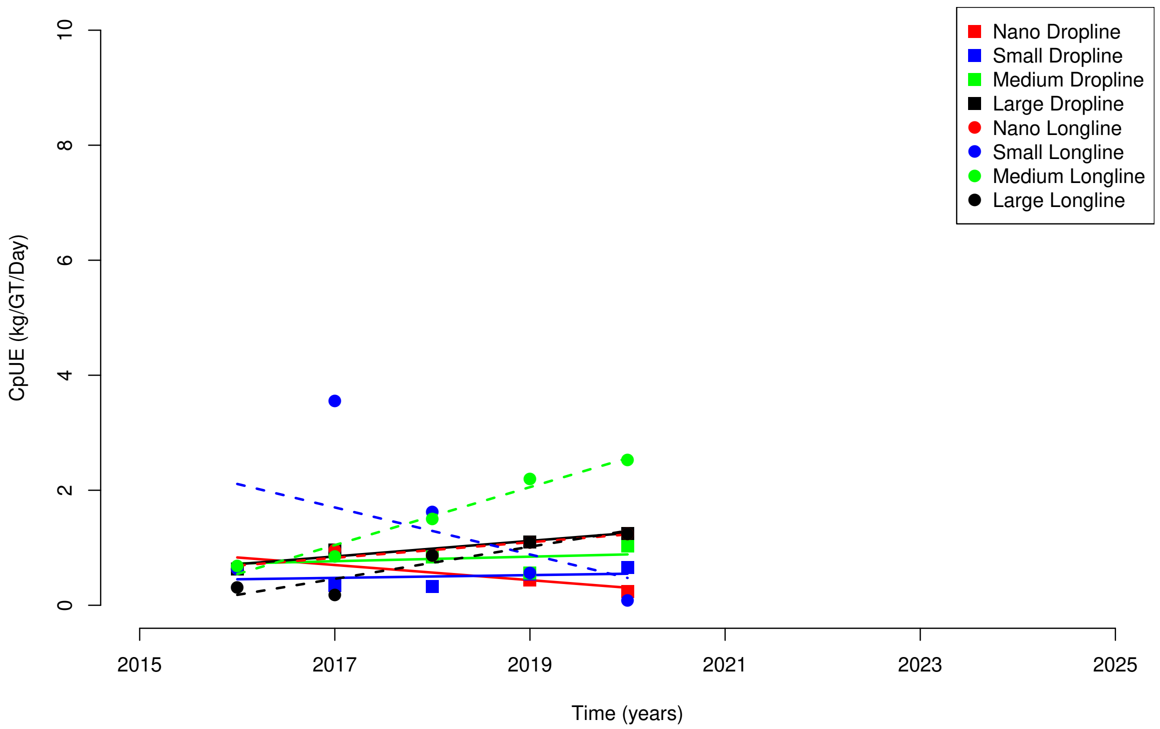


Figure 2.6: Catch per Unit of Effort per calendar year for Lutjanus malabaricus in WPP 713 for Dropline and Longline catches by fleet segment.
Solid lines and dashed lines for trends in Dropline CpUE and Longline CpUE respectively.

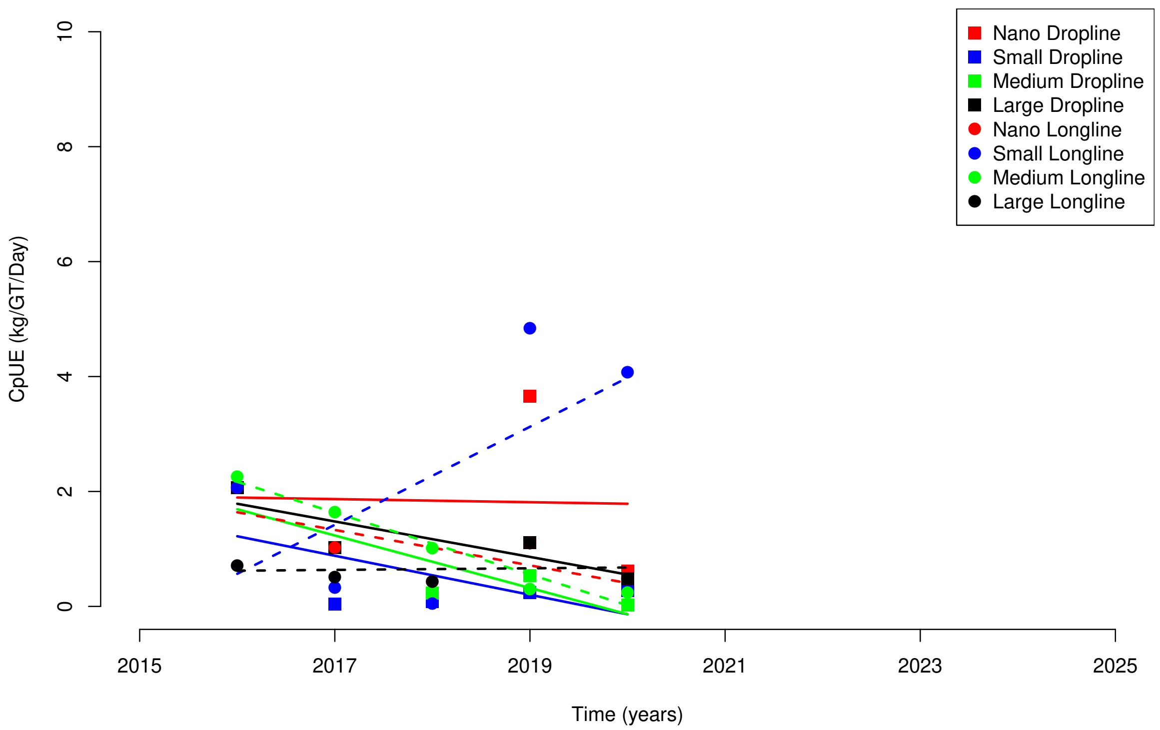


Figure 2.7: Catch per Unit of Effort per calendar year for Pristipomoides multidens in WPP 713 for Dropline and Longline catches by fleet segment.
Solid lines and dashed lines for trends in Dropline CpUE and Longline CpUE respectively.

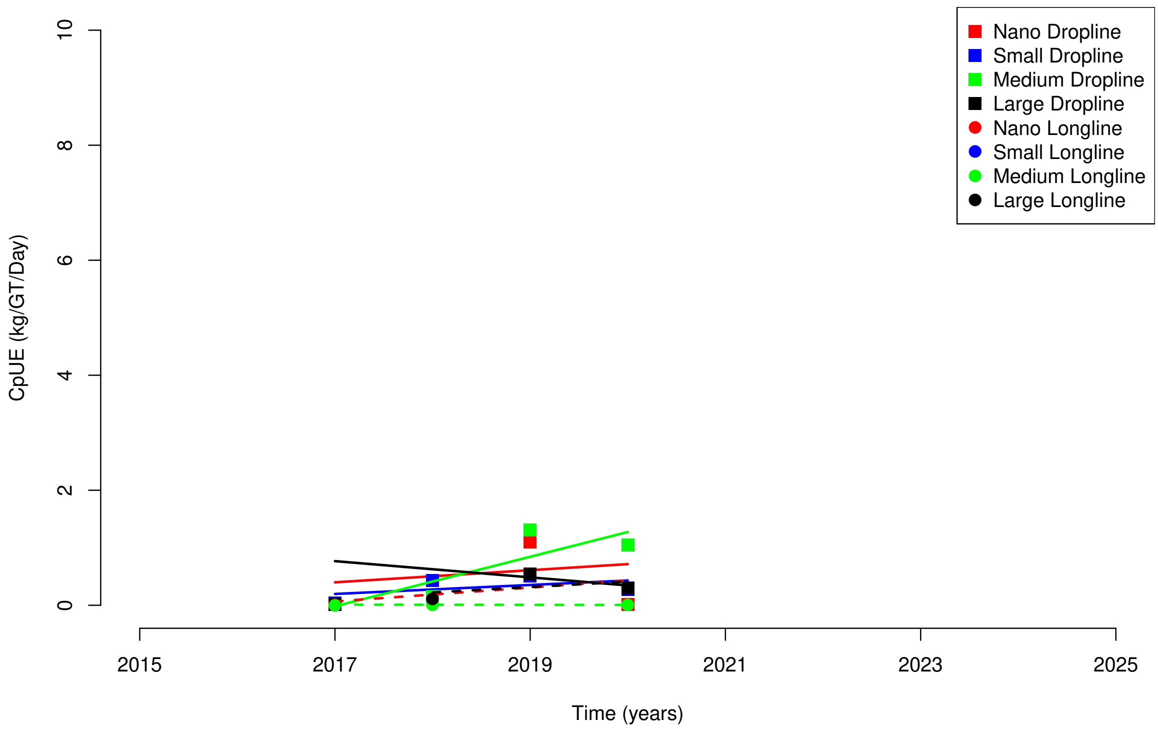


Figure 2.8: Catch per Unit of Effort per calendar year for Etelis sp.
in WPP 713 for Dropline and Longline catches by fleet segment.
Solid lines and dashed lines for trends in Dropline CpUE and Longline CpUE respectively.

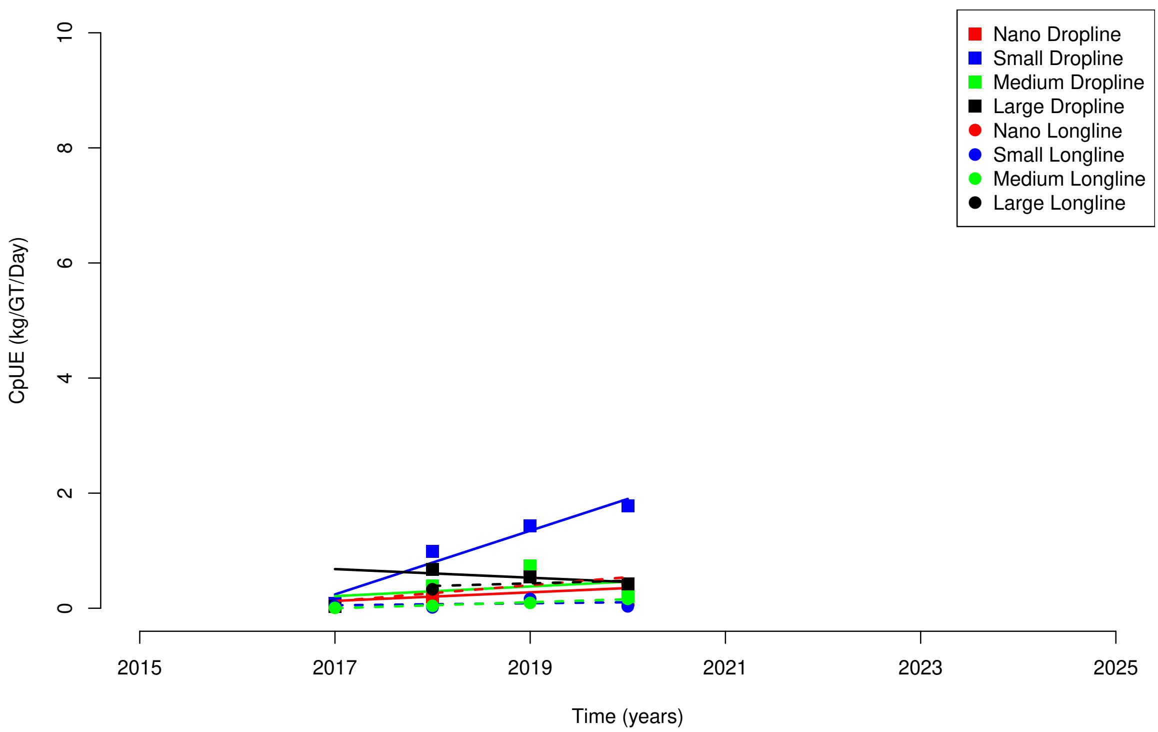


Figure 2.9: Catch per Unit of Effort per calendar year for Caranx sexfasciatus
in WPP 713 for Dropline and Longline catches by fleet segment.
Solid lines and dashed lines for trends in Dropline CpUE and Longline CpUE respectively.

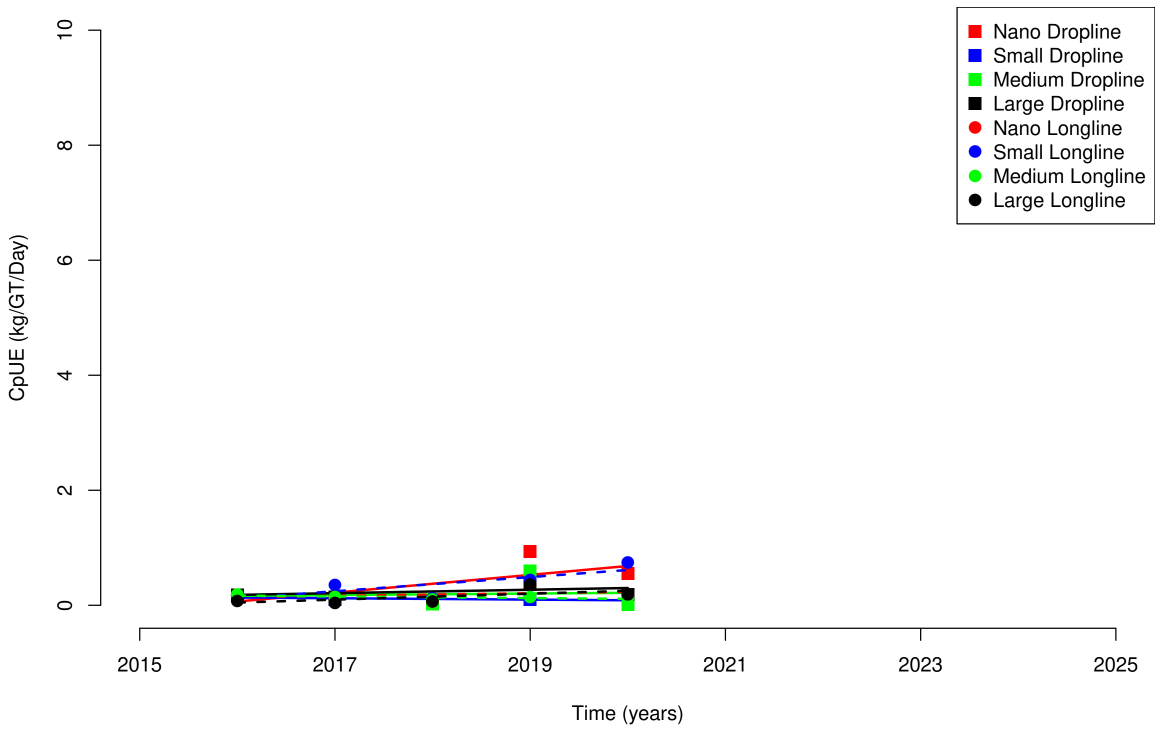


Figure 2.10: Catch per Unit of Effort per calendar year for Pristipomoides typus in WPP 713 for Dropline and Longline catches by fleet segment. Solid lines and dashed lines for trends in Dropline CpUE and Longline CpUE respectively.

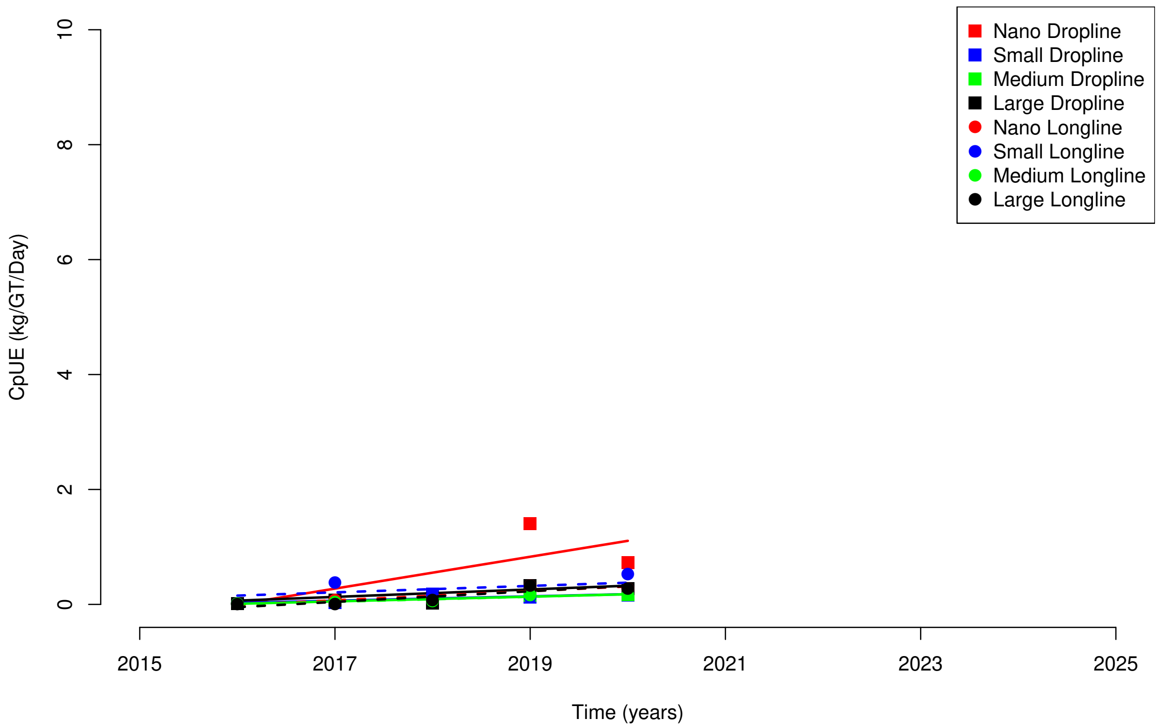


Figure 2.11: Catch per Unit of Effort per calendar year for Lutjanus argentimaculatus in WPP 713 for Dropline and Longline catches by fleet segment. Solid lines and dashed lines for trends in Dropline CpUE and Longline CpUE respectively.

Table 2.14: Total Number and Gross Tonnage of Snapper Fishing Boats by Main Target WPP, Registration Port, Home District (Kabupaten), Boat Size Category and Type of Fishing Gear. (Nano < 5 GT, Small 5-<10 GT, Medium 10-30 GT, Large >30 GT)

Row	WPP	Registration Port	Home District	Boat Size	Gear	N	Total GT
1	571	Desa Sungai Kuruk III	Aceh Tamiang	Nano	Mixgears	2	6
2	571	Desa Sungai Kuruk III	Aceh Tamiang	Small	Mixgears	6	34
3	571	PP. Kuala Cangkoi	Aceh Utara	Nano	Dropline	1	2
4	571	PP. Kuala Cangkoi	Aceh Utara	Nano	Trap	5	10
5	571	PP. Pasiran	Kota Sabang	Nano	Dropline	3	4
6	571	Pangkalan Susu	Langkat	Nano	Mixgears	38	114
7	571	Pelabuhan Ujung Kampung	Langkat	Medium	Mixgears	3	39
8	571	Pelabuhan Ujung Kampung	Langkat	Nano	Mixgears	5	23
9	571	Pelabuhan Ujung Kampung	Langkat	Nano	Trap	1	4
10	571	Pelabuhan Ujung Kampung	Langkat	Small	Mixgears	2	15
11	571	PPI. Pangkalan Brandan	Langkat	Medium	Mixgears	1	10
12	571	PPI. Pangkalan Brandan	Langkat	Nano	Mixgears	33	135
13	571	PPI. Pangkalan Brandan	Langkat	Small	Mixgears	7	42
14	571	PP. Ujung Blang	Lhokseumawe	Nano	Longline	7	11
15	571	Belawan	Medan	Small	Mixgears	10	50
16	571	Teluk Mengkudu	Serdang Bedagai	Small	Longline	5	48
17	571	TPI. Sialang Buah	Serdang Bedagai	Small	Longline	5	48
18	572	Kuala Bubon	Aceh Barat	Medium	Mixgears	2	21
19	572	Kuala Bubon	Aceh Barat	Small	Mixgears	2	14
20	572	PP. Meulaboh	Aceh Barat	Nano	Mixgears	5	17
21	572	PP. Ujoeng Baroh	Aceh Barat	Medium	Mixgears	1	10
22	572	PP. Ujoeng Baroh	Aceh Barat	Nano	Mixgears	1	3
23	572	PP. Ujong Baroeh	Aceh Barat	Nano	Mixgears	3	10
24	572	PP. Ujong Baroeh	Aceh Barat	Small	Dropline	2	13
25	572	PP. Ujong Baroeh	Aceh Barat	Small	Mixgears	18	107
26	572	Susoh	Aceh Barat Daya	Medium	Dropline	1	11
27	572	Susoh	Aceh Barat Daya	Small	Dropline	2	12
28	572	Desa Lampuyang	Aceh Besar	Nano	Dropline	15	22
29	572	PP. Lhok Bengkuang	Aceh Selatan	Nano	Mixgears	10	36
30	572	PP. Lhok Bengkuang	Aceh Selatan	Small	Mixgears	37	236
31	572	PP. Lampulo	Banda Aceh	Nano	Dropline	1	4
32	572	PP. Lampulo	Banda Aceh	Nano	Longline	2	6
33	572	PP. Lampulo	Banda Aceh	Small	Dropline	8	49
34	572	PP. Lampulo	Banda Aceh	Small	Longline	1	6
35	572	PPS Lampulo	Banda Aceh	Small	Dropline	9	63
36	572	PP. Pulau Baai	Bengkulu	Large	Trap	1	31
37	572	PP. Pulau Baai	Bengkulu	Medium	Dropline	2	34
38	572	PP. Pulau Baai	Bengkulu	Medium	Gillnet	7	153
39	572	PP. Pulau Baai	Bengkulu	Medium	Mixgears	5	61
40	572	PP. Pulau Baai	Bengkulu	Nano	Dropline	5	21
41	572	PP. Pulau Baai	Bengkulu	Nano	Mixgears	2	8
42	572	PP. Pulau Baai	Bengkulu	Small	Dropline	23	130
43	572	PP. Pulau Baai	Bengkulu	Small	Gillnet	1	6
44	572	PP. Pulau Baai	Bengkulu	Small	Mixgears	2	12
45	572	PP. Muara Angke	Jakarta	Large	Dropline	1	158
46	572	PP. Sikakap	Kepulauan Mentawai	Nano	Dropline	1	3
47	572	PP. Tuapejat	Kepulauan Mentawai	Medium	Dropline	2	24
48	572	PP. Tuapejat	Kepulauan Mentawai	Small	Dropline	2	18
49	572	PP. Muara Piluk Bakauheni	Lampung	Nano	Longline	14	39
50	572	PP. Muara Piluk Bakauheni	Lampung	Small	Longline	1	5
51	572	Botolakha	Nias	Small	Dropline	25	197
52	572	Helera	Nias	Nano	Mixgears	13	21
53	572	Helera	Nias	Small	Mixgears	2	11
54	572	Teluk Dalam	Nias	Nano	Dropline	5	18
55	572	Muara Padang	Padang	Medium	Dropline	1	12
56	572	Muara Padang	Padang	Medium	Longline	1	11
57	572	Muara Padang	Padang	Nano	Dropline	2	7
58	572	Muara Padang	Padang	Small	Dropline	12	70

Table 2.14: Total Number and Gross Tonnage of Snapper Fishing Boats by Main Target WPP, Registration Port, Home District (Kabupaten), Boat Size Category and Type of Fishing Gear. (Nano $<$ 5 GT, Small 5-$<$10 GT, Medium 10-30 GT, Large $>$30 GT)

Row	WPP	Registration Port	Home District	Boat Size	Gear	N	Total GT
59	572	PP. Bungus	Padang	Medium	Mixgears	1	15
60	572	PP. Bungus	Padang	Small	Longline	1	8
61	572	PP. Muaro	Padang	Medium	Dropline	2	23
62	572	PP. Muaro	Padang	Medium	Longline	1	11
63	572	PP. Muaro	Padang	Medium	Mixgears	2	24
64	572	PP. Muaro	Padang	Small	Dropline	1	5
65	572	PP. Muaro	Padang	Small	Longline	2	19
66	572	PP. Muaro	Padang	Small	Mixgears	4	29
67	572	PP. Labuan	Pandeglang	Small	Dropline	29	152
68	572	PP. Sibolga	Sibolga	Medium	Trap	4	64
69	572	PP. Sibolga	Sibolga	Nano	Dropline	4	14
70	572	PP. Sibolga	Sibolga	Nano	Trap	12	47
71	572	PP. Sibolga	Sibolga	Small	Dropline	3	18
72	572	PP. Sibolga	Sibolga	Small	Trap	6	35
73	573	Desa Alor Kecil	Alor	Nano	Dropline	25	17
74	573	Kedonganan	Badung	Nano	Mixgears	30	56
75	573	PP. Pancer	Banyuwangi	Nano	Dropline	300	306
76	573	Atapupu	Belu	Nano	Dropline	5	6
77	573	PP. Rompo	Bima	Nano	Dropline	50	50
78	573	PP. Sape	Bima	Nano	Dropline	103	170
79	573	PP. Sape	Bima	Nano	Mixgears	109	267
80	573	Jetis	Cilacap	Nano	Longline	30	26
81	573	Pelabuhan Benoa	Denpasar	Medium	Dropline	12	268
82	573	Pelabuhan Benoa	Denpasar	Medium	Longline	1	27
83	573	PP. Tenau Kupang	Denpasar	Medium	Dropline	1	22
84	573	PP. Soroadu	Dompu	Nano	Dropline	27	15
85	573	PP. Soroadu	Dompu	Nano	Longline	11	6
86	573	Pengambengan	Jembrana	Nano	Longline	20	40
87	573	Yeh Kuning	Jembrana	Nano	Longline	150	126
88	573	Pelabuhan Benoa	Kupang	Medium	Dropline	1	27
89	573	PP. Mayangan	Kupang	Medium	Longline	1	29
90	573	PP. Oeba Kupang	Kupang	Nano	Dropline	5	5
91	573	PP. Tenau Kupang	Kupang	Medium	Dropline	21	365
92	573	PP. Tenau Kupang	Kupang	Medium	Longline	2	48
93	573	PP. Tenau Kupang	Kupang	Nano	Dropline	6	22
94	573	PP. Tenau Kupang	Kupang	Small	Dropline	22	174
95	573	Tablolong Kupang	Kupang	Nano	Dropline	11	22
96	573	Desa waijarang	Lembata	Nano	Dropline	20	14
97	573	Tapolango	Lembata	Nano	Mixgears	20	14
98	573	PP. Tanjung Luar	Lombok Timur	Nano	Dropline	30	30
99	573	PP. Tanjung Luar	Lombok Timur	Nano	Longline	50	70
100	573	PP. Tanjung Luar	Lombok Timur	Small	Dropline	1	9
101	573	Pulau Maringkik	Lombok Timur	Small	Dropline	11	93
102	573	TPI Kampung Ujung	Manggarai Barat	Nano	Dropline	60	74
103	573	PP Cikidang	Pangandaran	Small	Gillnet	8	50
104	573	PP. Cikidang	Pangandaran	Nano	Gillnet	3	13
105	573	Batutua Rote	Rote	Nano	Dropline	8	8
106	573	Oesely Rote	Rote	Nano	Dropline	1	1
107	573	Papela Darat	Rote	Nano	Dropline	9	9
108	573	Papela Tanjung	Rote	Nano	Dropline	9	9
109	573	Rote	Rote	Nano	Dropline	4	7
110	573	Sukabumi	Sukabumi	Nano	Dropline	50	50
111	573	Wini	Timor Tengah Utara	Nano	Dropline	7	12
112	711	PP Baturusa Pangkal Batam	Bangka	Small	Trap	4	24
113	711	PP. Sungailiat	Bangka	Small	Dropline	1	6
114	711	PP. Sungailiat	Bangka	Small	Gillnet	11	67
115	711	PP. Sungailiat	Bangka	Small	Mixgears	2	12
116	711	PP. Sungailiat	Bangka	Small	Trap	1	6

Table 2.14: Total Number and Gross Tonnage of Snapper Fishing Boats by Main Target WPP, Registration Port, Home District (Kabupaten), Boat Size Category and Type of Fishing Gear. (Nano < 5 GT, Small 5-<10 GT, Medium 10-30 GT, Large >30 GT)

Row	WPP	Registration Port	Home District	Boat Size	Gear	N	Total GT
117	711	Batam	Batam	Large	Trap	1	34
118	711	Batam	Batam	Medium	Trap	2	56
119	711	Batam	Batam	Small	Dropline	2	12
120	711	Batam	Batam	Small	Trap	2	13
121	711	PP. Tanjung Pandan	Belitung	Medium	Mixgears	2	36
122	711	PP. Tanjung Pandan	Belitung	Medium	Trap	3	63
123	711	PP. Tanjung Pandan	Belitung	Nano	Dropline	77	157
124	711	PP. Tanjung Pandan	Belitung	Nano	Mixgears	75	225
125	711	PP. Tanjung Pandan	Belitung	Nano	Trap	20	71
126	711	PP. Tanjung Pandan	Belitung	Small	Dropline	5	27
127	711	PP. Tanjung Pandan	Belitung	Small	Gillnet	3	16
128	711	PP. Tanjung Pandan	Belitung	Small	Longline	2	11
129	711	PP. Tanjung Pandan	Belitung	Small	Mixgears	10	65
130	711	PP. Tanjung Pandan	Belitung	Small	Trap	46	248
131	711	PP. Manggar Belitung Timur	Belitung Timur	Medium	Dropline	2	21
132	711	PP. Manggar Belitung Timur	Belitung Timur	Medium	Mixgears	1	20
133	711	PP. Manggar Belitung Timur	Belitung Timur	Nano	Dropline	3	11
134	711	PP. Manggar Belitung Timur	Belitung Timur	Nano	Mixgears	1	4
135	711	PP. Manggar Belitung Timur	Belitung Timur	Small	Dropline	4	22
136	711	PP. Manggar Belitung Timur	Belitung Timur	Small	Mixgears	87	481
137	711	PP. Kijang	Bintan	Large	Longline	2	69
138	711	PP. Kijang	Bintan	Medium	Dropline	3	47
139	711	PP. Kijang	Bintan	Medium	Longline	4	78
140	711	PP. Kijang	Bintan	Medium	Trap	245	4709
141	711	PP. Kijang	Bintan	Nano	Mixgears	2	8
142	711	PP. Kijang	Bintan	Nano	Trap	7	29
143	711	PP. Kijang	Bintan	Small	Dropline	10	66
144	711	PP. Kijang	Bintan	Small	Longline	5	36
145	711	PP. Kijang	Bintan	Small	Mixgears	9	58
146	711	PP. Kijang	Bintan	Small	Trap	210	1425
147	711	Moro	Karimun	Small	Trap	1	7
148	711	Tanjung Balai Karimun	Karimun	Medium	Longline	7	163
149	711	PP. Tarempa	Kepulauan Anambas	Nano	Dropline	202	298
150	711	PP. Tarempa	Kepulauan Anambas	Nano	Trap	19	24
151	711	PP. Tarempa	Kepulauan Anambas	Small	Dropline	11	63
152	711	PPI Ladan	Kepulauan Anambas	Nano	Dropline	73	182
153	711	PPI Ladan	Kepulauan Anambas	Small	Dropline	1	5
154	711	Bunguran	Natuna	Nano	Dropline	22	79
155	711	Dermaga Kayu Sededap	Natuna	Nano	Dropline	1	5
156	711	Lagong	Natuna	Nano	Dropline	23	69
157	711	Natuna	Natuna	Large	Longline	3	94
158	711	Natuna	Natuna	Medium	Longline	1	28
159	711	Pelabuhan Midai	Natuna	Medium	Mixgears	4	48
160	711	Pelabuhan Midai	Natuna	Small	Mixgears	1	6
161	711	Pelabuhan Pasir Putih	Natuna	Nano	Dropline	1	2
162	711	Pelabuhan Pering	Natuna	Medium	Dropline	2	30
163	711	Pelabuhan Pering	Natuna	Nano	Dropline	21	78
164	711	Pelabuhan Pering	Natuna	Small	Dropline	1	8
165	711	Pelabuhan Sabang Barat-Midai	Natuna	Medium	Mixgears	1	12
166	711	Pelabuhan Sabang Barat-Midai	Natuna	Small	Mixgears	2	12
167	711	Pelabuhan Tanjung	Natuna	Nano	Dropline	30	59
168	711	Pering	Natuna	Nano	Dropline	1	4
169	711	PP. Pering	Natuna	Small	Dropline	1	5
170	711	PP. Tarempa	Natuna	Medium	Longline	1	18
171	711	Pulau Tiga Natuna	Natuna	Small	Dropline	28	170
172	711	Sepempang	Natuna	Small	Dropline	22	132
173	711	Subi-besar	Natuna	Nano	Dropline	23	69
174	711	Tanjung Balai Karimun	Natuna	Medium	Longline	57	1579

Table 2.14: Total Number and Gross Tonnage of Snapper Fishing Boats by Main Target WPP, Registration Port, Home District (Kabupaten), Boat Size Category and Type of Fishing Gear. (Nano < 5 GT, Small 5-<10 GT, Medium 10-30 GT, Large >30 GT)

Row	WPP	Registration Port	Home District	Boat Size	Gear	N	Total GT
175	711	Teluk Buton	Natuna	Nano	Dropline	26	78
176	711	Pangkal Balam	Pangkal Pinang	Nano	Dropline	2	7
177	711	Pangkal Balam	Pangkal Pinang	Nano	Mixgears	3	12
178	711	Pangkal Balam	Pangkal Pinang	Nano	Trap	1	4
179	711	Pangkal Balam	Pangkal Pinang	Small	Gillnet	1	6
180	711	Pangkal Balam	Pangkal Pinang	Small	Mixgears	5	27
181	711	Pangkal Balam	Pangkal Pinang	Small	Trap	12	67
182	711	PP. Bajomulyo	Pati	Large	Longline	2	125
183	711	PP. Kuala Mempawah	Pontianak	Medium	Trap	2	20
184	711	PP. Kuala Mempawah	Pontianak	Small	Trap	3	19
185	712	PP. Tanjung Pandan	Belitung	Nano	Trap	2	7
186	712	PP. Tanjung Pandan	Belitung	Small	Trap	12	63
187	712	PP. Karangsong	Indramayu	Medium	Longline	11	165
188	712	PP. Karangsong	Indramayu	Small	Longline	1	9
189	712	PP. Cituis	Jakarta	Nano	Mixgears	8	32
190	712	Jepara	Jepara	Medium	Mixgears	4	55
191	712	Jepara	Jepara	Small	Mixgears	1	6
192	712	PP. Karimun Jawa	Jepara	Medium	Mixgears	28	395
193	712	PP. Karimun Jawa	Jepara	Nano	Mixgears	6	21
194	712	PP. Karimun Jawa	Jepara	Small	Mixgears	68	491
195	712	Pulau Parang	Jepara	Medium	Mixgears	5	99
196	712	Pulau Parang	Jepara	Small	Trap	1	7
197	712	PP. Brondong	Lamongan	Medium	Dropline	43	575
198	712	PP. Brondong	Lamongan	Medium	Mixgears	18	314
199	712	PP. Brondong	Lamongan	Nano	Dropline	8	32
200	712	PP. Brondong	Lamongan	Small	Dropline	118	902
201	712	PP. Brondong	Lamongan	Small	Mixgears	2	14
202	712	PP. Paciran	Lamongan	Medium	Dropline	1	16
203	712	PP. Paciran	Lamongan	Medium	Mixgears	22	343
204	712	PP. Bajomulyo	Pati	Large	Longline	42	2117
205	712	PP. Bajomulyo	Pati	Medium	Longline	36	956
206	712	PP. Bajomulyo	Pati	Small	Longline	2	16
207	712	PP. Asem Doyong	Pemalang	Small	Dropline	24	132
208	712	PP. Mayangan	Probolinggo	Medium	Longline	1	29
209	712	Probolinggo	Probolinggo	Large	Longline	1	85
210	712	Situbondo	Situbondo	Nano	Dropline	20	60
211	712	Situbondo	Situbondo	Nano	Longline	20	60
212	712	Desa Masalima	Sumenep	Small	Dropline	10	68
213	712	Desa Masalima	Sumenep	Small	Mixgears	2	16
214	712	Dungkek	Sumenep	Medium	Dropline	1	12
215	712	Dungkek	Sumenep	Small	Dropline	3	22
216	712	Gili Iyang	Sumenep	Small	Dropline	7	51
217	712	Pagerungan Besar	Sumenep	Nano	Longline	1	4
218	712	Pagerungan Besar	Sumenep	Small	Longline	4	25
219	712	Sumenep	Sumenep	Medium	Dropline	2	28
220	712	Sumenep	Sumenep	Nano	Dropline	1	4
221	712	Sumenep	Sumenep	Nano	Longline	1	3
222	712	Sumenep	Sumenep	Small	Dropline	401	3398
223	712	Sumenep	Sumenep	Small	Longline	49	392
224	712	Pagatan	Tanah Bumbu	Small	Dropline	2	10
225	713	PP. Filial Klandasan	Balikpapan	Nano	Dropline	2	8
226	713	PP. Filial Klandasan	Balikpapan	Small	Dropline	23	132
227	713	PP. Klandasan	Balikpapan	Small	Dropline	3	21
228	713	PP. Manggar Baru	Balikpapan	Medium	Dropline	17	303
229	713	PP. Manggar Baru	Balikpapan	Small	Longline	8	44
230	713	PP. Tanjung Pandan	Belitung	Nano	Trap	1	3
231	713	PP. Tanjung Pandan	Belitung	Small	Dropline	1	5
232	713	PP. Tanjung Pandan	Belitung	Small	Trap	4	21

Table 2.14: Total Number and Gross Tonnage of Snapper Fishing Boats by Main Target WPP, Registration Port, Home District (Kabupaten), Boat Size Category and Type of Fishing Gear. (Nano $<$ 5 GT, Small 5-$<$10 GT, Medium 10-30 GT, Large $>$30 GT)

Row	WPP	Registration Port	Home District	Boat Size	Gear	N	Total GT
233	713	Lok Tuan	Bontang	Nano	Dropline	1	1
234	713	Lok Tuan	Bontang	Nano	Mixgears	3	12
235	713	PP. Tanjung Limau	Bontang	Nano	Dropline	5	11
236	713	PP. Tanjung Limau	Bontang	Small	Dropline	4	24
237	713	Tanjung Laut	Bontang	Nano	Dropline	1	1
238	713	Dannuang	Bulukumba	Nano	Mixgears	20	20
239	713	Kalumeme	Bulukumba	Nano	Mixgears	20	20
240	713	Kota Bulukumba	Bulukumba	Nano	Mixgears	300	300
241	713	Para-para	Bulukumba	Small	Dropline	20	120
242	713	PP. Soro Kempo	Dompu	Nano	Longline	300	300
243	713	PP. Labean	Donggala	Nano	Dropline	27	24
244	713	Anawoi	Kolaka	Medium	Trap	5	64
245	713	Gang Kakap, Muara Jawa	Kutai Kartanegara	Nano	Longline	20	60
246	713	Kampung Terusan	Kutai Kartanegara	Small	Longline	10	85
247	713	Kuala Samboja	Kutai Kartanegara	Small	Longline	3	15
248	713	Pantai Biru Kersik	Kutai Kartanegara	Nano	Dropline	16	48
249	713	Semangkok	Kutai Kartanegara	Nano	Dropline	10	31
250	713	Gang Mulia, Kampung Kajang	Kutai Timur	Small	Dropline	1	5
251	713	Maloy	Kutai Timur	Small	Dropline	1	5
252	713	Muara Selangkau	Kutai Timur	Nano	Dropline	40	120
253	713	Majene	Majene	Nano	Mixgears	52	156
254	713	Majene	Majene	Small	Dropline	1	7
255	713	Majene	Majene	Small	Longline	12	84
256	713	Mamuju	Mamuju	Nano	Dropline	31	93
257	713	Mamuju	Mamuju	Small	Dropline	4	20
258	713	PP. Labuhan Bajo	Manggarai Barat	Nano	Dropline	40	15
259	713	PP. Konge	Nagekeo	Nano	Dropline	50	16
260	713	Muara Pasir	Paser	Nano	Longline	10	20
261	713	PP. Bajomulyo	Pati	Large	Longline	3	130
262	713	Kampung Pejala	Penajam Paser Utara	Small	Mixgears	17	85
263	713	Logpond CV. Alas	Penajam Paser Utara	Nano	Dropline	26	78
264	713	Logpond CV. Alas	Penajam Paser Utara	Small	Dropline	4	20
265	713	Logpond SDR	Penajam Paser Utara	Nano	Dropline	14	42
266	713	Muara Tunan	Penajam Paser Utara	Nano	Dropline	40	120
267	713	Nenang	Penajam Paser Utara	Small	Trap	50	253
268	713	PP. Mayangan	Probolinggo	Medium	Longline	1	27
269	713	PP. Kenyamukan	Sangatta	Medium	Dropline	3	32
270	713	PP. Kenyamukan	Sangatta	Nano	Dropline	40	40
271	713	PP. Kenyamukan	Sangatta	Small	Dropline	11	75
272	713	PP. Sangatta	Sangatta	Medium	Dropline	1	10
273	713	PP. Sangatta	Sangatta	Small	Dropline	5	31
274	713	Labuan Sangoro	Sumbawa	Nano	Longline	20	37
275	713	Labuan Sumbawa	Sumbawa	Large	Dropline	1	34
276	713	Labuan Terata	Sumbawa	Nano	Dropline	4	7
277	713	Labuhan Sumbawa	Sumbawa	Medium	Dropline	1	12
278	713	Labuhan Sumbawa	Sumbawa	Small	Dropline	7	36
279	713	Sumbawa	Sumbawa	Nano	Longline	50	50
280	713	PP. Beba	Takalar	Medium	Dropline	26	362
281	713	PP. Beba	Takalar	Medium	Gillnet	14	215
282	713	PP. Beba	Takalar	Medium	Longline	82	1003
283	713	PP. Beba	Takalar	Nano	Longline	1	3
284	713	PP. Paotere	Takalar	Medium	Dropline	1	12
285	713	PP. Paotere	Takalar	Small	Dropline	1	8
286	713	PP. Paotere	Takalar	Small	Longline	3	24
287	714	Kabola	Alor	Nano	Dropline	15	10
288	714	Kokar	Alor	Nano	Dropline	100	88
289	714	Banggai Kepulauan	Banggai Kepulauan	Nano	Dropline	10	10
290	714	Banggai Laut	Banggai Laut	Nano	Dropline	50	50

Table 2.14: Total Number and Gross Tonnage of Snapper Fishing Boats by Main Target WPP, Registration Port, Home District (Kabupaten), Boat Size Category and Type of Fishing Gear. (Nano < 5 GT, Small 5-<10 GT, Medium 10-30 GT, Large >30 GT)

Row	WPP	Registration Port	Home District	Boat Size	Gear	N	Total GT
291	714	Bontosi	Banggai Laut	Nano	Dropline	2	5
292	714	Kasuari	Banggai Laut	Nano	Longline	18	21
293	714	Matanga	Banggai Laut	Nano	Longline	5	4
294	714	Sonit	Banggai Laut	Nano	Longline	3	9
295	714	Tinakin	Banggai Laut	Nano	Dropline	1	1
296	714	PP. Tanjung Pandan	Belitung	Small	Dropline	1	6
297	714	PPI Soropia	Konawe	Medium	Trap	1	12
298	714	PPI Soropia	Konawe	Nano	Trap	2	1
299	714	Labengki	Konawe Utara	Nano	Dropline	4	5
300	714	Labengki	Konawe Utara	Nano	Longline	1	1
301	714	Labengki	Konawe Utara	Nano	Mixgears	5	5
302	714	Batu Lubang	Kota Ambon	Nano	Dropline	30	53
303	714	Asilulu	Maluku Tengah	Nano	Dropline	30	56
304	714	PP. Tulehu	Maluku Tengah	Large	Dropline	1	34
305	714	Kampung Barbar	Maluku Tenggara Barat	Nano	Dropline	6	12
306	714	Pasar Baru Omele Saumlaki	Maluku Tenggara Barat	Nano	Dropline	6	13
307	714	Pasar Baru Omele Saumlaki	Maluku Tenggara Barat	Nano	Longline	1	3
308	714	Pasar Lama Saumlaki	Maluku Tenggara Barat	Nano	Dropline	1	2
309	714	Saumlaki	Maluku Tenggara Barat	Nano	Dropline	3	8
310	714	PP. Kema	Minahasa Utara	Large	Dropline	1	30
311	714	Desa Bahonsuai	Morowali	Nano	Dropline	2	2
312	714	Desa Umbele	Morowali	Nano	Dropline	2	2
313	714	Desa Umbele	Morowali	Nano	Longline	1	1
314	714	Limbo	Pulau Taliabu	Nano	Mixgears	30	18
315	714	Dusun Anauni	Seram Bagian Barat	Nano	Dropline	15	15
316	714	Dusun Anauni	Seram Bagian Barat	Nano	Longline	35	44
317	714	Dusun Huaroa	Seram Bagian Barat	Nano	Dropline	50	74
318	714	Dusun Huhua	Seram Bagian Barat	Nano	Mixgears	20	27
319	714	Dusun Naeselan	Seram Bagian Barat	Nano	Mixgears	20	33
320	714	Dusun Pattinea	Seram Bagian Barat	Nano	Mixgears	50	67
321	714	Dusun Pohon Batu	Seram Bagian Barat	Nano	Dropline	30	43
322	714	Dusun Waisela	Seram Bagian Barat	Nano	Dropline	5	7
323	714	Dusun Waisela	Seram Bagian Barat	Nano	Longline	10	14
324	714	Dusun Wayohong	Seram Bagian Barat	Nano	Dropline	10	12
325	714	Langgur Tual	Tual	Medium	Longline	1	15
326	714	Langgur Tual	Tual	Small	Longline	2	13
327	714	Mangon Tual	Tual	Small	Dropline	1	7
328	714	PP. Tual	Tual	Large	Dropline	1	36
329	714	PP. Tual	Tual	Medium	Dropline	2	47
330	714	PP. Tual	Tual	Medium	Longline	3	62
331	714	PP. Tual	Tual	Nano	Dropline	1	2
332	714	PP. Tual	Tual	Nano	Longline	1	4
333	714	PP. Tual	Tual	Small	Dropline	2	13
334	714	PP. Tual	Tual	Small	Longline	3	18
335	714	Watdek	Tual	Small	Mixgears	5	32
336	714	Binongko	Wakatobi	Medium	Dropline	1	13
337	714	Binongko	Wakatobi	Nano	Dropline	28	16
338	714	Dermaga Desa Wali	Wakatobi	Small	Dropline	1	5
339	714	Desa Lagongga	Wakatobi	Nano	Dropline	7	26
340	714	Desa Lagongga	Wakatobi	Small	Dropline	1	6
341	714	Desa Wali	Wakatobi	Nano	Dropline	2	8
342	714	Pelabuhan Lagelewa	Wakatobi	Nano	Dropline	1	3
343	715	Pagimana	Banggai	Nano	Dropline	3	4
344	715	Pagimana	Banggai	Nano	Mixgears	60	48
345	715	Pangkalaseang	Banggai	Nano	Dropline	10	10
346	715	Kampung Sekar	Fakfak	Nano	Dropline	7	7
347	715	Kampung Sosar, Kokas	Fakfak	Nano	Dropline	7	7
348	715	Kampung Ugar	Fakfak	Nano	Dropline	17	11

Table 2.14: Total Number and Gross Tonnage of Snapper Fishing Boats by Main Target WPP, Registration Port, Home District (Kabupaten), Boat Size Category and Type of Fishing Gear. (Nano $<$ 5 GT, Small 5-$<$10 GT, Medium 10-30 GT, Large $>$30 GT)

Row	WPP	Registration Port	Home District	Boat Size	Gear	N	Total GT
349	715	Pasar Sorpeha	Fakfak	Nano	Dropline	7	17
350	715	PP. Dulan Pokpok	Fakfak	Nano	Dropline	215	206
351	715	PP. Fakfak	Fakfak	Medium	Longline	3	46
352	715	PP. Fakfak	Fakfak	Small	Longline	2	19
353	715	Bacan	Halmahera Selatan	Nano	Dropline	39	18
354	715	Bacan	Halmahera Selatan	Nano	Mixgears	1	0
355	715	Bacan Barat	Halmahera Selatan	Nano	Dropline	6	2
356	715	Bacan Tengah	Halmahera Selatan	Nano	Dropline	35	11
357	715	Bacan Timur	Halmahera Selatan	Nano	Dropline	4	1
358	715	Bacan Utara	Halmahera Selatan	Nano	Dropline	5	2
359	715	Desa Lalei	Halmahera Selatan	Nano	Dropline	29	17
360	715	Gane Barat	Halmahera Selatan	Nano	Dropline	15	5
361	715	Gane Timur Selatan	Halmahera Selatan	Nano	Dropline	40	13
362	715	Kep. Batang Lomang	Halmahera Selatan	Nano	Dropline	12	4
363	715	Kepulauan Joronga	Halmahera Selatan	Nano	Dropline	7	2
364	715	Mandioli Selatan	Halmahera Selatan	Nano	Dropline	13	4
365	715	Mandioli Utara	Halmahera Selatan	Nano	Dropline	17	5
366	715	Puau Obilatu	Halmahera Selatan	Nano	Dropline	10	3
367	715	Pulau Obi	Halmahera Selatan	Nano	Dropline	137	44
368	715	Buli	Halmahera Timur	Nano	Dropline	7	7
369	715	Halmahera Timur	Halmahera Timur	Nano	Dropline	48	78
370	715	Kaimana	Kaimana	Nano	Dropline	53	53
371	715	PU. Kaimana	Kaimana	Large	Longline	2	61
372	715	PU. Kaimana	Kaimana	Medium	Longline	6	101
373	715	PP. Kema	Minahasa Utara	Large	Dropline	8	339
374	715	PP. Kema	Minahasa Utara	Medium	Dropline	12	349
375	715	Desa Pantai Pos, Bula	Seram Bagian Timur	Nano	Dropline	30	50
376	715	Desa Sesar, Bula	Seram Bagian Timur	Nano	Dropline	10	20
377	715	Desa Waru	Seram Bagian Timur	Nano	Dropline	50	90
378	715	Pulau Parang	Seram Bagian Timur	Nano	Dropline	50	92
379	715	Sofifi	Sofifi	Nano	Dropline	10	10
380	715	Jembatan Puri Sorong	Sorong	Medium	Dropline	5	94
381	715	Jembatan Puri Sorong	Sorong	Medium	Mixgears	2	26
382	715	PP. Sorong	Sorong	Medium	Dropline	8	145
383	715	PP. Sorong	Sorong	Medium	Longline	1	17
384	715	PP. Sorong	Sorong	Medium	Trap	9	136
385	715	PP. Sorong	Sorong	Nano	Dropline	7	22
386	715	PP. Sorong	Sorong	Nano	Mixgears	2	6
387	715	PP. Sorong	Sorong	Small	Dropline	4	26
388	715	PP. Sorong	Sorong	Small	Trap	2	18
389	715	Bajugan	Tolitoli	Nano	Dropline	10	6
390	716	Biduk-biduk	Berau	Medium	Dropline	1	22
391	716	Biduk-biduk	Berau	Nano	Dropline	23	69
392	716	Desa Tanjung Batu	Berau	Nano	Dropline	67	201
393	716	Desa Tanjung Batu	Berau	Nano	Trap	1	3
394	716	Giring-giring	Berau	Nano	Dropline	22	66
395	716	Labuan Cermin	Berau	Nano	Dropline	1	3
396	716	Logpond, Batu Putih	Berau	Nano	Dropline	10	16
397	716	P. Derawan	Berau	Nano	Trap	4	7
398	716	Pantai Harapan	Berau	Nano	Dropline	20	60
399	716	Pulau Balikukup, Batu Putih	Berau	Nano	Longline	5	20
400	716	Tanjung Batu	Berau	Nano	Trap	6	18
401	716	Tanjung Batu	Berau	Small	Trap	1	8
402	716	Tanjung Perepat	Berau	Nano	Dropline	5	13
403	716	Teluk Sulaiman	Berau	Nano	Dropline	29	87
404	716	Desa Sampiro	Bolaang Mongondow Utara	Nano	Mixgears	11	4
405	716	Desa Bulontio	Gorontalo Utara	Nano	Dropline	11	5
406	716	Desa Buluwatu	Gorontalo Utara	Nano	Dropline	21	16

Table 2.14: Total Number and Gross Tonnage of Snapper Fishing Boats by Main Target WPP, Registration Port, Home District (Kabupaten), Boat Size Category and Type of Fishing Gear. (Nano < 5 GT, Small 5-<10 GT, Medium 10-30 GT, Large >30 GT)

Row	WPP	Registration Port	Home District	Boat Size	Gear	N	Total GT
407	716	Desa Huntokalo	Gorontalo Utara	Nano	Dropline	10	3
408	716	Desa Tihengo	Gorontalo Utara	Nano	Dropline	26	7
409	716	Desa Dalako Bembanehe	Kepulauan Sangihe	Nano	Dropline	4	2
410	716	Desa Lipang	Kepulauan Sangihe	Nano	Dropline	5	2
411	716	Desa Paruruang	Kepulauan Sangihe	Nano	Dropline	16	8
412	716	Desa Parururang	Kepulauan Sangihe	Nano	Dropline	5	2
413	716	Kampung Lipang	Kepulauan Sangihe	Nano	Dropline	5	1
414	716	Sangihe	Kepulauan Sangihe	Nano	Dropline	2	0
415	716	Tariang Baru	Kepulauan Sangihe	Nano	Longline	4	3
416	716	Buhias	Kepulauan Sitaro	Nano	Dropline	153	124
417	716	Mahongsawang Tagulandang	Kepulauan Sitaro	Nano	Dropline	8	4
418	716	Mongsawang	Kepulauan Sitaro	Nano	Dropline	16	6
419	716	Pulau Biaro	Kepulauan Sitaro	Nano	Dropline	29	7
420	716	Desa Damau	Talaud	Nano	Dropline	8	3
421	716	Desa Makatara	Talaud	Nano	Dropline	20	24
422	716	Desa Makatara, Dusun Bawunia	Talaud	Nano	Dropline	1	1
423	716	Desa Makatara, Dusun Bawunian	Talaud	Nano	Dropline	4	3
424	716	Belakang BRI, Selumit Pantai	Tarakan	Nano	Longline	46	138
425	716	Belakang BRI, Selumit Pantai	Tarakan	Small	Longline	4	20
426	716	Mamburungan Dalam	Tarakan	Nano	Mixgears	48	144
427	717	Biak	Biak	Nano	Dropline	1796	1793
428	717	Desa Nikakamp	Biak	Nano	Dropline	4	7
429	717	Desa Tanjung Barari	Biak	Nano	Dropline	5	4
430	717	Fanindi Pantai	Manokwari	Nano	Dropline	4	10
431	717	Kampung Fanindi	Manokwari	Nano	Dropline	20	21
432	717	Manokwari	Manokwari	Nano	Dropline	6	16
433	717	PP. Sanoba	Nabire	Nano	Dropline	12	30
434	717	Wasior	Teluk Wondama	Nano	Dropline	19	23
435	718	PP. Muara Angke	Jakarta	Large	Dropline	2	97
436	718	PP. Muara Angke	Jakarta	Medium	Dropline	1	30
437	718	PP. Nizam Zachman	Jakarta	Large	Longline	4	205
438	718	Namatota	Kaimana	Large	Longline	6	379
439	718	PP. Kaimana	Kaimana	Large	Longline	1	45
440	718	Dusun Wamar Desa Durjela	Kepulauan Aru	Medium	Longline	4	73
441	718	PP. Bajomulyo	Kepulauan Aru	Large	Gillnet	1	82
442	718	PP. Benjina	Kepulauan Aru	Large	Longline	2	92
443	718	PP. Dobo	Kepulauan Aru	Large	Gillnet	8	527
444	718	PP. Dobo	Kepulauan Aru	Large	Longline	10	596
445	718	PP. Dobo	Kepulauan Aru	Medium	Dropline	93	1658
446	718	PP. Dobo	Kepulauan Aru	Medium	Gillnet	5	121
447	718	PP. Dobo	Kepulauan Aru	Medium	Longline	10	185
448	718	PP. Dobo	Kepulauan Aru	Nano	Dropline	11	30
449	718	PP. Dobo	Kepulauan Aru	Nano	Longline	8	23
450	718	PP. Dobo	Kepulauan Aru	Small	Dropline	7	56
451	718	PP. Dobo	Kepulauan Aru	Small	Longline	1	7
452	718	PP. Kaimana	Kepulauan Aru	Large	Longline	1	51
453	718	PP. Klidang Lor	Kepulauan Aru	Large	Gillnet	1	73
454	718	PP. Mayangan	Kepulauan Aru	Large	Longline	19	1405
455	718	PP. Merauke	Kepulauan Aru	Large	Longline	4	397
456	718	PP. Nizam Zachman	Kepulauan Aru	Large	Gillnet	1	92
457	718	PP. Pekalongan	Kepulauan Aru	Large	Gillnet	1	115
458	718	PU. Dobo	Kepulauan Aru	Large	Gillnet	3	285
459	718	PU. Dobo	Kepulauan Aru	Large	Longline	36	2670
460	718	Saumlaki	Maluku Tenggara Barat	Nano	Dropline	37	109
461	718	Saumlaki	Maluku Tenggara Barat	Small	Dropline	1	5
462	718	Saumlaki	Maluku Tenggara Barat	Small	Longline	5	37
463	718	PP. Bajomulyo	Merauke	Large	Gillnet	1	91
464	718	PP. Merauke	Merauke	Large	Dropline	1	106

Table 2.14: Total Number and Gross Tonnage of Snapper Fishing Boats by Main Target WPP, Registration Port, Home District (Kabupaten), Boat Size Category and Type of Fishing Gear. (Nano < 5 GT, Small 5-$<$10 GT, Medium 10-30 GT, Large $>$30 GT)

Row	WPP	Registration Port	Home District	Boat Size	Gear	N	Total GT
465	718	PP. Merauke	Merauke	Large	Gillnet	48	3873
466	718	PP. Merauke	Merauke	Large	Longline	2	213
467	718	PP. Merauke	Merauke	Medium	Gillnet	5	138
468	718	PP. Nizam Zachman	Merauke	Large	Dropline	5	455
469	718	PP. Nizam Zachman	Merauke	Large	Gillnet	13	841
470	718	PP. Nizam Zachman	Merauke	Large	Longline	1	60
471	718	PP. Poumako	Merauke	Medium	Gillnet	3	88
472	718	PP. Tegal	Merauke	Large	Gillnet	1	148
473	718	PP. Bajomulyo	Mimika	Large	Longline	1	82
474	718	PP. Dobo	Mimika	Large	Gillnet	1	75
475	718	PP. Mayangan	Mimika	Large	Gillnet	1	129
476	718	PP. Merauke	Mimika	Large	Gillnet	2	123
477	718	PP. Merauke	Mimika	Medium	Gillnet	2	49
478	718	PP. Muara Angke	Mimika	Large	Gillnet	1	92
479	718	PP. Nizam Zachman	Mimika	Large	Gillnet	1	88
480	718	PP. Paumako	Mimika	Large	Gillnet	2	60
481	718	PP. Paumako	Mimika	Medium	Gillnet	2	58
482	718	PP. Pekalongan	Mimika	Large	Gillnet	1	112
483	718	PP. Pomako	Mimika	Medium	Gillnet	1	16
484	718	PP. Poumako	Mimika	Large	Gillnet	3	90
485	718	PP. Poumako	Mimika	Medium	Gillnet	15	387
486	718	PP. Poumako	Mimika	Small	Gillnet	1	8
487	718	PP. Bajomulyo	Pati	Large	Longline	2	217
488	718	Bagansiapiapi	Probolinggo	Large	Longline	1	40
489	718	PP. Dobo	Probolinggo	Large	Longline	2	142
490	718	PP. Mayangan	Probolinggo	Large	Gillnet	3	124
491	718	PP. Mayangan	Probolinggo	Large	Longline	33	2095
492	718	PP. Mayangan	Probolinggo	Medium	Longline	7	199
493	718	Probolinggo	Probolinggo	Large	Longline	19	1408
494	718	PP. Lappa	Sinjai	Large	Dropline	1	35
495	718	PP. Lappa	Sinjai	Medium	Dropline	10	233
496	718	Timika	Timika	Medium	Longline	3	88
497	718	PP. Bajomulyo	Tual	Large	Longline	1	87
498	718	PP. Tual	Tual	Medium	Dropline	1	28
499	718	PP. Tual	Tual	Nano	Longline	1	4
500	718	PP. Tual	Tual	Small	Dropline	1	6
		TOTAL				10329	61081

2.5 I-Fish Community

I-Fish Community only stores data that are relevant to fisheries management, whereas data on processed volume and sales, from the Smart Weighing and Measuring System, remain on servers at processing companies. Access to the I-Fish Community database is controlled by user name and password. I-Fish Community has different layers of privacy, which is contingent on the user's role in the supply chain. For instance, boat owners may view exact location of their boats, but not of the boats of other owners.

I-Fish Community has an automatic length-frequency distribution reporting system for length-based assessment of the fishery by species. The database generates length frequency distribution graphs for each species, together with life history parameters including length at maturity (Lmat), optimum harvest size (Lopt), asymptotic length-(Linf), and maximum total length (Lmax). Procedures for estimation of these length based life history characteristics are explained in the "Guide to Length Based Stock Assessment" (Mous et al., 2019). The data base also includes size limits used in the trade. These "trade limit" lengths are derived from general buying behavior (minimal weight) of processing companies. The weights are converted into lengths by using species-specific length- weight relationships.

Each length frequency distribution is accompanied by an automated length-based assessment on current status of the fishery by species. Any I-Fish Community user can access these graphs and the conclusions from the assessments. The report produces an assessment for the 50 most abundant species in the fishery, based on complete catches from the most recent complete calendar year (to ensure full year data sets). The graphs show the position of the catch length frequency distributions relative to various life history parameter values and trading limits for each species. Relative abundance of specific size groups is plotted for all years for which data are available, to indicate trends in status by species.

Immature fish, small mature fish, large mature fish, and a subset of large mature fish, namely "mega-spawners", which are fish larger than 1.1 times the optimum harvest size (Froese 2004), make up the specific size groups used in our length based assessment. For all fish of each species in the catch, the percentage in each category is calculated for further use in the length based assessment. These percentages are calculated and presented as the first step in the length based assessment as follows: W% is immature (smaller than the length at maturity), X% is small matures (at or above size at maturity but smaller than the optimum harvest size), and Y% is large mature fish (at or above optimum harvest size). The percentage of mega-spawners is Z%.

The automated assessment comprises of six elements from the catch length frequencies. These elements all work with length based indicators of various kinds to draw conclusions from species specific length frequencies in the catch.

1. Minimum size as traded compared to length and maturity.

We use a comparison between the trade limit (minimum size accepted by the trade) and the size at maturity as an indicator for incentives from the trade for either unsustainable targeting of juveniles or for more sustainable targeting of mature fish that have spawned at least once. We consider a trade limit at 10% below or above the length at maturity to be significantly different from the length at maturity and we consider trade limits to provide incentives for targeting of specific sizes of fish through price differentiation.

IF "TradeLimit" is lower than 0.9 * L-mat THEN: "The trade limit is significantly lower than the length at first maturity. This means that the trade encourages capture of immature fish, which impairs sustainability. Risk level is high."

ELSE, IF "TradeLimit" is greater than or equal to 0.9 * L-mat AND "TradeLimit" is lower than or equal to 1.1 * L-mat THEN: "The trade limit is about the same as the length at first maturity. This means that the trade puts a premium on fish that have spawned at least once, which improves sustainability of the fishery. Risk level is medium."

ELSE, IF "TradeLimit" is greater than 1.1 * L-mat THEN: "The trade limit is significantly higher than length at first maturity. This means that the trade puts a premium on fish that have spawned at least once. The trade does not cause any concern of recruitment overfishing for this species. Risk level is low."

2. Proportion of immature fish in the catch.

With 0% immature fish in the catch as an ideal target (Froese, 2004), a target of 10% or less is considered a reasonable indicator for sustainable (or safe) harvesting (Fujita et al., 2012; Vasilakopoulos et al., 2011). Zhang et al. (2009) consider 20% immature fish in the catch as an indicator for a fishery at risk, in their approach to an ecosystem based fisheries assessment. Results from meta-analysis over multiple fisheries showed stock status over a range of stocks to fall below precautionary limits at 30% or more immature fish in the catch (Vasilakopoulos et al., 2011). The fishery is considered highly at risk when more than 50% of the fish in the catch are immature (Froese et al, 2016).

IF "% immature" is lower than or equal to 10% THEN: "At least 90% of the fish in the catch are mature specimens that have spawned at least once before they were caught. The fishery does not depend on immature size classes for this species and is considered safe for this indicator. This fishery will not be causing overfishing through over harvesting of juveniles for this species. Risk level is low."

ELSE, IF "% immature" is greater than 10% AND "% immature" is lower than or equal to 20% THEN: "Between 10% and 20% of the fish in the catch are juveniles that have not yet reproduced. There is no immediate concern in terms of overfishing through over harvesting of juveniles, but the fishery needs to be monitored closely for any further increase in this indicator and incentives need to be geared towards targeting larger fish. Risk level is medium."

ELSE, IF "% immature" is greater than 20% AND "% immature" is lower than or equal to 30% THEN: "Between 20% and 30% of the fish in the catch are specimens that have not yet reproduced. This is reason for concern in terms of potential overfishing through overharvesting of juveniles, if fishing pressure is high and percentages immature fish would further rise. Targeting larger fish and avoiding small fish in the catch will promote a sustainable fishery. Risk level is medium."

ELSE, IF "% immature" is greater than 30% AND "% immature" is lower than or equal to 50% THEN: "Between 30% and 50% of the fish in the catch are immature and have not had a chance to reproduce before capture. The fishery is in immediate danger of overfishing through overharvesting of juveniles, if fishing pressure is high. Catching small and immature fish needs to be actively avoided and a limit on overall fishing pressure is warranted. Risk level is high."

ELSE, IF "% immature" is greater than 50% THEN: "The majority of the fish in the catch have not had a chance to reproduce before capture. This fishery is most likely overfished already if fishing mortality is high for all size classes in the population. An immediate shift away from targeting juvenile fish and a reduction in overall fishing pressure is essential to prevent collapse of the stock. Risk level is high."

3. Current exploitation level.

We use the current exploitation level expressed as the percentage of fish in the catch below the optimum harvest size as an indicator for fisheries status. We consider a proportion of 65% of the fish (i.e. the vast majority in numbers) in the catch below the optimum harvest size as an indicator for growth overfishing. We also consider a majority in the catch around or above the optimum harvest size as an indicator for minimizing the impact of fishing (Froese et al., 2016). This indicator will be achieved when less than 50% of the fish in the catch are below the optimum harvest size.

IF "% immature + % small mature" is greater than or equal to 65% THEN: "The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high."

ELSE, IF "% immature + % small mature" is lower than or equal to 50% THEN: "The majority of the catch consists of size classes around or above the optimum harvest size. This means that the impact of the fishery is minimized for this species. Potentially higher yields of this species could be achieved by catching them at somewhat smaller size, although capture of smaller specimen may take place already in other fisheries. Risk level is low."

ELSE, IF "% immature + % small mature" is greater than 50% AND "% immature + % small mature" is lower than 65% THEN: "The bulk of the catch includes age groups that have just matured and are about to achieve their full growth potential. This indicates that the fishery is probably at least being fully exploited. Risk level is medium."

4. Proportion of mega spawners in the catch.

Mega spawners are fish larger than 1.1 times the optimum harvest size. We consider a proportion of 30% or more mega spawners in the catch to be a sign of a healthy population (Froese, 2004), whereas lower proportions are increasingly leading to concerns, with proportions below 20% indicating great risk to the fishery.

IF "% mega spawners" is greater than 30% THEN: "More than 30% of the catch consists of mega spawners which indicates that this fish population is in good health unless large amounts of much smaller fish from the same population are caught by other fisheries. Risk level is low."

ELSE, IF "% mega spawners" is greater than 20% AND "% mega spawners" is lower than or equal to 30% THEN: "The percentage of mega spawners is between 20 and 30%. There is no immediate reason for concern, though fishing pressure may be significantly reducing the percentage of mega-spawners, which may negatively affect the reproductive output of this population. Risk level is medium."

ELSE, IF "% mega spawners" is lower than or equal to 20%, THEN: "Less than 20% of the catch comprises of mega spawners. This indicates that the population may be severely affected by the fishery, and that there is a substantial risk of recruitment overfishing through over harvesting of the mega spawners, unless large numbers of mega spawners would be surviving at other habitats. There is no reason to assume that this is the case and therefore a reduction of fishing effort may be necessary in this fishery. Risk level is high.

5. Spawning Potential Ratio.

As an indicator for Spawning Potential Ratio (SPR, Quinn and Deriso, 1999), we used the estimated spawning stock biomass divided by the spawning stock biomass of that population if it would have been pristine (see, for example, Meester et al 2001). We calculated SPR on a per-recruit basis from life-history parameters Z, F, K (von Bertalanffy), and Linf. We estimated the instantaneous total mortality (Z) from the equilibrium Beverton-Holt estimator from length data using Ehrhardt and Ault (1992) bias-correction, implemented through the function bheq2 of the R Fishmethods package.

We estimated the natural rate of mortality (M) using Froese and Pauly (2000) empirical formula with asymptotic length as estimated by species and an ambient water temperature at fishing depth estimated at about 20 degrees Celcius. With an asymptotic length for a snapper of about 80cm this results in an M of about 0.4, which aligns well with the mean of reported values from the literature (Martinez-Andrade, 2003). The fishing mortality F follows as the difference between total and natural mortality. We estimated K from Lopt and M and Linf, using the equation presented in Froese and Binohlan 2000: K = M*Lopt / 3*(Linf-Lopt).

In a perfect world, fishery biologists would know what the appropriate SPR should be for every harvested stock based on the biology of that stock. Generally, however, not enough is known about managed stocks to be so precise. However, studies show that some stocks (depending on the species of fish) can maintain themselves if the spawning stock biomass per recruit can be kept at 20 to 35% (or more) of what it was in the un-fished stock. Lower values of SPR may lead to severe stock declines (Wallace and Fletcher, 2001). Froese et al. (2016) considered a total population biomass B of half the pristine population biomass Bo to be the lower limit reference point for stock size, minimizing the impact of fishing. Using SPR and B/Bo estimates from our own data set, this Froese et al. (2016) lower limit reference point correlates with an SPR of about 40%, not far from but slightly more conservative than the Wallace and Fletcher (2001) reference point. We chose an SPR of 40% as our reference point for low risk and after similar comparisons we consider and SPR between 25% and 40% to represent a medium risk situation.

IF "SPR" is lower than 25% THEN: "SPR is less than 25%. The fishery probably over-exploits the stock, and there is a substantial risk that the fishery will cause severe decline of the stock if fishing effort is not reduced. Risk level is high."

ELSE, IF "SPR" is greater than or equal to 25% AND "SPR" is lower than 40% THEN: "SPR is between 25% and 40%. The stock is heavily exploited, and there is some risk that the fishery will cause further decline of the stock. Risk level is medium."

ELSE, IF "SPR" is greater than or equal to 40% THEN: "SPR is more than 40%. The stock is probably not over exploited, and the risk that the fishery will cause further stock decline is small. Risk level is low."

3 Fishing grounds and traceability

Fish landings made at ports in any specific WPP are not necessarily originating from fishing grounds within that same WPP, and this is especially true for snappers, groupers and emperors landed and processed in South Sulawesi, on the coast of WPP 713 and in Java, on the coast of WPP 712. At an even larger scale the issue of landings originating from multiple WPP is illustrated by the fish that are processed in major processing centres like Makassar. These fish commonly originate from a number of different fleets that can operate throughout the waters of Central and Eastern Indonesia in WPP 712, WPP 713, WPP 714 and WPP 715.

The current report with length based stock assessments for groupers, snappers, emperors and grunts in WPP 713 is based on catches that were actually made on WPP 713 fishing grounds only, regardless of vessel origin or landing place. Some of these fish were caught by fleets from Java for example, and processed in Surabaya or Probolinggo, but caught within WPP 713 boundaries. SPOT Trace tracking devices on cooperating vessels indicate where catches are actually made, as dates on CODRS images can be related to locations of fishing vessels on the fishing grounds.

Even without linking SPOT locations to CODRS data it is possible to distinguish between steaming and fishing activity, when SPOT data are plotted on the maps of the fishing grounds (Figures 3.1 to 3.3). Catches are allocated in our analysis to a specific WPP when SPOT data indicate that the vessel was actually (mostly) fishing in that particular WPP during the trip that the catches were photographed as CODRS images.

Fishing vessels from many home ports around the Makassar Strait (Figures 3.4 to 3.6) operate in WPP 713 as well as in neighbouring WPP like WPP 712. The Spot Trace data from the Java Sea and Makassar Strait snapper fisheries illustrate that effective management by WPP is only possible in close coordination with fisheries management in the neighbouring WPP, and in neighbouring provinces from where fishing fleets originate.

Coordination of management across WPP boundaries is especially important when fishing grounds are continues across those boundaries, with fish stocks spread over multiple WWP, and when fishing fleets freely move across WPP boundaries to target these stocks. In the case of the snapper fisheries in WPP 712 and WPP 713 for example, many vessels are fishing right around the border separating these two fisheries management areas, on the slope from the Java Sea into the deeper Makassar Strait, regularly fishing in both these WPP, sometimes even within single fishing trips.

Potential IUU issues related to fish landed at ports in WPP 713 include the illegal operation by various fleets inside Marine Protected Areas in Central and Eastern Indonesia. Additional issues include the under marking of medium scale vessels to below 30GT and issues related to the licensing of the various fleets for various WPP. All this needs to be discussed with fishing boat captains, fish processors and traders, to prevent issues of supply line "pollution" with IUU fish. Maps with projections of SPOT trace data that illustrate the fishing grounds can be helpful tools in support of those discussions.

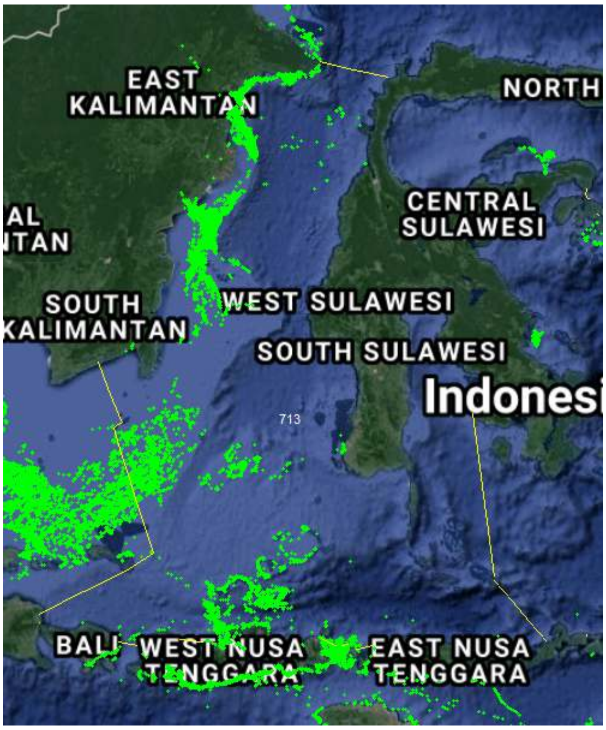


Figure 3.1: Fishing positions of dropliners participating in the CODRS program over the years 2014 - 2019 in WPP 713, as reported by Spot Trace. Reported positions during steaming, anchoring, or docking are excluded from this map.

Figure 3.2: Fishing positions of longliners participating in the CODRS program over the years 2014 - 2019 in WPP 713, as reported by Spot Trace. Reported positions during steaming, anchoring, or docking are excluded from this map.

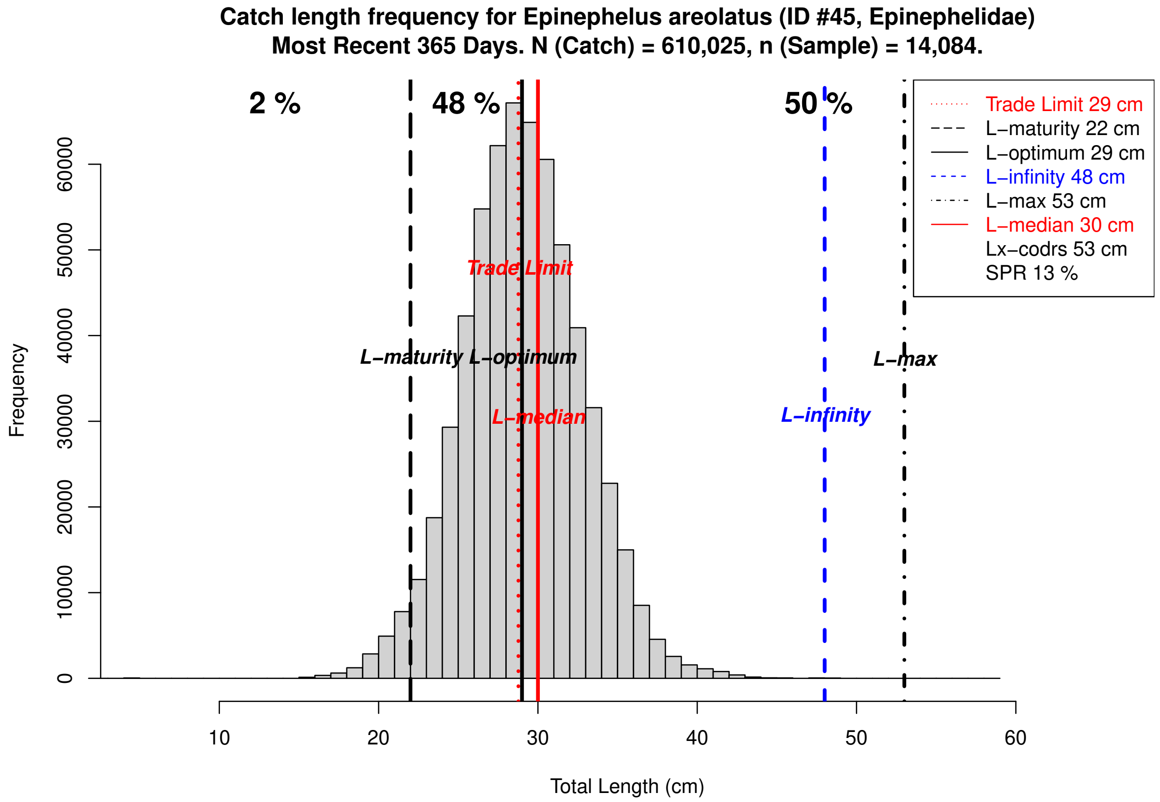
Figure 3.3: Fishing positions of vessels applying more than one gear, participating in the CODRS program over the years 2014 - 2019 in WPP 713, as reported by Spot Trace. Gears used by the vessels in this group are a combination of droplines, longlines, traps, and gillnets. Reported positions during steaming, anchoring, or docking are excluded from this map.

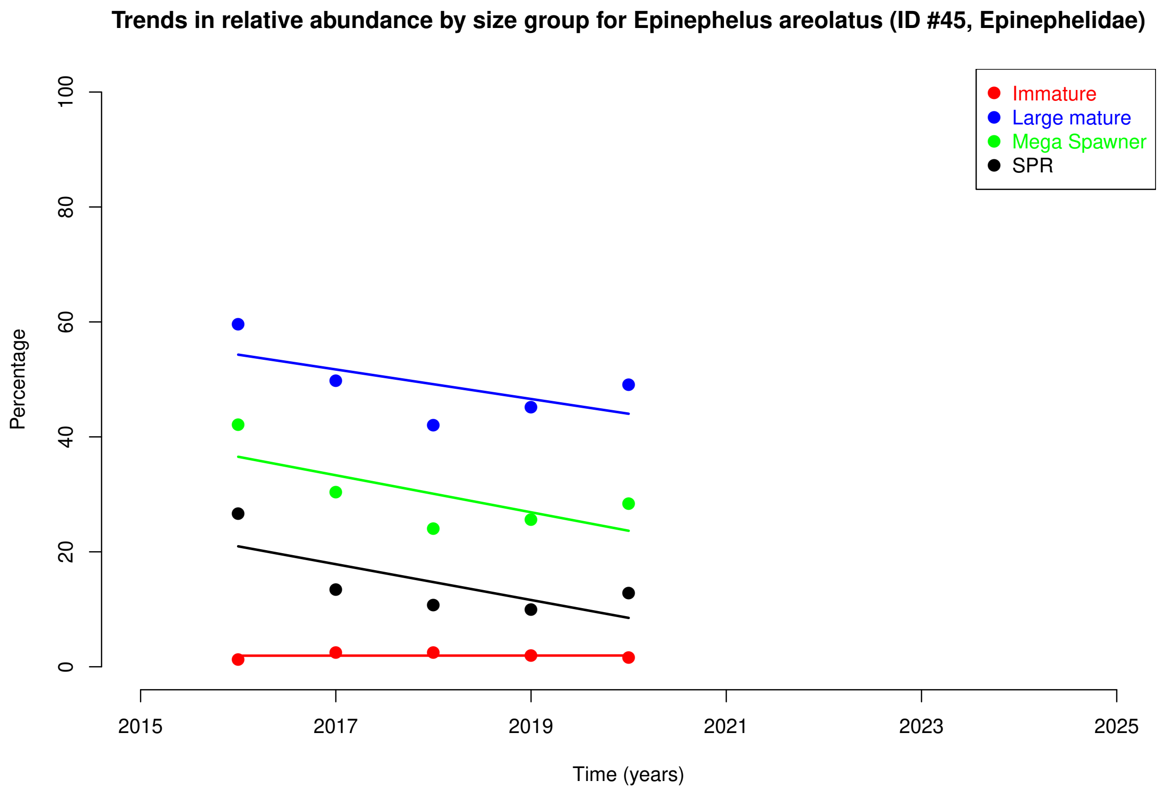
Figure 3.4: A typical snapper fishing boat from Galesong, Takalar, Sulawesi Selatan, operating in the Makassar Strait (WPP 713) and on nearby fishing grounds.

Figure 3.5: A typical snapper fishing boat from Probolinggo, Jawa Timur, operating in the Makassar Strait (WPP 713) and on nearby fishing grounds.

Figure 3.6: A typical snapper fishing boat from Balikpapan, Kalimantan Timur, operating in the Makassar Strait (WPP 713) and on nearby fishing grounds.

4 Length-based assessments of Top 20 most abundant species in CODRS samples including all years in WPP 713





The percentages of Epinephelus areolatus (ID #45, Epinephelidae) in most recent 365 days.
N (Catch) =610,025, n (Sample) = 14,084
Immature (< 22cm): 2%
Small mature (>= 22cm, < 29cm): 48%
Large mature (>= 29cm): 50%
Mega spawner (>= 31.9cm): 30% (subset of large mature fish)
Spawning Potential Ratio: 13 %

The trade limit is significantly higher than length at first maturity. This means that the trade puts a premium on fish that have spawned at least once. The trade does not cause any concern of recruitment overfishing for this species. Risk level is low.

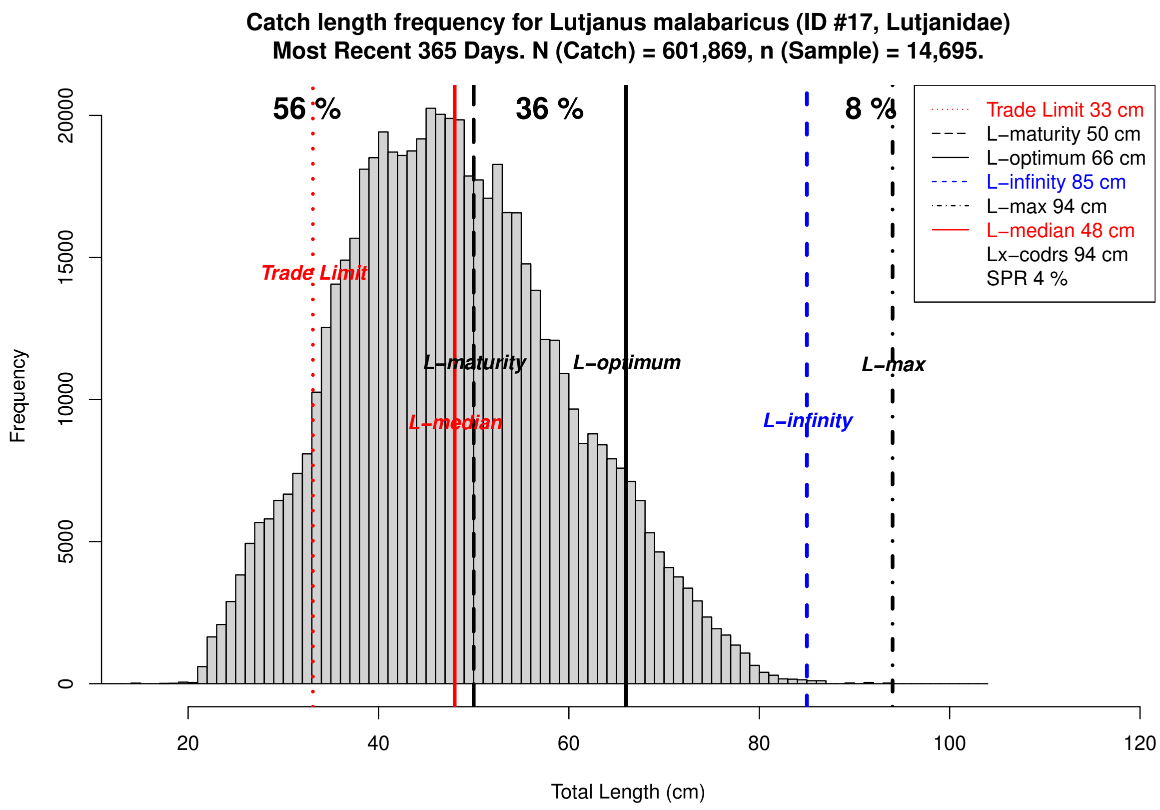
At least 90% of the fish in the catch are mature specimens that have spawned at least once before they were caught. The fishery does not depend on immature size classes for this species and is considered safe for this indicator. This fishery will not be causing overfishing through over harvesting of juveniles for this species. Risk level is low.

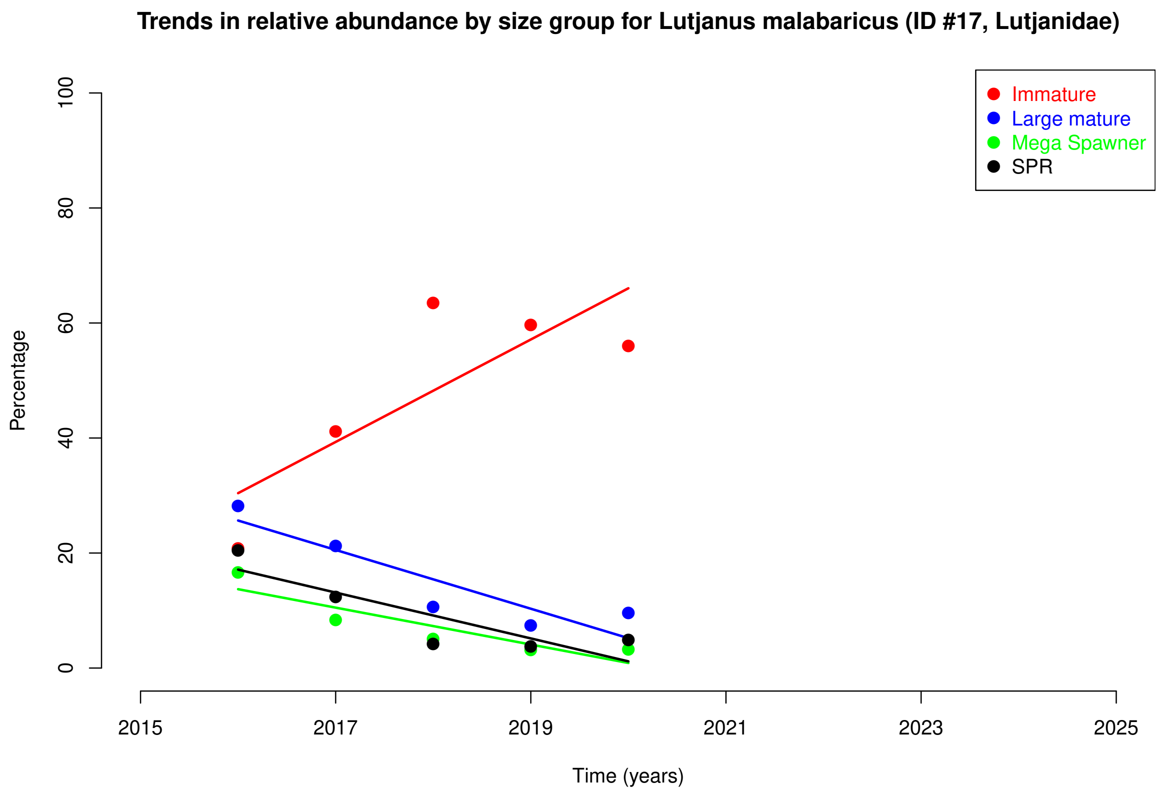
The majority of the catch consists of size classes around or above the optimum harvest size. This means that the impact of the fishery is minimized for this species. Potentially higher yields of this species could be achieved by catching them at somewhat smaller size, although capture of smaller specimen may take place already in other fisheries. Risk level is low.

The percentage of mega spawners is between 20 and 30%. There is no immediate reason for concern, though fishing pressure may be significantly reducing the percentage of mega-spawners, which may negatively affect the reproductive output of this population. Risk level is medium.

SPR is less than 25%. The fishery probably over-exploits the stock, and there is a substantial risk that the fishery will cause severe decline of the stock if fishing effort is not reduced. Risk level is high.

Trends in relative abundance by size group for Epinephelus areolatus (ID #45, Epinephelidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature no trend over recent years, situation stable. P: 0.970
% Large Mature falling over recent years, situation deteriorating. P: 0.272
% Mega Spawner falling over recent years, situation deteriorating. P: 0.177
% SPR falling over recent years, situation deteriorating. P: 0.168


Catch length frequency for Lutjanus malabaricus (ID #17, Lutjanidae)
Most Recent 365 Days. N (Catch) = 601,869, n (Sample) = 14,695.
56 %
36 %
8 %
Trade Limit 33 cm
L−maturity 50 cm
L−optimum 66 cm
L−infinity 85 cm
L−max 94 cm
L−median 48 cm
Lx−codrs 94 cm
SPR 4 %
Trade Limit
L−maturity
L−optimum
L−max
L−median
L−infinity
Frequency
0
5000
10000
15000
20000
20
40
60
80
100
120
Total Length (cm)


Trends in relative abundance by size group for Lutjanus malabaricus (ID #17, Lutjanidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
0
20
40
60
80
100
2015
2017
2019
2021
2023
2025
Time (years)

The percentages of Lutjanus malabaricus (ID #17, Lutjanidae) in most recent 365 days.
N (Catch) =601,869, n (Sample) = 14,695
Immature (< 50cm): 56%
Small mature (>= 50cm, < 66cm): 36%
Large mature (>= 66cm): 8%
Mega spawner (>= 72.6cm): 3% (subset of large mature fish)
Spawning Potential Ratio: 4 %

The trade limit is significantly lower than the length at first maturity. This means that the trade encourages capture of immature fish, which impairs sustainability. Risk level is high.

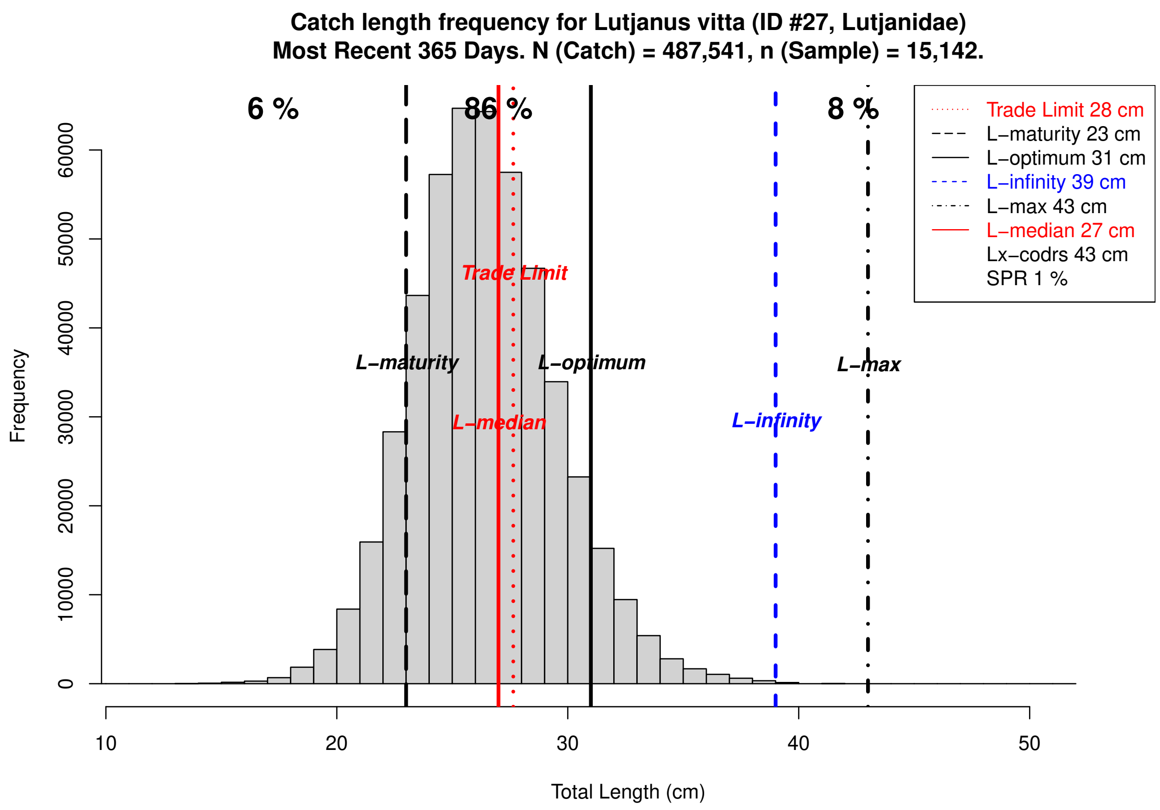
The majority of the fish in the catch have not had a chance to reproduce before capture. This fishery is most likely overfished already if fishing mortality is high for all size classes in the population. An immediate shift away from targeting juvenile fish and a reduction in overall fishing pressure is essential to prevent collapse of the stock. Risk level is high.

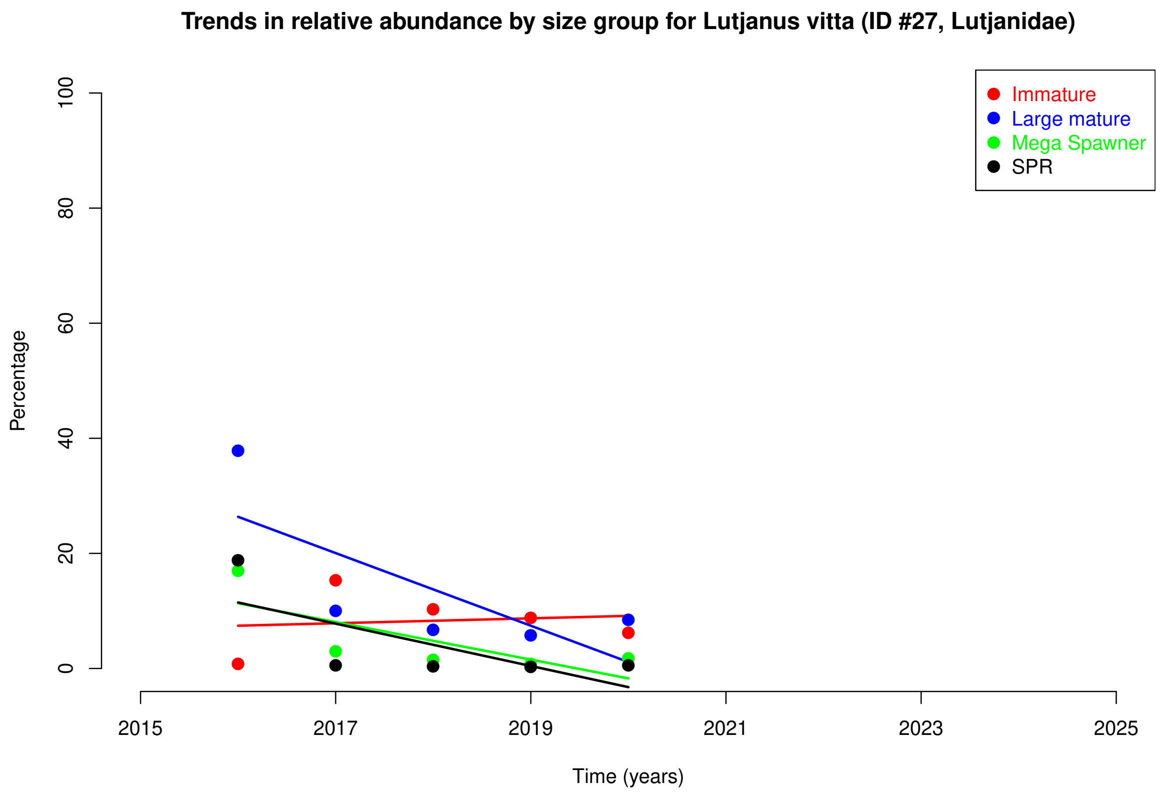
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

Less than 20% of the catch comprises of mega spawners. This indicates that the population may be severely affected by the fishery, and that there is a substantial risk of recruitment overfishing through over harvesting of the mega spawners, unless large numbers of mega spawners would be surviving at other habitats. There is no reason to assume that this is the case and therefore a reduction of fishing effort may be necessary in this fishery. Risk level is high.

SPR is less than 25%. The fishery probably over-exploits the stock, and there is a substantial risk that the fishery will cause severe decline of the stock if fishing effort is not reduced. Risk level is high.

Trends in relative abundance by size group for Lutjanus malabaricus (ID #17, Lutjanidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature rising over recent years, situation deteriorating. P: 0.101
% Large Mature falling over recent years, situation deteriorating. P: 0.034
% Mega Spawner falling over recent years, situation deteriorating. P: 0.038
% SPR falling over recent years, situation deteriorating. P: 0.056


Catch length frequency for Lutjanus vitta (ID #27, Lutjanidae)
Most Recent 365 Days. N (Catch) = 487,541, n (Sample) = 15,142.
6 %
86 %
8 %
Trade Limit 28 cm
L–maturity 23 cm
L–optimum 31 cm
L–infinity 39 cm
L–max 43 cm
L–median 27 cm
Lx–codrs 43 cm
SPR 1 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
Frequency
Total Length (cm)


Trends in relative abundance by size group for Lutjanus vitta (ID #27, Lutjanidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
Time (years)

The percentages of Lutjanus vitta (ID #27, Lutjanidae) in most recent 365 days.
N (Catch) =487,541, n (Sample) = 15,142
Immature (< 23cm): 6%
Small mature (>= 23cm, < 31cm): 86%
Large mature (>= 31cm): 8%
Mega spawner (>= 34.1cm): 1% (subset of large mature fish)
Spawning Potential Ratio: 1 %

The trade limit is significantly higher than length at first maturity. This means that the trade puts a premium on fish that have spawned at least once. The trade does not cause any concern of recruitment overfishing for this species. Risk level is low.

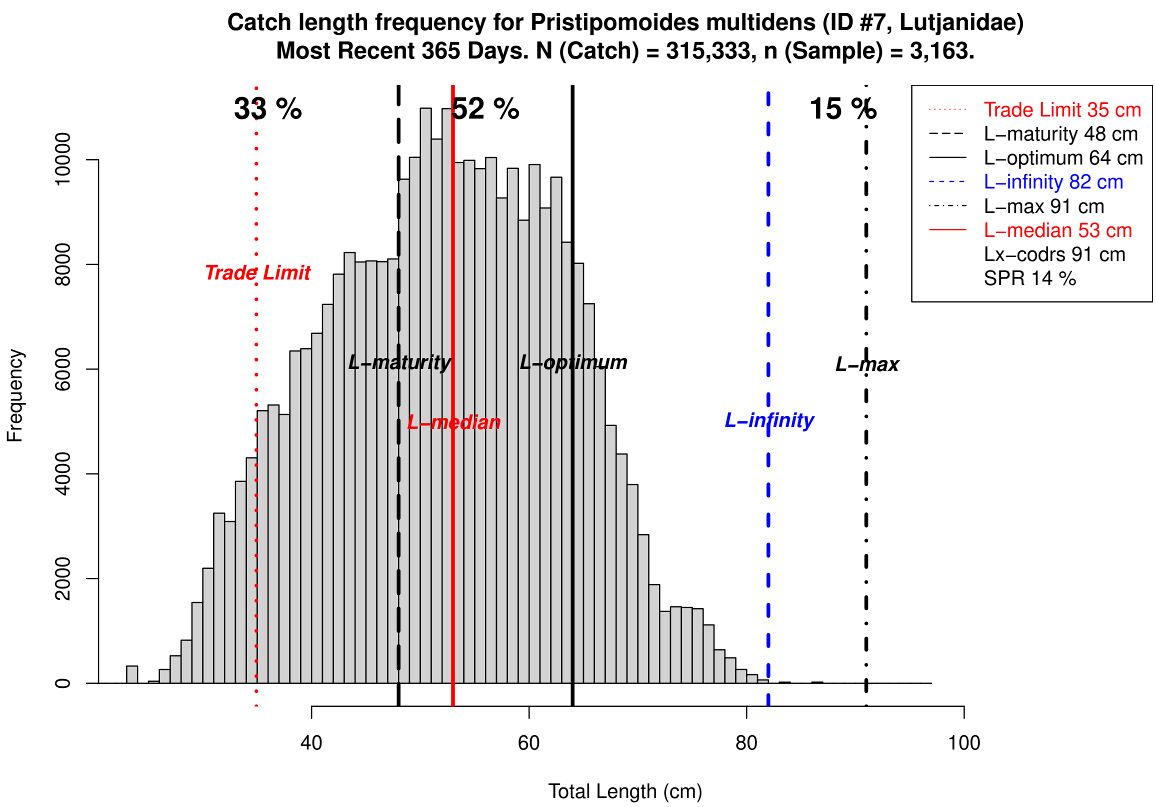
At least 90% of the fish in the catch are mature specimens that have spawned at least once before they were caught. The fishery does not depend on immature size classes for this species and is considered safe for this indicator. This fishery will not be causing overfishing through over harvesting of juveniles for this species. Risk level is low.

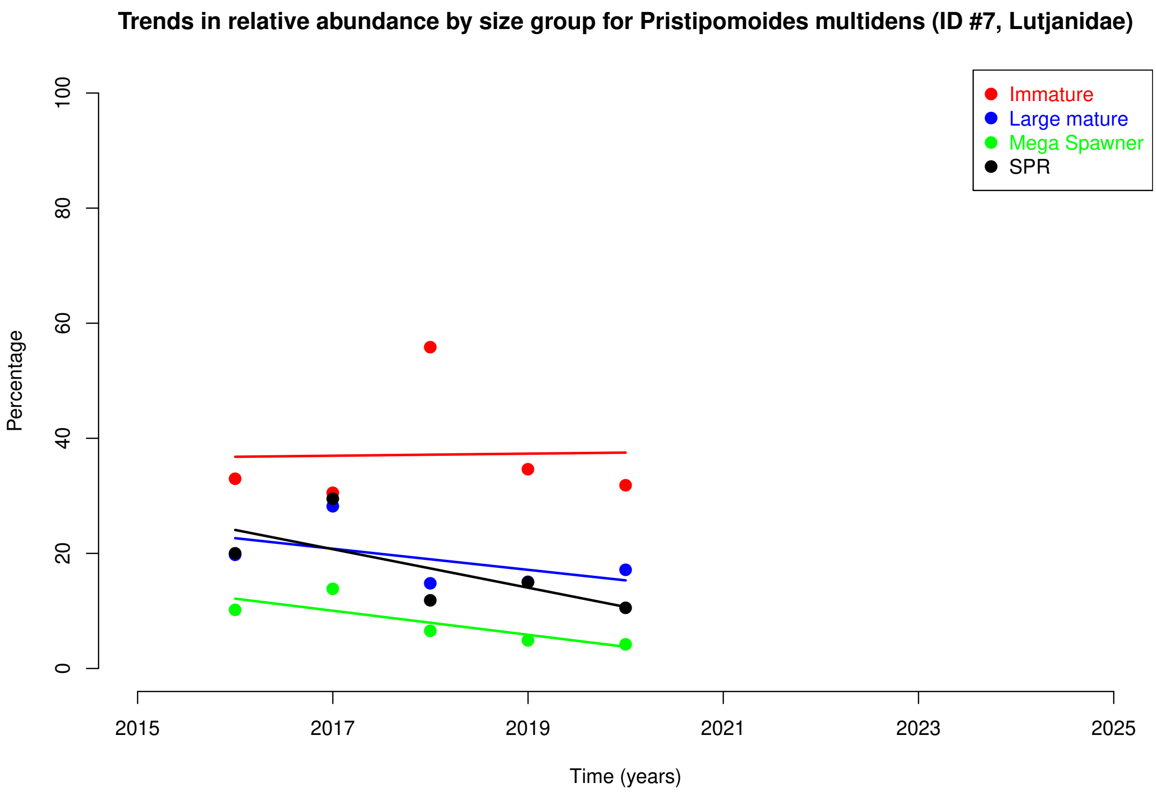
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

Less than 20% of the catch comprises of mega spawners. This indicates that the population may be severely affected by the fishery, and that there is a substantial risk of recruitment overfishing through over harvesting of the mega spawners, unless large numbers of mega spawners would be surviving at other habitats. There is no reason to assume that this is the case and therefore a reduction of fishing effort may be necessary in this fishery. Risk level is high.

SPR is less than 25%. The fishery probably over-exploits the stock, and there is a substantial risk that the fishery will cause severe decline of the stock if fishing effort is not reduced. Risk level is high.

Trends in relative abundance by size group for Lutjanus vitta (ID #27, Lutjanidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature rising over recent years, situation deteriorating. P: 0.839
% Large Mature falling over recent years, situation deteriorating. P: 0.157
% Mega Spawner falling over recent years, situation deteriorating. P: 0.142
% SPR falling over recent years, situation deteriorating. P: 0.181


Catch length frequency for Pristipomoides multidens (ID #7, Lutjanidae)
Most Recent 365 Days. N (Catch) = 315,333, n (Sample) = 3,163.
33 %
52 %
15 %
Trade Limit 35 cm
L−maturity 48 cm
L−optimum 64 cm
L−infinity 82 cm
L−max 91 cm
L−median 53 cm
Lx−codrs 91 cm
SPR 14 %
Trade Limit
L−maturity
L−optimum
L−median
L−infinity
L−max
Frequency
0
2000
4000
6000
8000
10000
40
60
80
100
Total Length (cm)


Trends in relative abundance by size group for Pristipomoides multidens (ID #7, Lutjanidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
0
20
40
60
80
100
2015
2017
2019
2021
2023
2025
Time (years)

The percentages of Pristipomoides multidens (ID #7, Lutjanidae) in most recent 365 days.
N (Catch) =315,333, n (Sample) = 3,163
Immature (< 48cm): 33%
Small mature (>= 48cm, < 64cm): 52%
Large mature (>= 64cm): 15%
Mega spawner (>= 70.4cm): 4% (subset of large mature fish)
Spawning Potential Ratio: 14 %

The trade limit is significantly lower than the length at first maturity. This means that the trade encourages capture of immature fish, which impairs sustainability. Risk level is high.

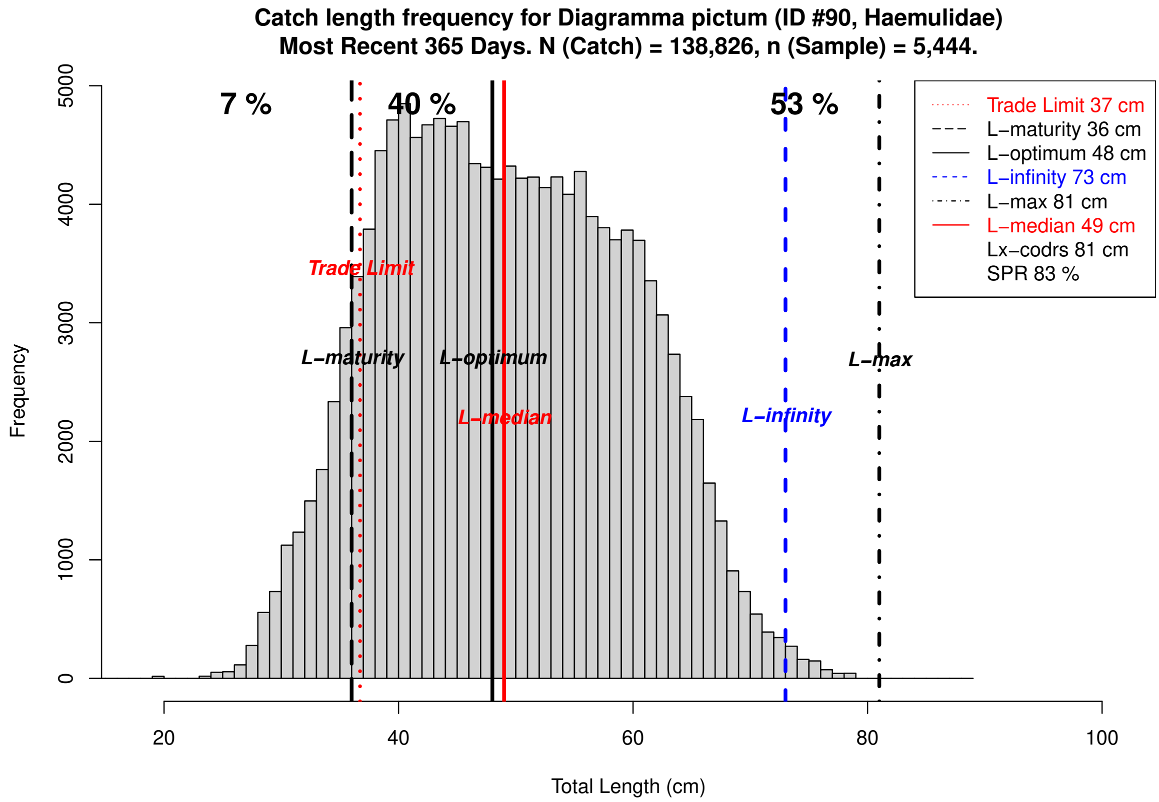
Between 30% and 50% of the fish in the catch are immature and have not had a chance to reproduce before capture. The fishery is in immediate danger of overfishing through overharvesting of juveniles, if fishing pressure is high. Catching small and immature fish needs to be actively avoided and a limit on overall fishing pressure is warranted. Risk level is high.

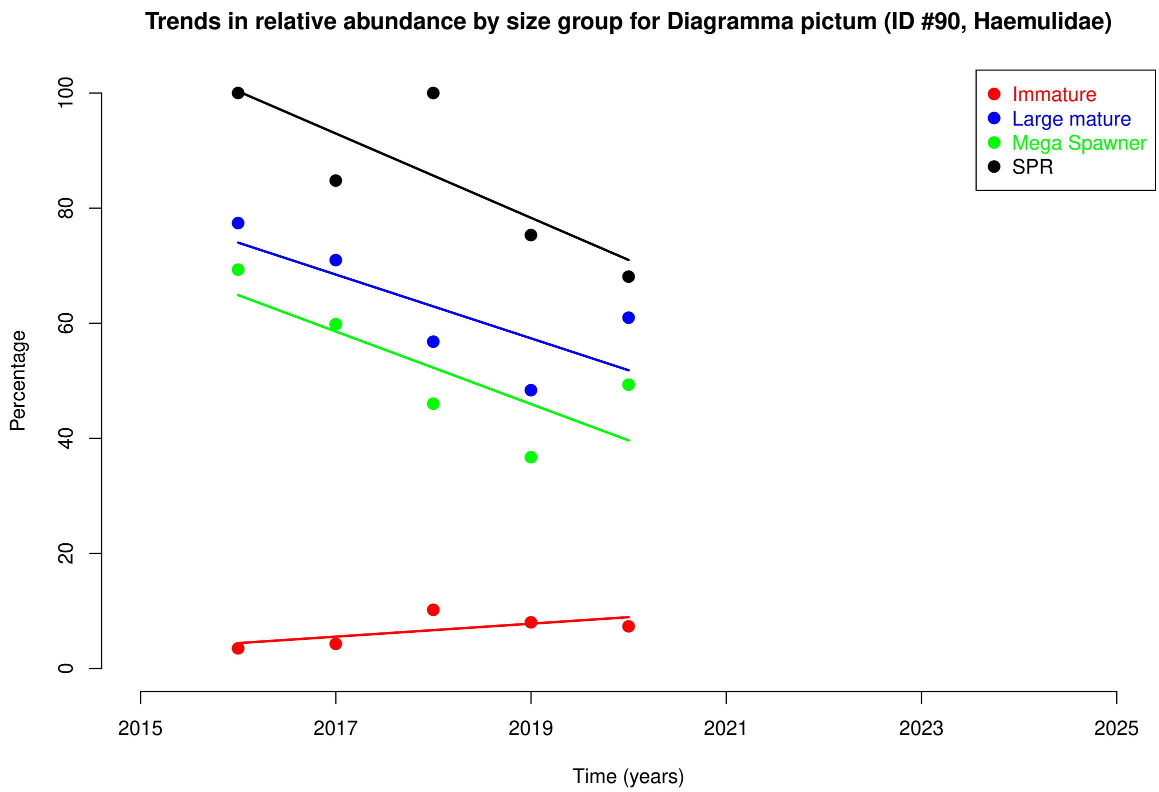
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

Less than 20% of the catch comprises of mega spawners. This indicates that the population may be severely affected by the fishery, and that there is a substantial risk of recruitment overfishing through over harvesting of the mega spawners, unless large numbers of mega spawners would be surviving at other habitats. There is no reason to assume that this is the case and therefore a reduction of fishing effort may be necessary in this fishery. Risk level is high.

SPR is less than 25%. The fishery probably over-exploits the stock, and there is a substantial risk that the fishery will cause severe decline of the stock if fishing effort is not reduced. Risk level is high.

Trends in relative abundance by size group for Pristipomoides multidens (ID #7, Lutjanidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature rising over recent years, situation deteriorating. P: 0.965
% Large Mature falling over recent years, situation deteriorating. P: 0.364
% Mega Spawner falling over recent years, situation deteriorating. P: 0.089
% SPR falling over recent years, situation deteriorating. P: 0.201


Catch length frequency for Diagramma pictum (ID #90, Haemulidae)
Most Recent 365 Days. N (Catch) = 138,826, n (Sample) = 5,444.
7 %
40 %
53 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
Trade Limit 37 cm
L–maturity 36 cm
L–optimum 48 cm
L–infinity 73 cm
L–max 81 cm
L–median 49 cm
Lx–codrs 81 cm
SPR 83 %
Frequency
Total Length (cm)


Trends in relative abundance by size group for Diagramma pictum (ID #90, Haemulidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
Time (years)

The percentages of Diagramma pictum (ID #90, Haemulidae) in most recent 365 days.
N (Catch) =138,826, n (Sample) = 5,444
Immature (< 36cm): 7%
Small mature (>= 36cm, < 48cm): 40%
Large mature (>= 48cm): 53%
Mega spawner (>= 52.8cm): 40% (subset of large mature fish)
Spawning Potential Ratio: 83 %

The trade limit is about the same as the length at first maturity. This means that the trade puts a premium on fish that have spawned at least once, which improves sustainability of the fishery. Risk level is medium.

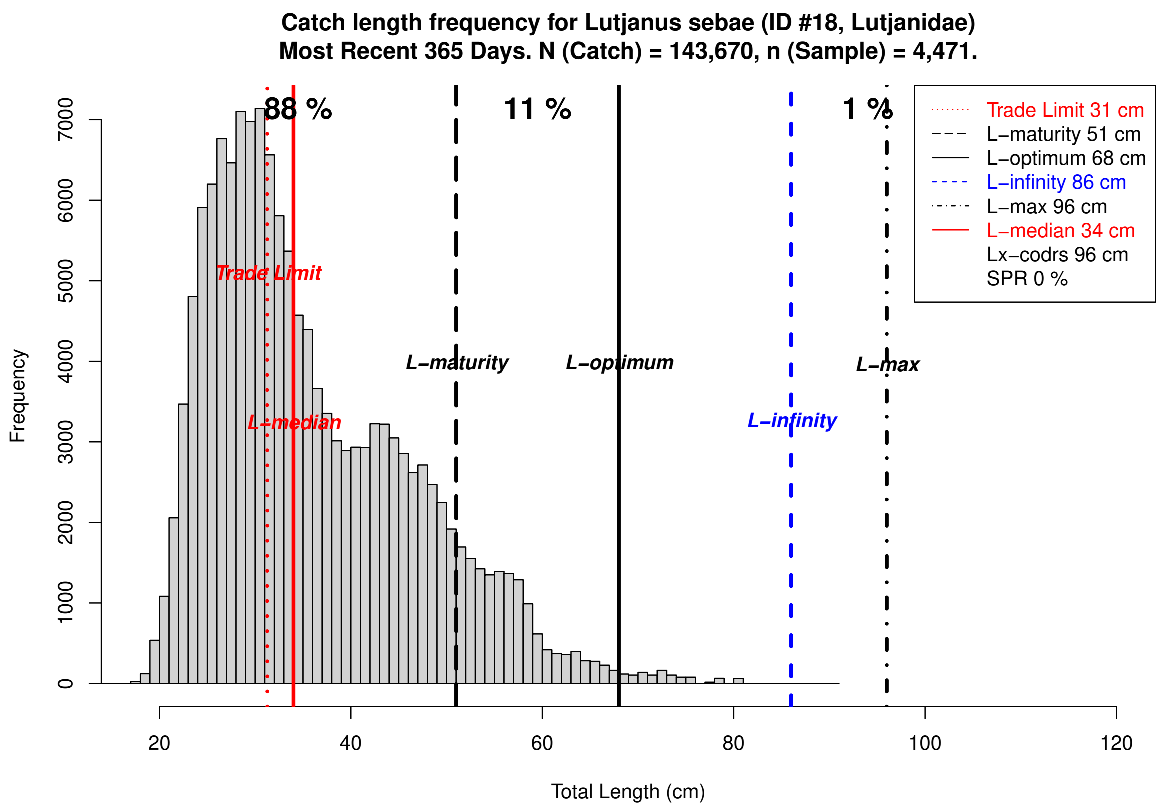
At least 90% of the fish in the catch are mature specimens that have spawned at least once before they were caught. The fishery does not depend on immature size classes for this species and is considered safe for this indicator. This fishery will not be causing overfishing through over harvesting of juveniles for this species. Risk level is low.

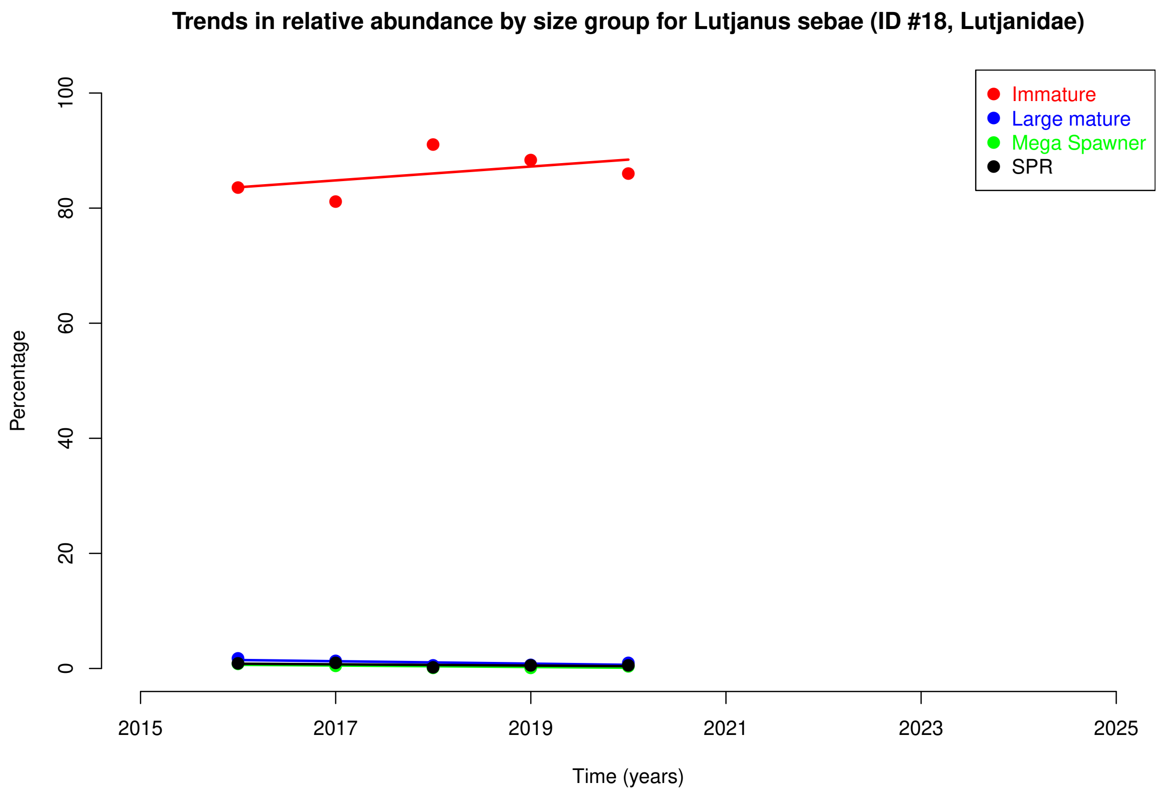
The majority of the catch consists of size classes around or above the optimum harvest size. This means that the impact of the fishery is minimized for this species. Potentially higher yields of this species could be achieved by catching them at somewhat smaller size, although capture of smaller specimen may take place already in other fisheries. Risk level is low.

More than 30% of the catch consists of mega spawners which indicates that this fish population is in good health unless large amounts of much smaller fish from the same population are caught by other fisheries. Risk level is low.

SPR is more than 40%. The stock is probably not over exploited, and the risk that the fishery will cause further stock decline is small. Risk level is low.

Trends in relative abundance by size group for Diagramma pictum (ID #90, Haemulidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature rising over recent years, situation deteriorating. P: 0.234
% Large Mature falling over recent years, situation deteriorating. P: 0.133
% Mega Spawner falling over recent years, situation deteriorating. P: 0.112
% SPR falling over recent years, situation deteriorating. P: 0.100


Catch length frequency for Lutjanus sebae (ID #18, Lutjanidae)
Most Recent 365 Days. N (Catch) = 143,670, n (Sample) = 4,471.
88 %
11 %
1 %
Trade Limit 31 cm
L–maturity 51 cm
L–optimum 68 cm
L–infinity 86 cm
L–max 96 cm
L–median 34 cm
Lx–codrs 96 cm
SPR 0 %
Trade Limit
L–median
L–maturity
L–optimum
L–infinity
L–max
Frequency
Total Length (cm)


Trends in relative abundance by size group for Lutjanus sebae (ID #18, Lutjanidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
Time (years)

The percentages of Lutjanus sebae (ID #18, Lutjanidae) in most recent 365 days.
N (Catch) =143,670, n (Sample) = 4,471
Immature (< 51cm): 88%
Small mature (>= 51cm, < 68cm): 11%
Large mature (>= 68cm): 1%
Mega spawner (>= 74.8cm): 0% (subset of large mature fish)
Spawning Potential Ratio: 0 %

The trade limit is significantly lower than the length at first maturity. This means that the trade encourages capture of immature fish, which impairs sustainability. Risk level is high.

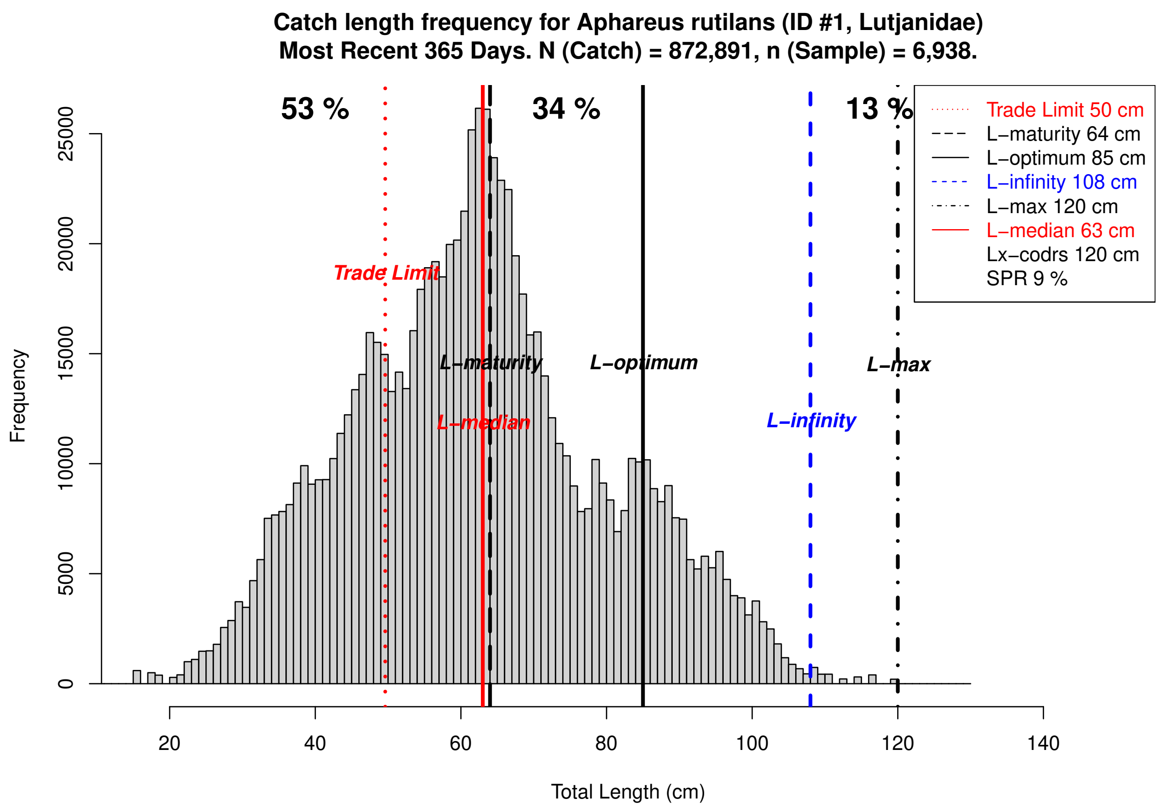
The majority of the fish in the catch have not had a chance to reproduce before capture. This fishery is most likely overfished already if fishing mortality is high for all size classes in the population. An immediate shift away from targeting juvenile fish and a reduction in overall fishing pressure is essential to prevent collapse of the stock. Risk level is high.

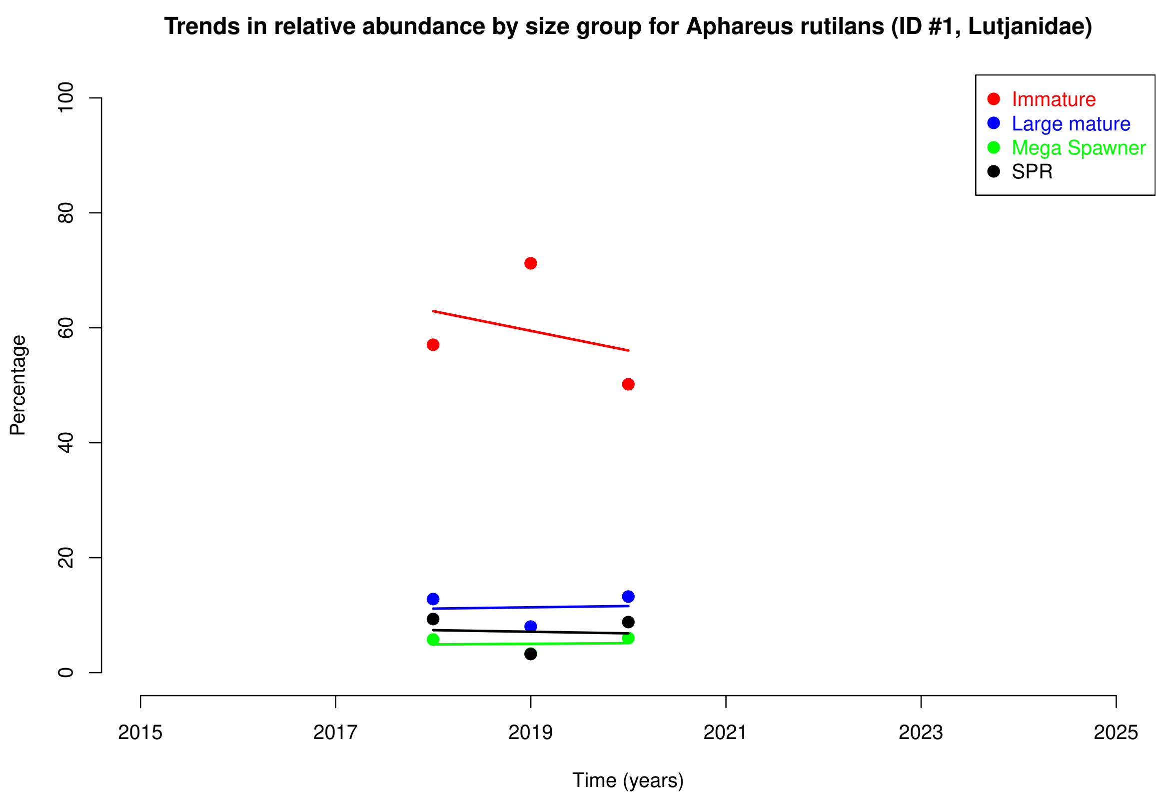
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

Less than 20% of the catch comprises of mega spawners. This indicates that the population may be severely affected by the fishery, and that there is a substantial risk of recruitment overfishing through over harvesting of the mega spawners, unless large numbers of mega spawners would be surviving at other habitats. There is no reason to assume that this is the case and therefore a reduction of fishing effort may be necessary in this fishery. Risk level is high.

SPR is less than 25%. The fishery probably over-exploits the stock, and there is a substantial risk that the fishery will cause severe decline of the stock if fishing effort is not reduced. Risk level is high.

Trends in relative abundance by size group for Lutjanus sebae (ID #18, Lutjanidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature rising over recent years, situation deteriorating. P: 0.405
% Large Mature falling over recent years, situation deteriorating. P: 0.213
% Mega Spawner falling over recent years, situation deteriorating. P: 0.204
% SPR falling over recent years, situation deteriorating. P: 0.316


Catch length frequency for Aphareus rutilans (ID #1, Lutjanidae)
Most Recent 365 Days. N (Catch) = 872,891, n (Sample) = 6,938.
53 %
34 %
13 %
Trade Limit 50 cm
L–maturity 64 cm
L–optimum 85 cm
L–infinity 108 cm
L–max 120 cm
L–median 63 cm
Lx–codrs 120 cm
SPR 9 %
Trade Limit
L–maturity
L–optimum
L–max
L–median
L–infinity
Frequency
0
5000
10000
15000
20000
25000
20
40
60
80
100
120
140
Total Length (cm)


Trends in relative abundance by size group for Aphareus rutilans (ID #1, Lutjanidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
0
20
40
60
80
100
2015
2017
2019
2021
2023
2025
Time (years)

The percentages of Aphareus rutilans (ID #1, Lutjanidae) in most recent 365 days.
N (Catch) =872,891, n (Sample) = 6,938
Immature (< 64cm): 53%
Small mature (>= 64cm, < 85cm): 34%
Large mature (>= 85cm): 13%
Mega spawner (>= 93.5cm): 6% (subset of large mature fish)
Spawning Potential Ratio: 9 %

The trade limit is significantly lower than the length at first maturity. This means that the trade encourages capture of immature fish, which impairs sustainability. Risk level is high.

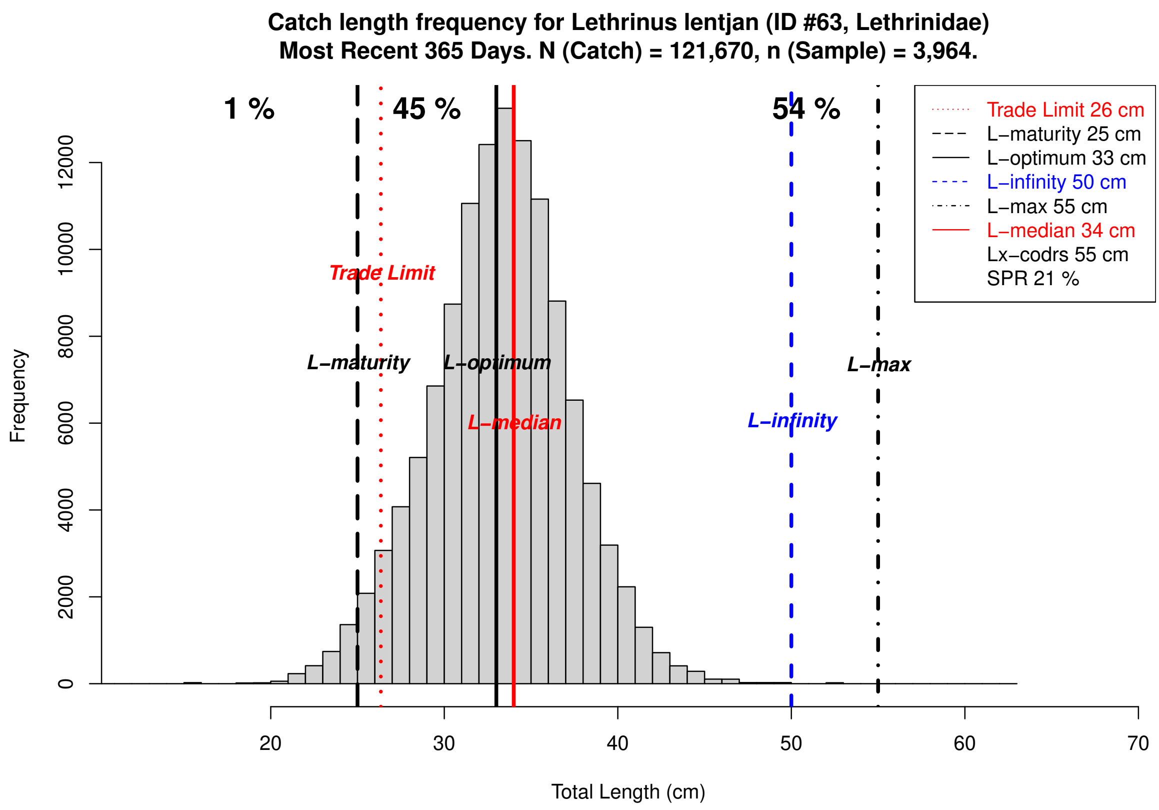
The majority of the fish in the catch have not had a chance to reproduce before capture. This fishery is most likely overfished already if fishing mortality is high for all size classes in the population. An immediate shift away from targeting juvenile fish and a reduction in overall fishing pressure is essential to prevent collapse of the stock. Risk level is high.

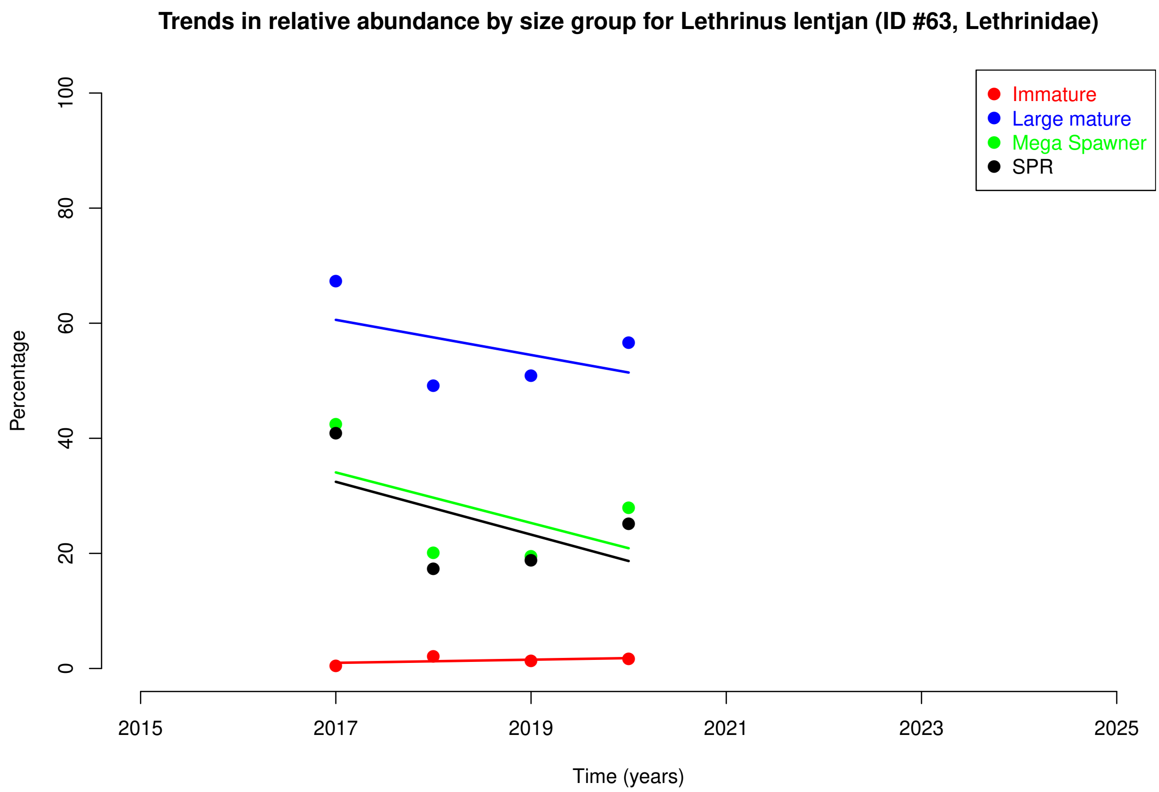
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

Less than 20% of the catch comprises of mega spawners. This indicates that the population may be severely affected by the fishery, and that there is a substantial risk of recruitment overfishing through over harvesting of the mega spawners, unless large numbers of mega spawners would be surviving at other habitats. There is no reason to assume that this is the case and therefore a reduction of fishing effort may be necessary in this fishery. Risk level is high.

SPR is less than 25%. The fishery probably over-exploits the stock, and there is a substantial risk that the fishery will cause severe decline of the stock if fishing effort is not reduced. Risk level is high.

Trends in relative abundance by size group for Aphareus rutilans (ID #1, Lutjanidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature falling over recent years, situation improving. P: 0.794
% Large Mature rising over recent years, situation improving. P: 0.951
% Mega Spawner rising over recent years, situation improving. P: 0.953
% SPR falling over recent years, situation deteriorating. P: 0.947


Catch length frequency for Lethrinus lentjan (ID #63, Lethrinidae)
Most Recent 365 Days. N (Catch) = 121,670, n (Sample) = 3,964.
1 %
45 %
54 %
Trade Limit 26 cm
L–maturity 25 cm
L–optimum 33 cm
L–infinity 50 cm
L–max 55 cm
L–median 34 cm
Lx–codrs 55 cm
SPR 21 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
Frequency
0
2000
4000
6000
8000
10000
12000
20
30
40
50
60
70
Total Length (cm)


Trends in relative abundance by size group for Lethrinus lentjan (ID #63, Lethrinidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
0
20
40
60
80
100
2015
2017
2019
2021
2023
2025
Time (years)

The percentages of Lethrinus lentjan (ID #63, Lethrinidae) in most recent 365 days.
N (Catch) =121,670, n (Sample) = 3,964
Immature (< 25cm): 1%
Small mature (>= 25cm, < 33cm): 45%
Large mature (>= 33cm): 54%
Mega spawner (>= 36.3cm): 23% (subset of large mature fish)
Spawning Potential Ratio: 21 %

The trade limit is about the same as the length at first maturity. This means that the trade puts a premium on fish that have spawned at least once, which improves sustainability of the fishery. Risk level is medium.

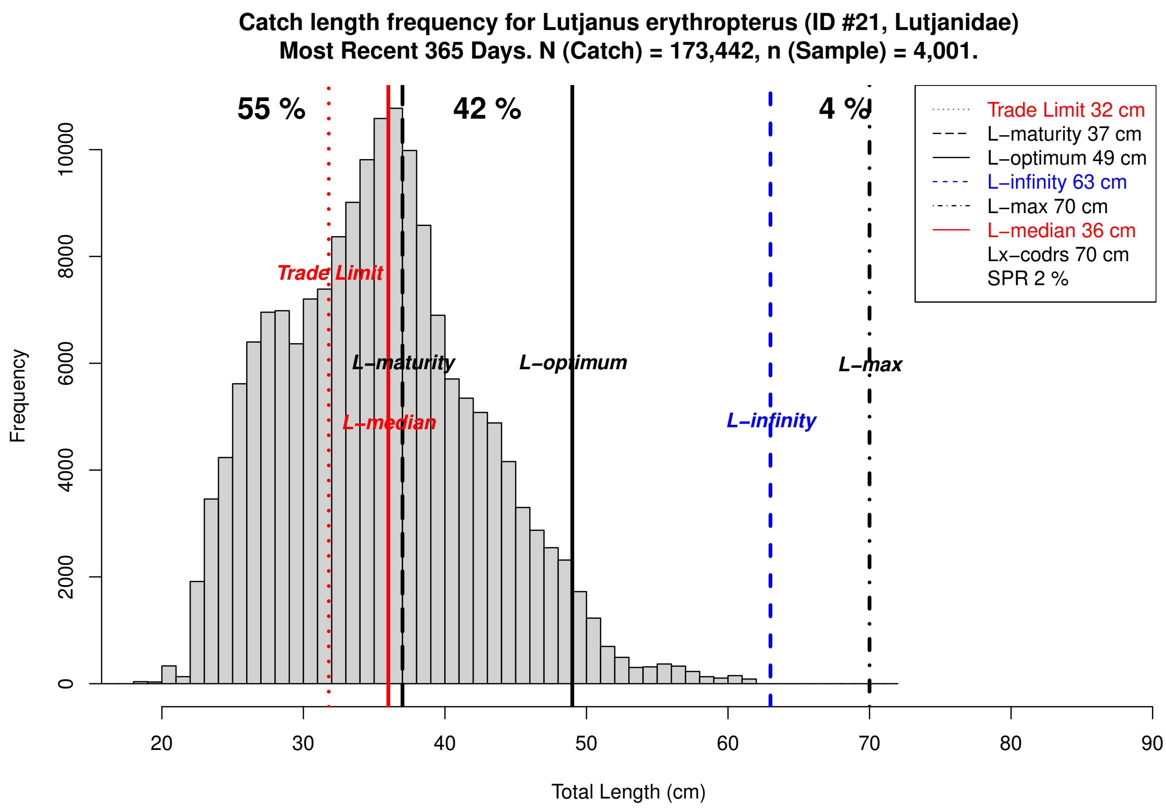
At least 90% of the fish in the catch are mature specimens that have spawned at least once before they were caught. The fishery does not depend on immature size classes for this species and is considered safe for this indicator. This fishery will not be causing overfishing through over harvesting of juveniles for this species. Risk level is low.

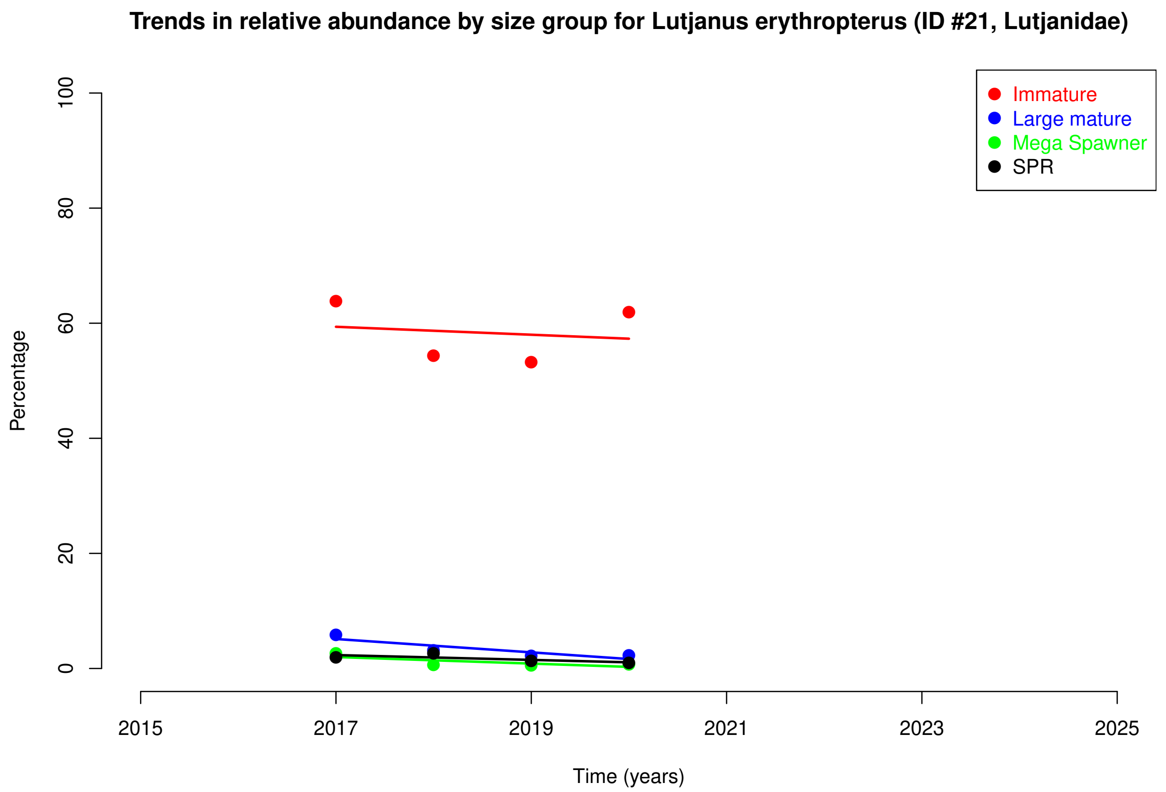
The majority of the catch consists of size classes around or above the optimum harvest size. This means that the impact of the fishery is minimized for this species. Potentially higher yields of this species could be achieved by catching them at somewhat smaller size, although capture of smaller specimen may take place already in other fisheries. Risk level is low.

The percentage of mega spawners is between 20 and 30%. There is no immediate reason for concern, though fishing pressure may be significantly reducing the percentage of mega-spawners, which may negatively affect the reproductive output of this population. Risk level is medium.

SPR is less than 25%. The fishery probably over-exploits the stock, and there is a substantial risk that the fishery will cause severe decline of the stock if fishing effort is not reduced. Risk level is high.

Trends in relative abundance by size group for Lethrinus lentjan (ID #63, Lethrinidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature rising over recent years, situation deteriorating. P: 0.483
% Large Mature falling over recent years, situation deteriorating. P: 0.519
% Mega Spawner falling over recent years, situation deteriorating. P: 0.469
% SPR falling over recent years, situation deteriorating. P: 0.450


Catch length frequency for Lutjanus erythropterus (ID #21, Lutjanidae)
Most Recent 365 Days. N (Catch) = 173,442, n (Sample) = 4,001.
55 %
42 %
4 %
Trade Limit 32 cm
L−maturity 37 cm
L−optimum 49 cm
L−infinity 63 cm
L−max 70 cm
L−median 36 cm
Lx−codrs 70 cm
SPR 2 %
Trade Limit
L−maturity
L−optimum
L−max
L−median
L−infinity
Frequency
Total Length (cm)


Trends in relative abundance by size group for Lutjanus erythropterus (ID #21, Lutjanidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
Time (years)

The percentages of Lutjanus erythropterus (ID #21, Lutjanidae) in most recent 365 days.
N (Catch) =173,442, n (Sample) = 4,001
Immature (< 37cm): 55%
Small mature (>= 37cm, < 49cm): 42%
Large mature (>= 49cm): 4%
Mega spawner (>= 53.9cm): 1% (subset of large mature fish)
Spawning Potential Ratio: 2 %

The trade limit is significantly lower than the length at first maturity. This means that the trade encourages capture of immature fish, which impairs sustainability. Risk level is high.

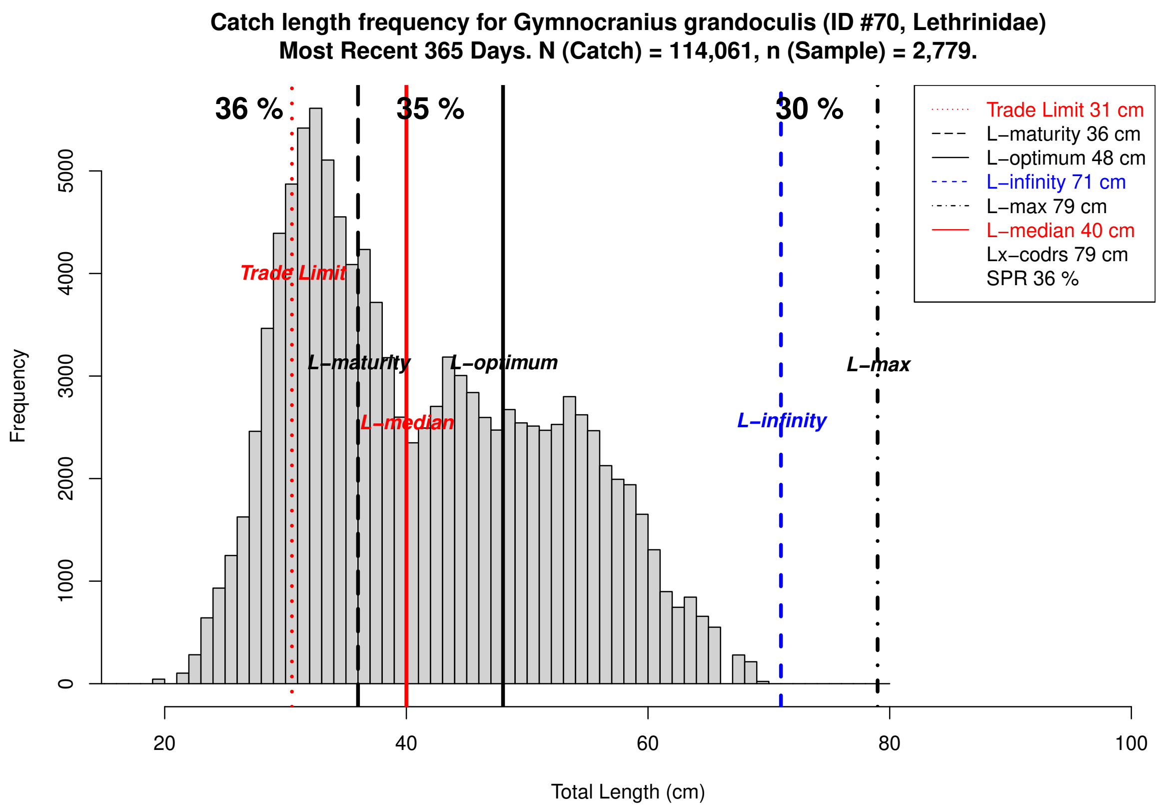
The majority of the fish in the catch have not had a chance to reproduce before capture. This fishery is most likely overfished already if fishing mortality is high for all size classes in the population. An immediate shift away from targeting juvenile fish and a reduction in overall fishing pressure is essential to prevent collapse of the stock. Risk level is high.

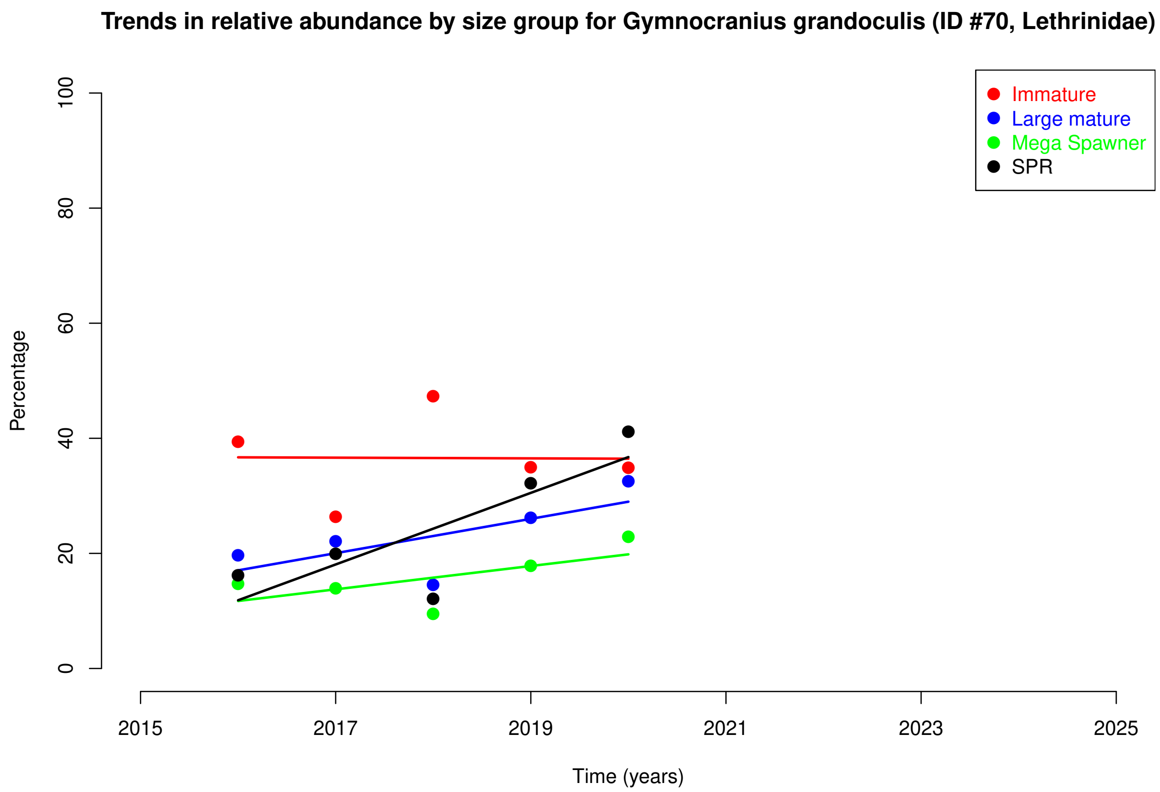
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

Less than 20% of the catch comprises of mega spawners. This indicates that the population may be severely affected by the fishery, and that there is a substantial risk of recruitment overfishing through over harvesting of the mega spawners, unless large numbers of mega spawners would be surviving at other habitats. There is no reason to assume that this is the case and therefore a reduction of fishing effort may be necessary in this fishery. Risk level is high.

SPR is less than 25%. The fishery probably over-exploits the stock, and there is a substantial risk that the fishery will cause severe decline of the stock if fishing effort is not reduced. Risk level is high.

Trends in relative abundance by size group for Lutjanus erythropterus (ID #21, Lutjanidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature falling over recent years, situation improving. P: 0.832
% Large Mature falling over recent years, situation deteriorating. P: 0.121
% Mega Spawner falling over recent years, situation deteriorating. P: 0.247
% SPR falling over recent years, situation deteriorating. P: 0.244


Catch length frequency for Gymnocranius grandoculis (ID #70, Lethrinidae)
Most Recent 365 Days. N (Catch) = 114,061, n (Sample) = 2,779.
36 %
35 %
30 %
Trade Limit 31 cm
L−maturity 36 cm
L−optimum 48 cm
L−infinity 71 cm
L−max 79 cm
L−median 40 cm
Lx−codrs 79 cm
SPR 36 %
Trade Limit
L−maturity
L−optimum
L−median
L−infinity
L−max
Frequency
Total Length (cm)


Trends in relative abundance by size group for Gymnocranius grandoculis (ID #70, Lethrinidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
Time (years)

The percentages of Gymnocranius grandoculis (ID #70, Lethrinidae) in most recent 365 days.
N (Catch) =114,061, n (Sample) = 2,779
Immature (< 36cm): 36%
Small mature (>= 36cm, < 48cm): 35%
Large mature (>= 48cm): 30%
Mega spawner (>= 52.8cm): 21% (subset of large mature fish)
Spawning Potential Ratio: 36 %

The trade limit is significantly lower than the length at first maturity. This means that the trade encourages capture of immature fish, which impairs sustainability. Risk level is high.

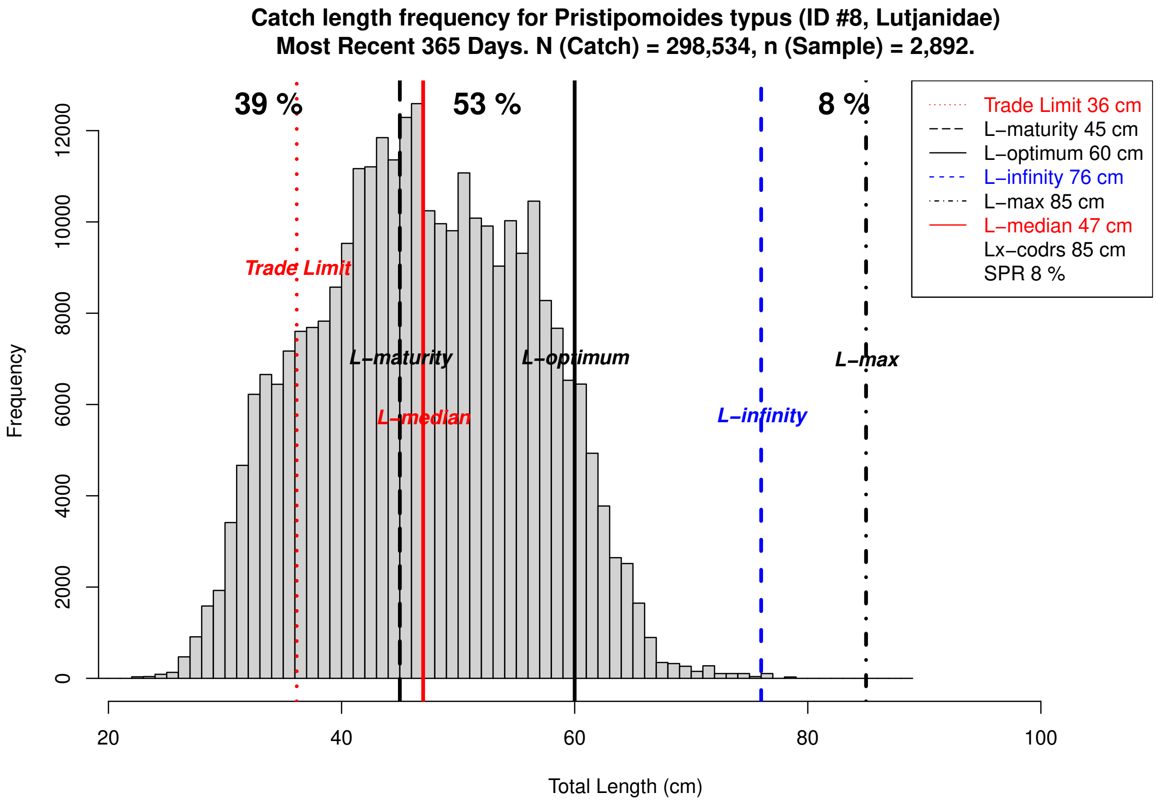
Between 30% and 50% of the fish in the catch are immature and have not had a chance to reproduce before capture. The fishery is in immediate danger of overfishing through overharvesting of juveniles, if fishing pressure is high. Catching small and immature fish needs to be actively avoided and a limit on overall fishing pressure is warranted. Risk level is high.

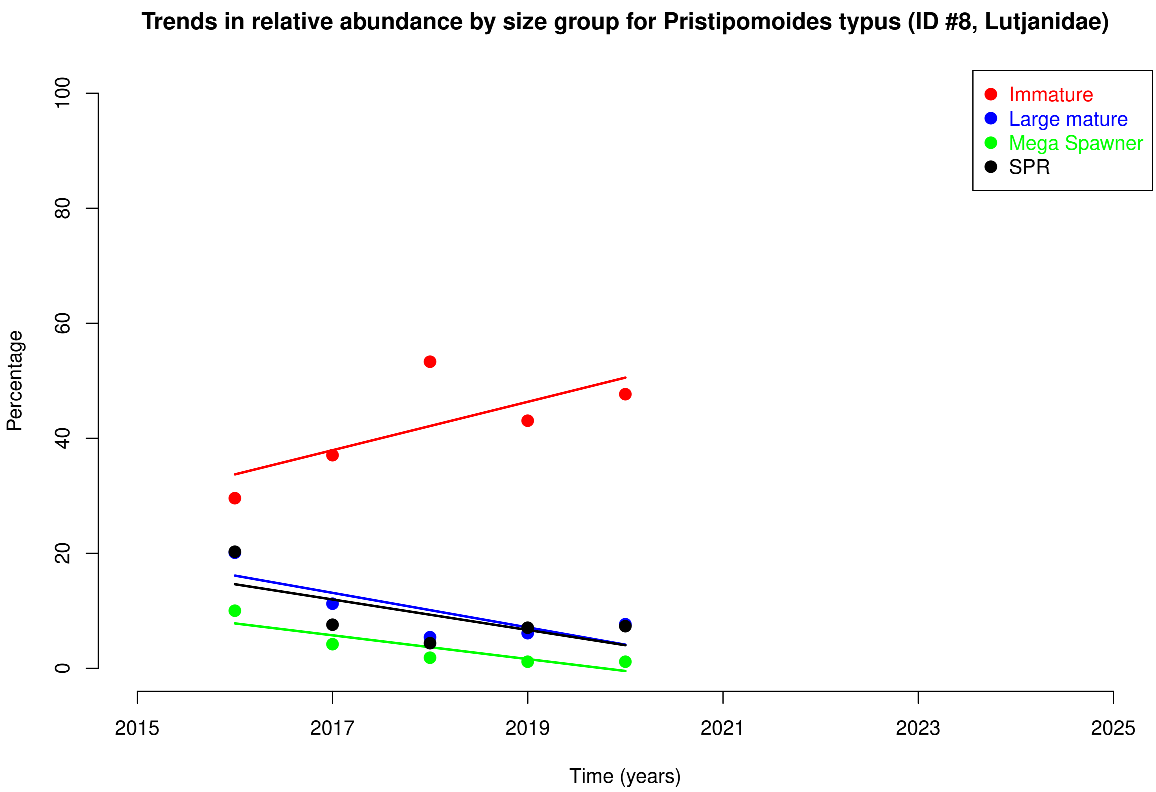
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

The percentage of mega spawners is between 20 and 30%. There is no immediate reason for concern, though fishing pressure may be significantly reducing the percentage of mega-spawners, which may negatively affect the reproductive output of this population. Risk level is medium.

SPR is between 25% and 40%. The stock is heavily exploited, and there is some risk that the fishery will cause further decline of the stock. Risk level is medium.

Trends in relative abundance by size group for Gymnocranius grandoculis (ID #70, Lethrinidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature no trend over recent years, situation stable. P: 0.984
% Large Mature rising over recent years, situation improving. P: 0.193
% Mega Spawner rising over recent years, situation improving. P: 0.242
% SPR rising over recent years, situation improving. P: 0.092


Catch length frequency for Pristipomoides typus (ID #8, Lutjanidae)
Most Recent 365 Days. N (Catch) = 298,534, n (Sample) = 2,892.
39 %
53 %
8 %
Trade Limit 36 cm
L–maturity 45 cm
L–optimum 60 cm
L–infinity 76 cm
L–max 85 cm
L–median 47 cm
Lx–codrs 85 cm
SPR 8 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
Frequency
Total Length (cm)


Trends in relative abundance by size group for Pristipomoides typus (ID #8, Lutjanidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
Time (years)

The percentages of Pristipomoides typus (ID #8, Lutjanidae) in most recent 365 days.
N (Catch) =298,534, n (Sample) = 2,892
Immature (< 45cm): 39%
Small mature (>= 45cm, < 60cm): 53%
Large mature (>= 60cm): 8%
Mega spawner (>= 66cm): 1% (subset of large mature fish)
Spawning Potential Ratio: 8 %

The trade limit is significantly lower than the length at first maturity. This means that the trade encourages capture of immature fish, which impairs sustainability. Risk level is high.

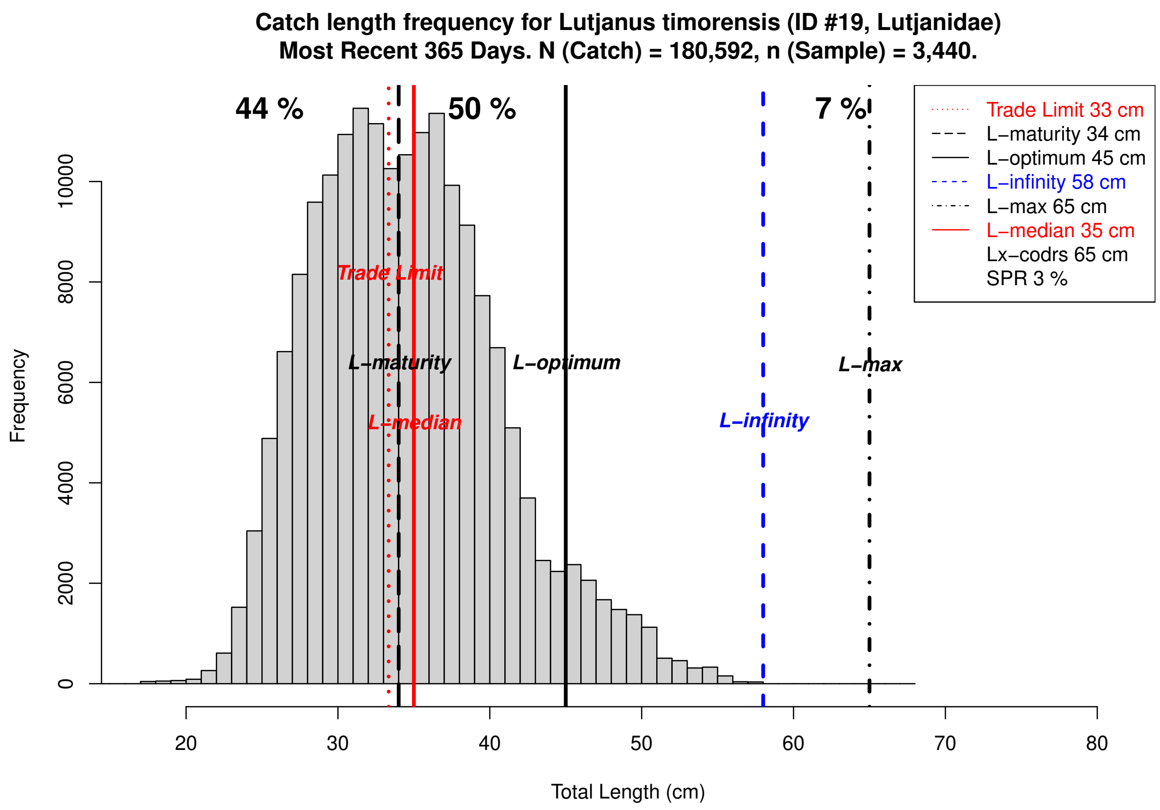
Between 30% and 50% of the fish in the catch are immature and have not had a chance to reproduce before capture. The fishery is in immediate danger of overfishing through overharvesting of juveniles, if fishing pressure is high. Catching small and immature fish needs to be actively avoided and a limit on overall fishing pressure is warranted. Risk level is high.

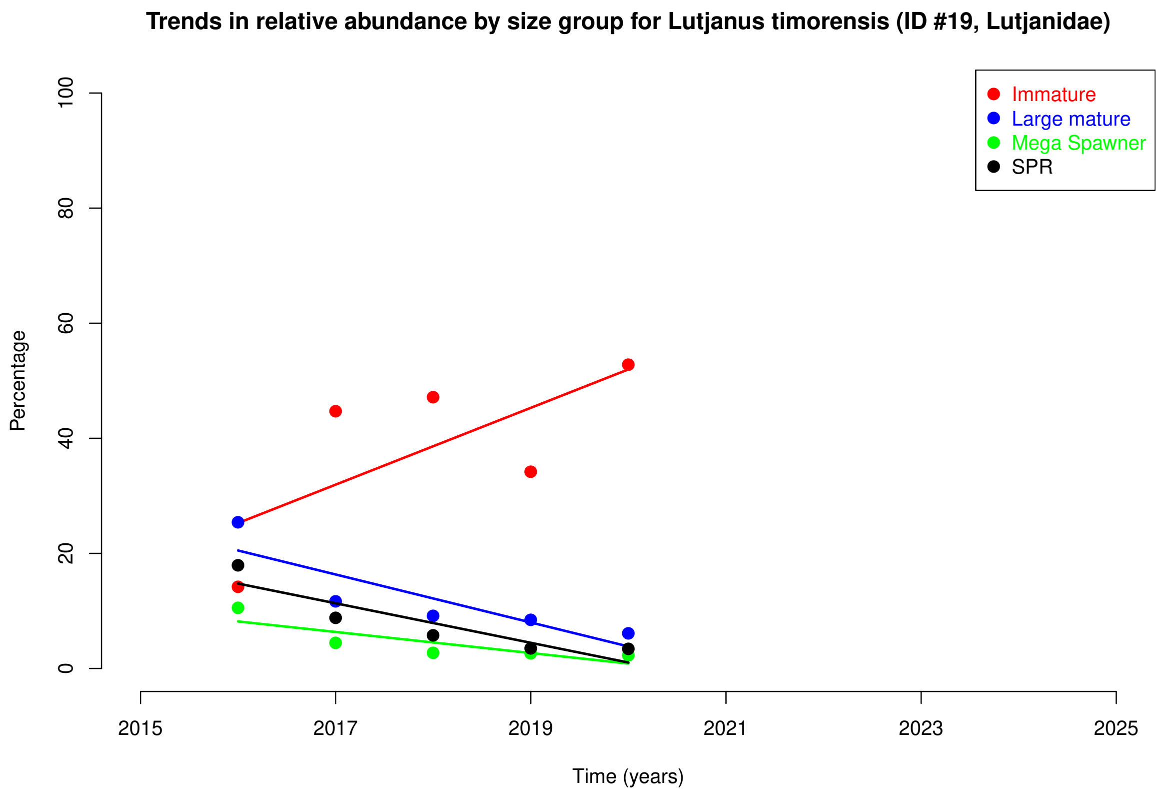
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

Less than 20% of the catch comprises of mega spawners. This indicates that the population may be severely affected by the fishery, and that there is a substantial risk of recruitment overfishing through over harvesting of the mega spawners, unless large numbers of mega spawners would be surviving at other habitats. There is no reason to assume that this is the case and therefore a reduction of fishing effort may be necessary in this fishery. Risk level is high.

SPR is less than 25%. The fishery probably over-exploits the stock, and there is a substantial risk that the fishery will cause severe decline of the stock if fishing effort is not reduced. Risk level is high.

Trends in relative abundance by size group for Pristipomoides typus (ID #8, Lutjanidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature rising over recent years, situation deteriorating. P: 0.169
% Large Mature falling over recent years, situation deteriorating. P: 0.114
% Mega Spawner falling over recent years, situation deteriorating. P: 0.053
% SPR falling over recent years, situation deteriorating. P: 0.217


Catch length frequency for Lutjanus timorensis (ID #19, Lutjanidae)
Most Recent 365 Days. N (Catch) = 180,592, n (Sample) = 3,440.
44 %
50 %
7 %
Trade Limit 33 cm
L−maturity 34 cm
L−optimum 45 cm
L−infinity 58 cm
L−max 65 cm
L−median 35 cm
Lx−codrs 65 cm
SPR 3 %
Trade Limit
L−maturity
L−optimum
L−median
L−infinity
L−max
Frequency
Total Length (cm)


Trends in relative abundance by size group for Lutjanus timorensis (ID #19, Lutjanidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
Time (years)

The percentages of Lutjanus timorensis (ID #19, Lutjanidae) in most recent 365 days.
N (Catch) =180,592, n (Sample) = 3,440
Immature (< 34cm): 44%
Small mature (>= 34cm, < 45cm): 50%
Large mature (>= 45cm): 7%
Mega spawner (>= 49.5cm): 2% (subset of large mature fish)
Spawning Potential Ratio: 3 %

The trade limit is about the same as the length at first maturity. This means that the trade puts a premium on fish that have spawned at least once, which improves sustainability of the fishery. Risk level is medium.

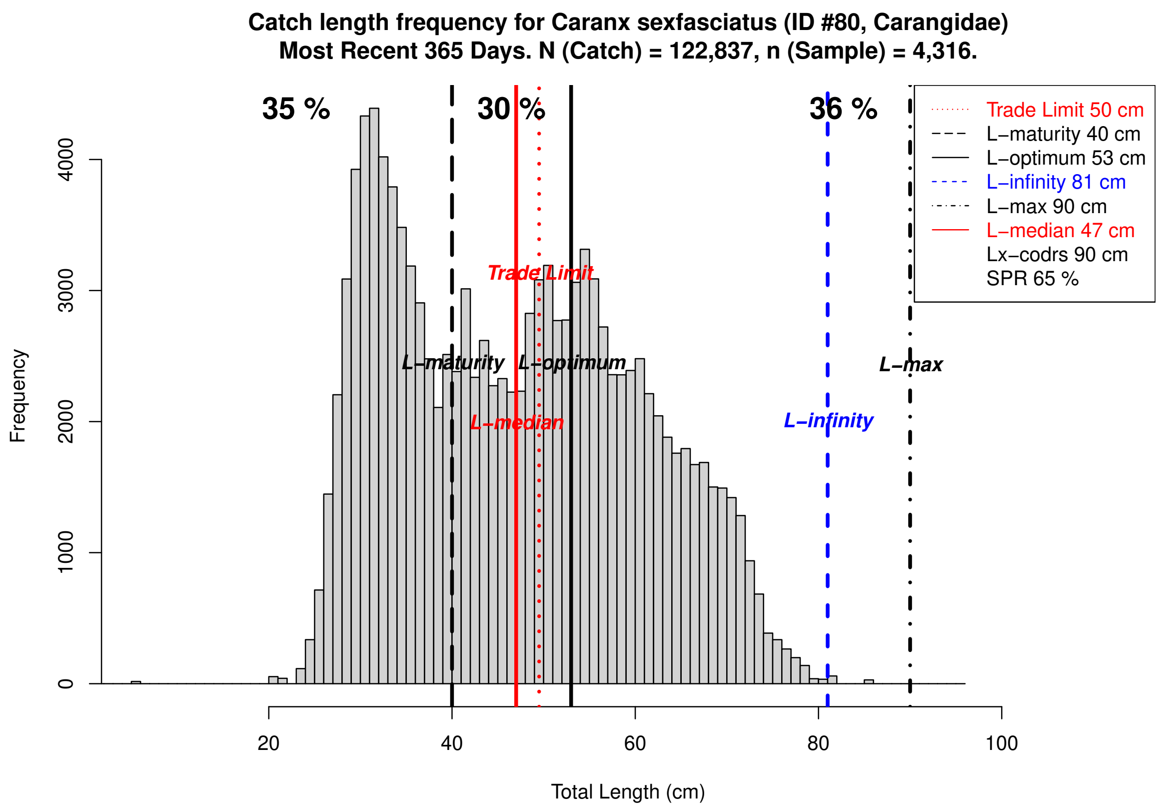
Between 30% and 50% of the fish in the catch are immature and have not had a chance to reproduce before capture. The fishery is in immediate danger of overfishing through overharvesting of juveniles, if fishing pressure is high. Catching small and immature fish needs to be actively avoided and a limit on overall fishing pressure is warranted. Risk level is high.

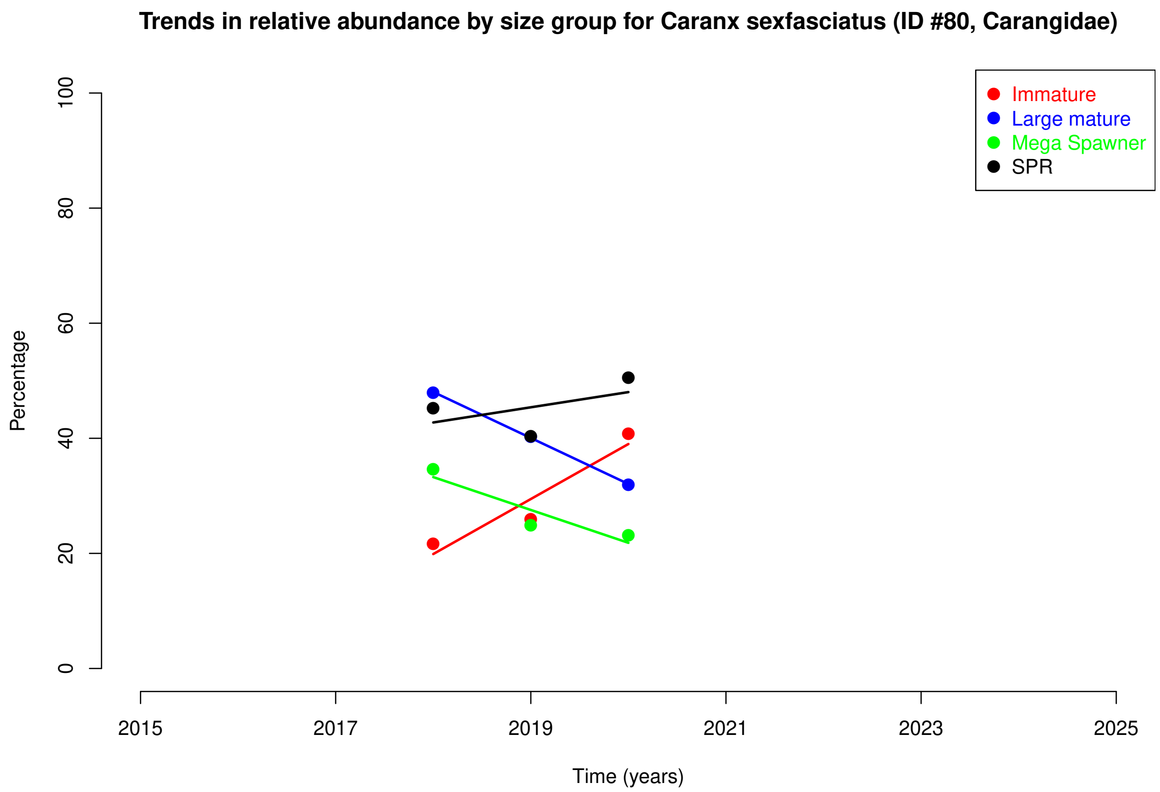
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

Less than 20% of the catch comprises of mega spawners. This indicates that the population may be severely affected by the fishery, and that there is a substantial risk of recruitment overfishing through over harvesting of the mega spawners, unless large numbers of mega spawners would be surviving at other habitats. There is no reason to assume that this is the case and therefore a reduction of fishing effort may be necessary in this fishery. Risk level is high.

SPR is less than 25%. The fishery probably over-exploits the stock, and there is a substantial risk that the fishery will cause severe decline of the stock if fishing effort is not reduced. Risk level is high.

Trends in relative abundance by size group for Lutjanus timorensis (ID #19, Lutjanidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature rising over recent years, situation deteriorating. P: 0.195
% Large Mature falling over recent years, situation deteriorating. P: 0.061
% Mega Spawner falling over recent years, situation deteriorating. P: 0.078
% SPR falling over recent years, situation deteriorating. P: 0.038


Catch length frequency for Caranx sexfasciatus (ID #80, Carangidae)
Most Recent 365 Days. N (Catch) = 122,837, n (Sample) = 4,316.
35 %
30 %
36 %
Trade Limit 50 cm
L–maturity 40 cm
L–optimum 53 cm
L–infinity 81 cm
L–max 90 cm
L–median 47 cm
Lx–codrs 90 cm
SPR 65 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
Frequency
0
1000
2000
3000
4000
20
40
60
80
100
Total Length (cm)


Trends in relative abundance by size group for Caranx sexfasciatus (ID #80, Carangidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
0
20
40
60
80
100
2015
2017
2019
2021
2023
2025
Time (years)

The percentages of Caranx sexfasciatus (ID #80, Carangidae) in most recent 365 days.
N (Catch) =122,837, n (Sample) = 4,316
Immature (< 40cm): 35%
Small mature (>= 40cm, < 53cm): 30%
Large mature (>= 53cm): 36%
Mega spawner (>= 58.3cm): 24% (subset of large mature fish)
Spawning Potential Ratio: 65 %

The trade limit is significantly higher than length at first maturity. This means that the trade puts a premium on fish that have spawned at least once. The trade does not cause any concern of recruitment overfishing for this species. Risk level is low.

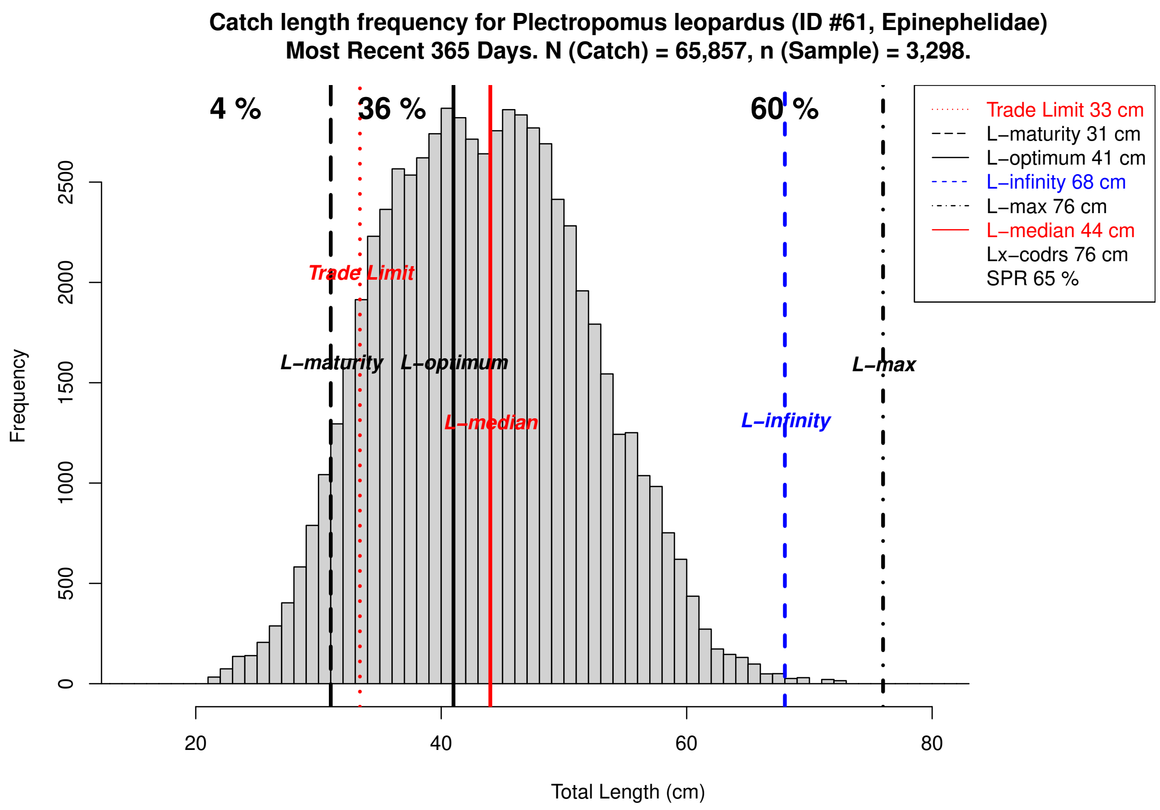
Between 30% and 50% of the fish in the catch are immature and have not had a chance to reproduce before capture. The fishery is in immediate danger of overfishing through overharvesting of juveniles, if fishing pressure is high. Catching small and immature fish needs to be actively avoided and a limit on overall fishing pressure is warranted. Risk level is high.

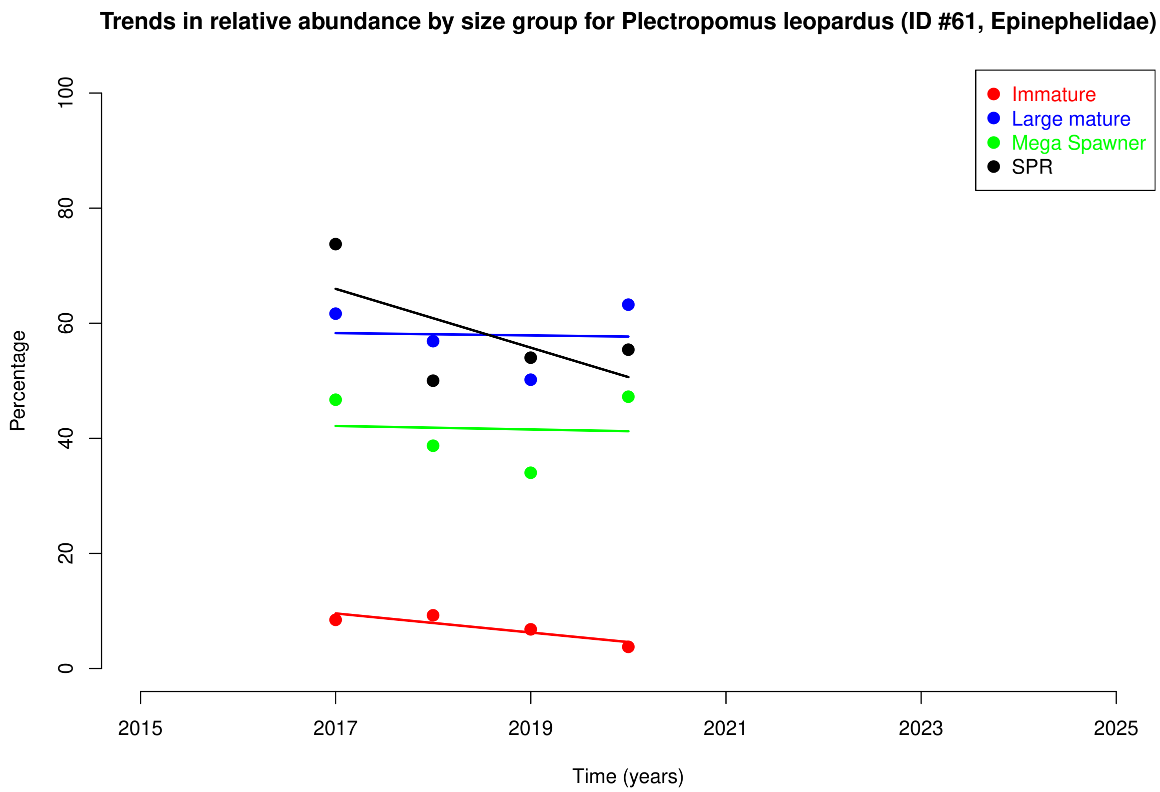
The bulk of the catch includes age groups that have just matured and are about to achieve their full growth potential. This indicates that the fishery is probably at least being fully exploited. Risk level is medium.

The percentage of mega spawners is between 20 and 30%. There is no immediate reason for concern, though fishing pressure may be significantly reducing the percentage of mega-spawners, which may negatively affect the reproductive output of this population. Risk level is medium.

SPR is more than 40%. The stock is probably not over exploited, and the risk that the fishery will cause further stock decline is small. Risk level is low.

Trends in relative abundance by size group for Caranx sexfasciatus (ID #80, Carangidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature rising over recent years, situation deteriorating. P: 0.197
% Large Mature falling over recent years, situation deteriorating. P: 0.014
% Mega Spawner falling over recent years, situation deteriorating. P: 0.247
% SPR rising over recent years, situation improving. P: 0.653


Catch length frequency for Plectropomus leopardus (ID #61, Epinephelidae)
Most Recent 365 Days. N (Catch) = 65,857, n (Sample) = 3,298.
4 %
36 %
60 %
Trade Limit 33 cm
L–maturity 31 cm
L–optimum 41 cm
L–infinity 68 cm
L–max 76 cm
L–median 44 cm
Lx–codrs 76 cm
SPR 65 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
Frequency
Total Length (cm)


Trends in relative abundance by size group for Plectropomus leopardus (ID #61, Epinephelidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
Time (years)

The percentages of Plectropomus leopardus (ID #61, Epinephelidae) in most recent 365 days.
N (Catch) =65,857, n (Sample) = 3,298
Immature (< 31cm): 4%
Small mature (>= 31cm, < 41cm): 36%
Large mature (>= 41cm): 60%
Mega spawner (>= 45.1cm): 43% (subset of large mature fish)
Spawning Potential Ratio: 65 %

The trade limit is about the same as the length at first maturity. This means that the trade puts a premium on fish that have spawned at least once, which improves sustainability of the fishery. Risk level is medium.

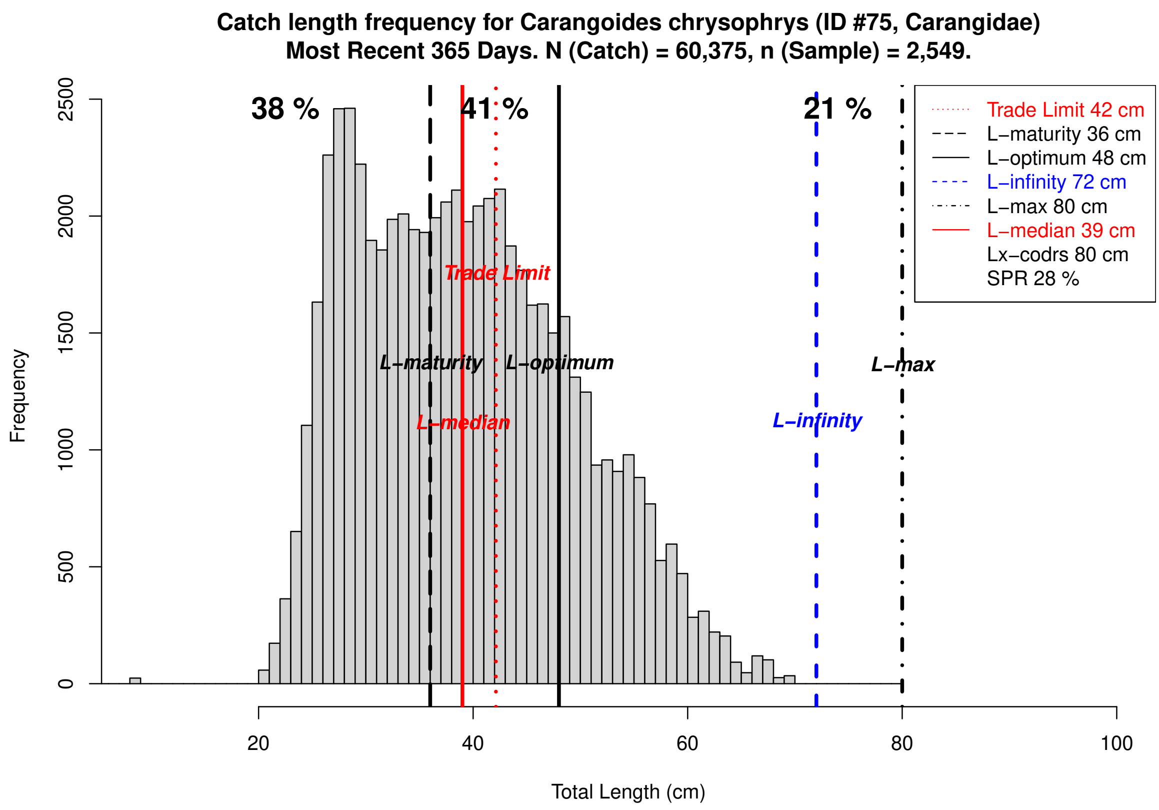
At least 90% of the fish in the catch are mature specimens that have spawned at least once before they were caught. The fishery does not depend on immature size classes for this species and is considered safe for this indicator. This fishery will not be causing overfishing through over harvesting of juveniles for this species. Risk level is low.

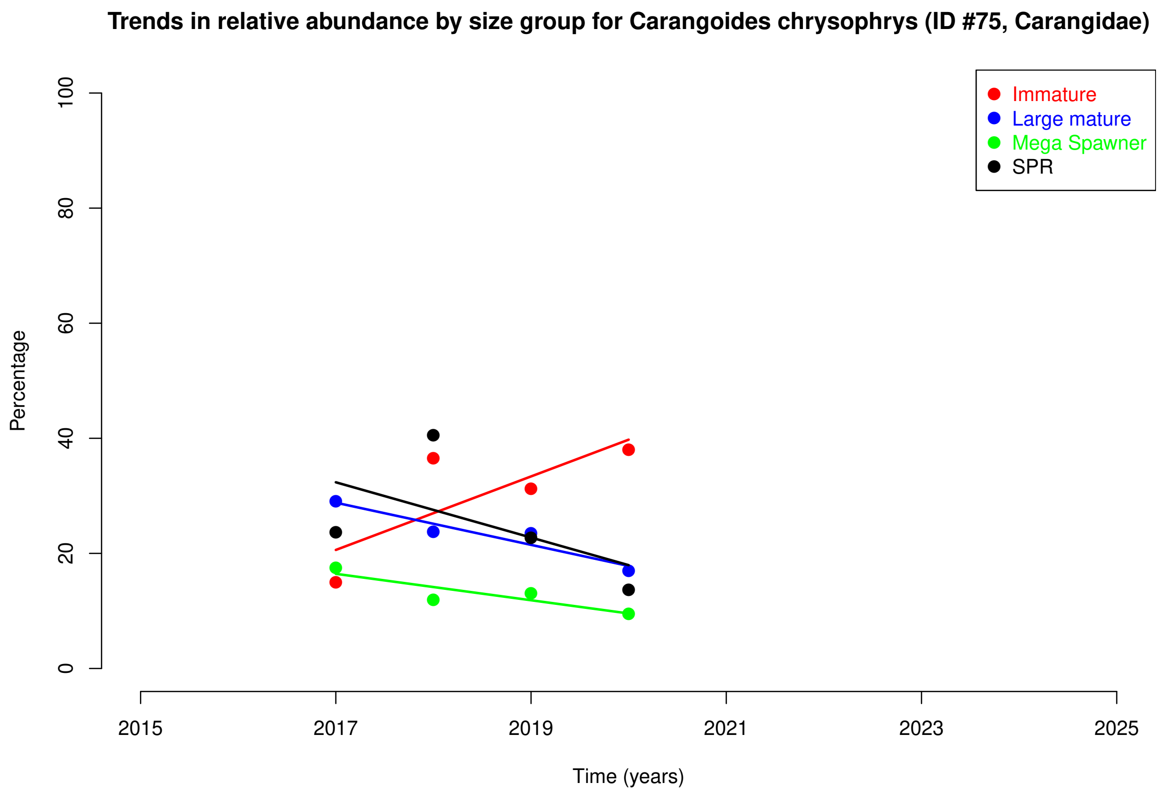
The majority of the catch consists of size classes around or above the optimum harvest size. This means that the impact of the fishery is minimized for this species. Potentially higher yields of this species could be achieved by catching them at somewhat smaller size, although capture of smaller specimen may take place already in other fisheries. Risk level is low.

More than 30% of the catch consists of mega spawners which indicates that this fish population is in good health unless large amounts of much smaller fish from the same population are caught by other fisheries. Risk level is low.

SPR is more than 40%. The stock is probably not over exploited, and the risk that the fishery will cause further stock decline is small. Risk level is low.

Trends in relative abundance by size group for Plectropomus leopardus (ID #61, Epinephelidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature falling over recent years, situation improving. P: 0.123
% Large Mature falling over recent years, situation deteriorating. P: 0.955
% Mega Spawner falling over recent years, situation deteriorating. P: 0.939
% SPR falling over recent years, situation deteriorating. P: 0.375


Catch length frequency for Carangoides chrysophrys (ID #75, Carangidae)
Most Recent 365 Days. N (Catch) = 60,375, n (Sample) = 2,549.
38 %
41 %
21 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
Trade Limit 42 cm
L–maturity 36 cm
L–optimum 48 cm
L–infinity 72 cm
L–max 80 cm
L–median 39 cm
Lx–codrs 80 cm
SPR 28 %
Frequency
Total Length (cm)


Trends in relative abundance by size group for Carangoides chrysophrys (ID #75, Carangidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
Time (years)

The percentages of Carangoides chrysophrys (ID #75, Carangidae) in most recent 365 days.
N (Catch) =60,375, n (Sample) = 2,549
Immature (< 36cm): 38%
Small mature (>= 36cm, < 48cm): 41%
Large mature (>= 48cm): 21%
Mega spawner (>= 52.8cm): 12% (subset of large mature fish)
Spawning Potential Ratio: 28 %

The trade limit is significantly higher than length at first maturity. This means that the trade puts a premium on fish that have spawned at least once. The trade does not cause any concern of recruitment overfishing for this species. Risk level is low.

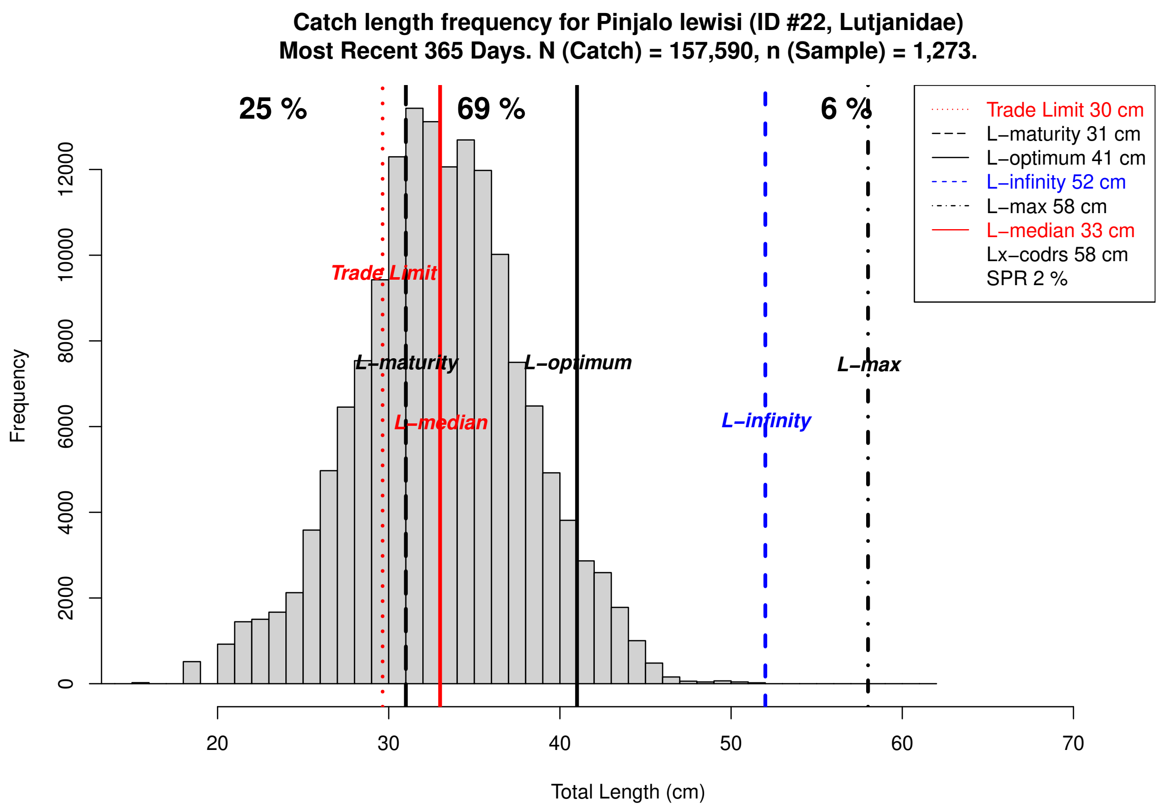
Between 30% and 50% of the fish in the catch are immature and have not had a chance to reproduce before capture. The fishery is in immediate danger of overfishing through overharvesting of juveniles, if fishing pressure is high. Catching small and immature fish needs to be actively avoided and a limit on overall fishing pressure is warranted. Risk level is high.

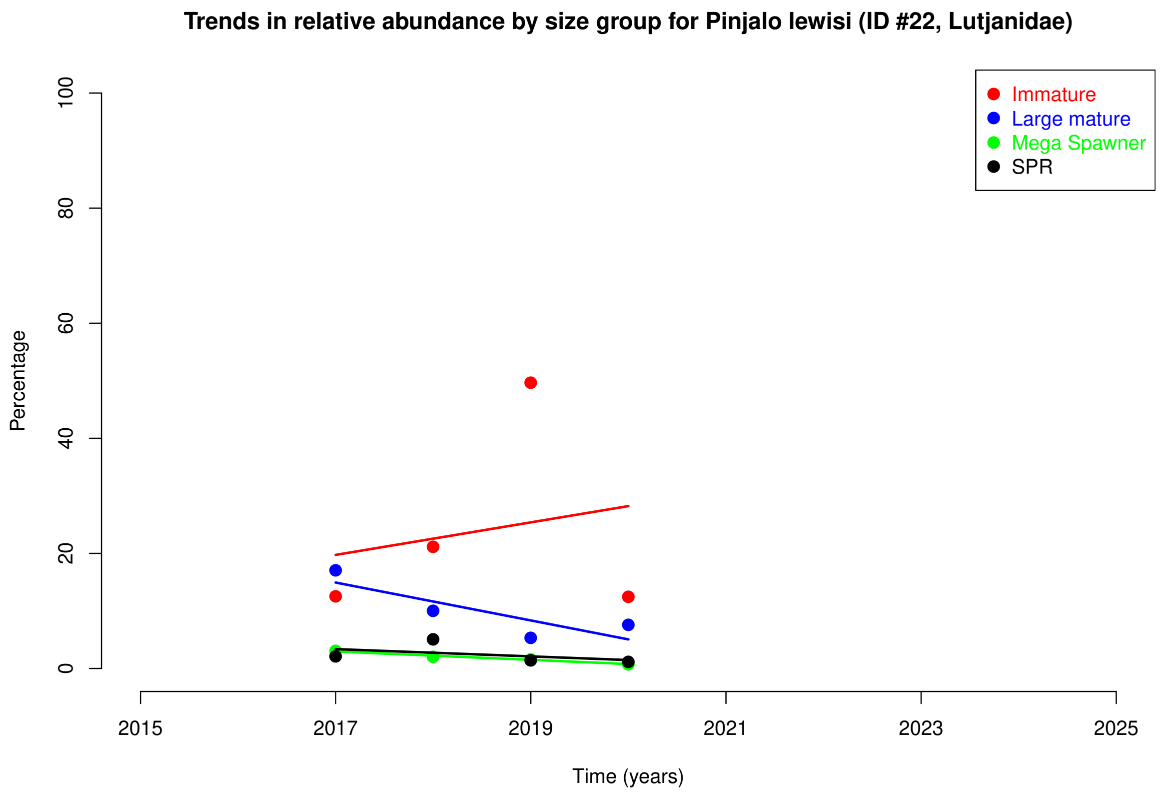
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

Less than 20% of the catch comprises of mega spawners. This indicates that the population may be severely affected by the fishery, and that there is a substantial risk of recruitment overfishing through over harvesting of the mega spawners, unless large numbers of mega spawners would be surviving at other habitats. There is no reason to assume that this is the case and therefore a reduction of fishing effort may be necessary in this fishery. Risk level is high.

SPR is between 25% and 40%. The stock is heavily exploited, and there is some risk that the fishery will cause further decline of the stock. Risk level is medium.

Trends in relative abundance by size group for Carangoides chrysophrys (ID #75, Carangidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature rising over recent years, situation deteriorating. P: 0.219
% Large Mature falling over recent years, situation deteriorating. P: 0.047
% Mega Spawner falling over recent years, situation deteriorating. P: 0.119
% SPR falling over recent years, situation deteriorating. P: 0.448


Catch length frequency for Pinjalo lewisi (ID #22, Lutjanidae)
Most Recent 365 Days. N (Catch) = 157,590, n (Sample) = 1,273.
25 %
69 %
6 %
Trade Limit 30 cm
L−maturity 31 cm
L−optimum 41 cm
L−infinity 52 cm
L−max 58 cm
L−median 33 cm
Lx−codrs 58 cm
SPR 2 %
Trade Limit
L−maturity
L−optimum
L−median
L−infinity
L−max
Frequency
Total Length (cm)


Trends in relative abundance by size group for Pinjalo lewisi (ID #22, Lutjanidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
Time (years)

The percentages of Pinjalo lewisi (ID #22, Lutjanidae) in most recent 365 days.
N (Catch) =157,590, n (Sample) = 1,273
Immature (< 31cm): 25%
Small mature (>= 31cm, < 41cm): 69%
Large mature (>= 41cm): 6%
Mega spawner (>= 45.1cm): 1% (subset of large mature fish)
Spawning Potential Ratio: 2 %

The trade limit is about the same as the length at first maturity. This means that the trade puts a premium on fish that have spawned at least once, which improves sustainability of the fishery. Risk level is medium.

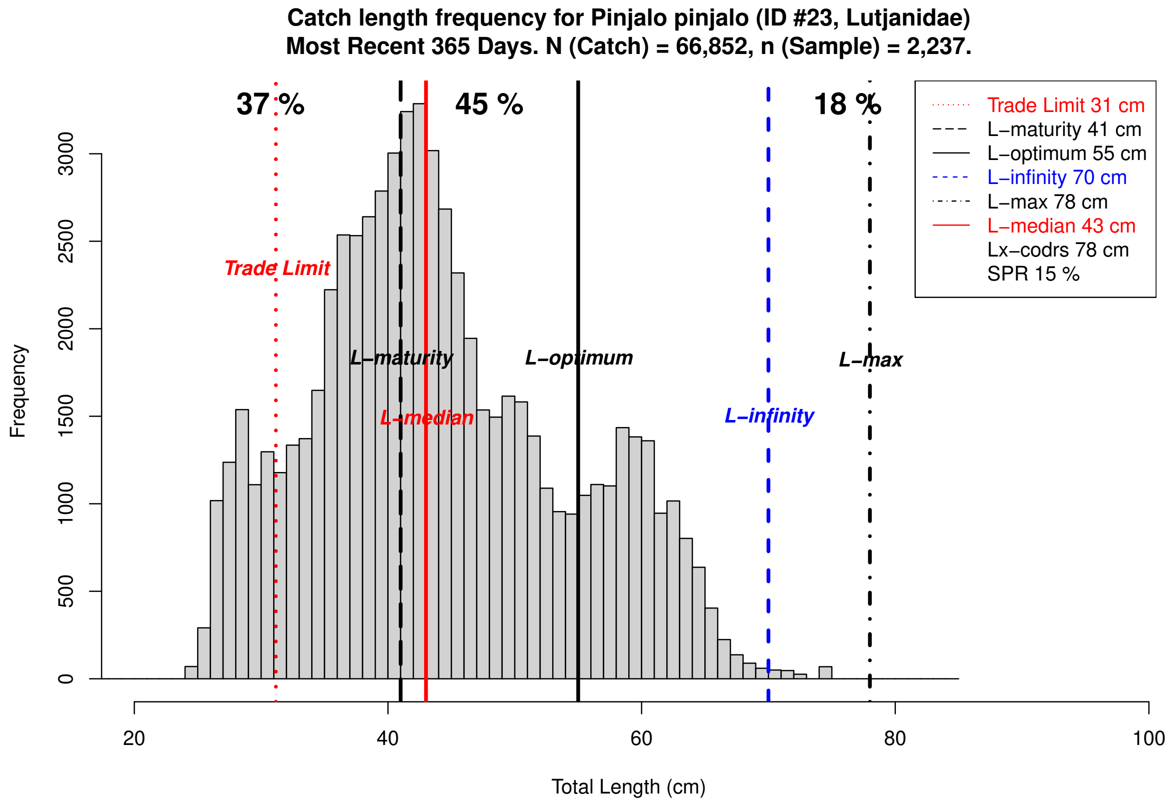
Between 20% and 30% of the fish in the catch are specimens that have not yet reproduced. This is reason for concern in terms of potential overfishing through overharvesting of juveniles, if fishing pressure is high and percentages immature fish would further rise. Targeting larger fish and avoiding small fish in the catch will promote a sustainable fishery. Risk level is medium.

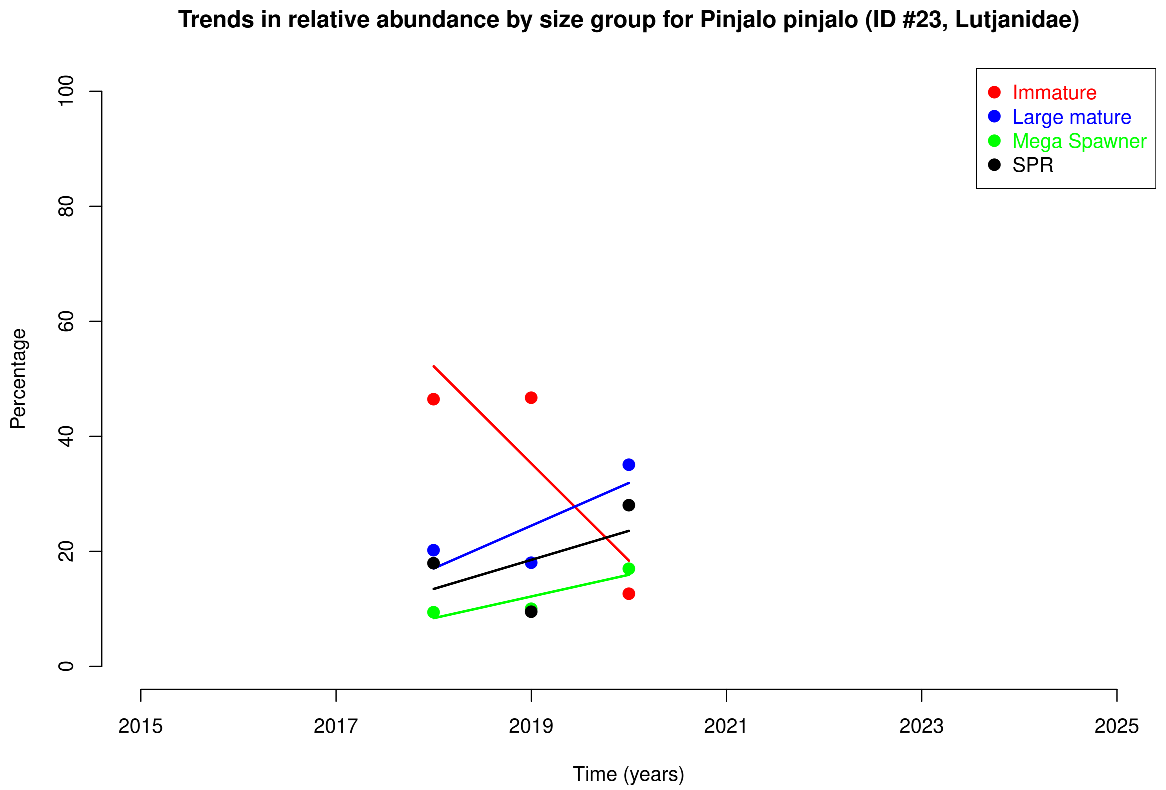
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

Less than 20% of the catch comprises of mega spawners. This indicates that the population may be severely affected by the fishery, and that there is a substantial risk of recruitment overfishing through over harvesting of the mega spawners, unless large numbers of mega spawners would be surviving at other habitats. There is no reason to assume that this is the case and therefore a reduction of fishing effort may be necessary in this fishery. Risk level is high.

SPR is less than 25%. The fishery probably over-exploits the stock, and there is a substantial risk that the fishery will cause severe decline of the stock if fishing effort is not reduced. Risk level is high.

Trends in relative abundance by size group for Pinjalo lewisi (ID #22, Lutjanidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature rising over recent years, situation deteriorating. P: 0.793
% Large Mature falling over recent years, situation deteriorating. P: 0.162
% Mega Spawner falling over recent years, situation deteriorating. P: 0.011
% SPR falling over recent years, situation deteriorating. P: 0.542


Catch length frequency for Pinjalo pinjalo (ID #23, Lutjanidae)
Most Recent 365 Days. N (Catch) = 66,852, n (Sample) = 2,237.
37 %
45 %
18 %
Trade Limit 31 cm
L−maturity 41 cm
L−optimum 55 cm
L−infinity 70 cm
L−max 78 cm
L−median 43 cm
Lx−codrs 78 cm
SPR 15 %
Trade Limit
L−maturity
L−optimum
L−max
L−median
L−infinity
Frequency
Total Length (cm)


Trends in relative abundance by size group for Pinjalo pinjalo (ID #23, Lutjanidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
Time (years)

The percentages of Pinjalo pinjalo (ID #23, Lutjanidae) in most recent 365 days.
N (Catch) =66,852, n (Sample) = 2,237
Immature (< 41cm): 37%
Small mature (>= 41cm, < 55cm): 45%
Large mature (>= 55cm): 18%
Mega spawner (>= 60.5cm): 9% (subset of large mature fish)
Spawning Potential Ratio: 15 %

The trade limit is significantly lower than the length at first maturity. This means that the trade encourages capture of immature fish, which impairs sustainability. Risk level is high.

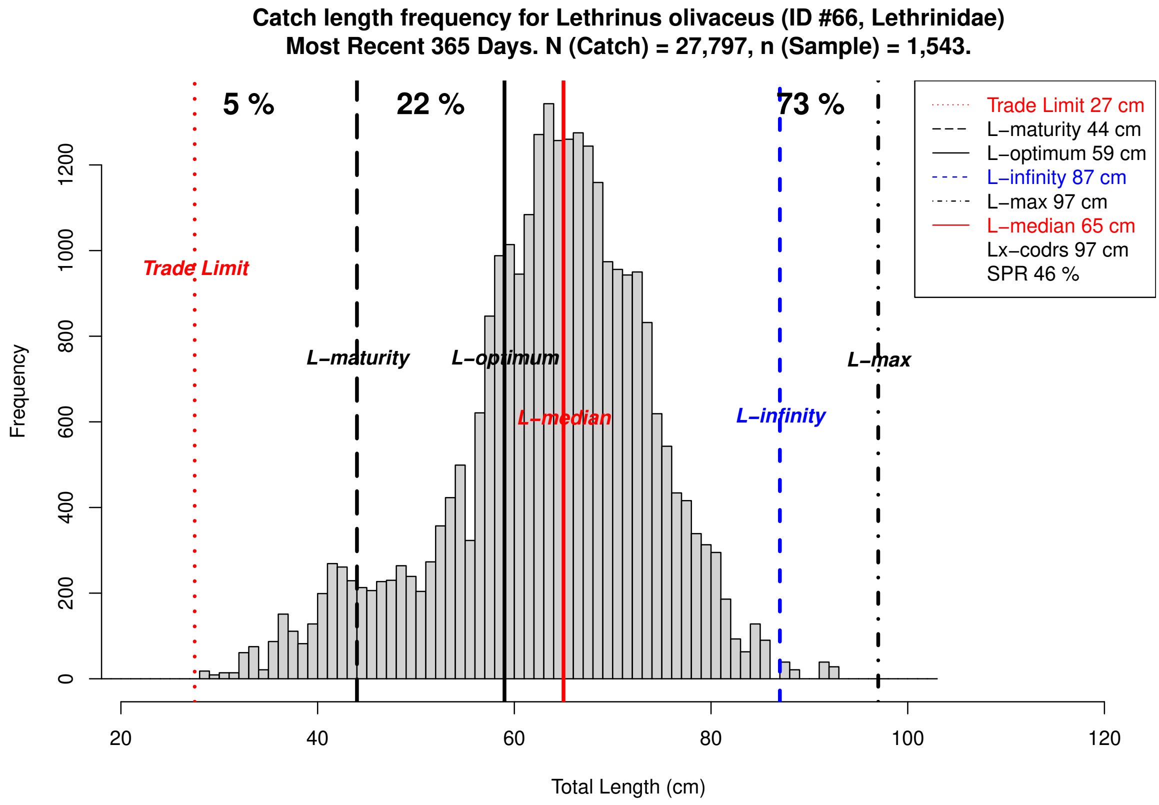
Between 30% and 50% of the fish in the catch are immature and have not had a chance to reproduce before capture. The fishery is in immediate danger of overfishing through overharvesting of juveniles, if fishing pressure is high. Catching small and immature fish needs to be actively avoided and a limit on overall fishing pressure is warranted. Risk level is high.

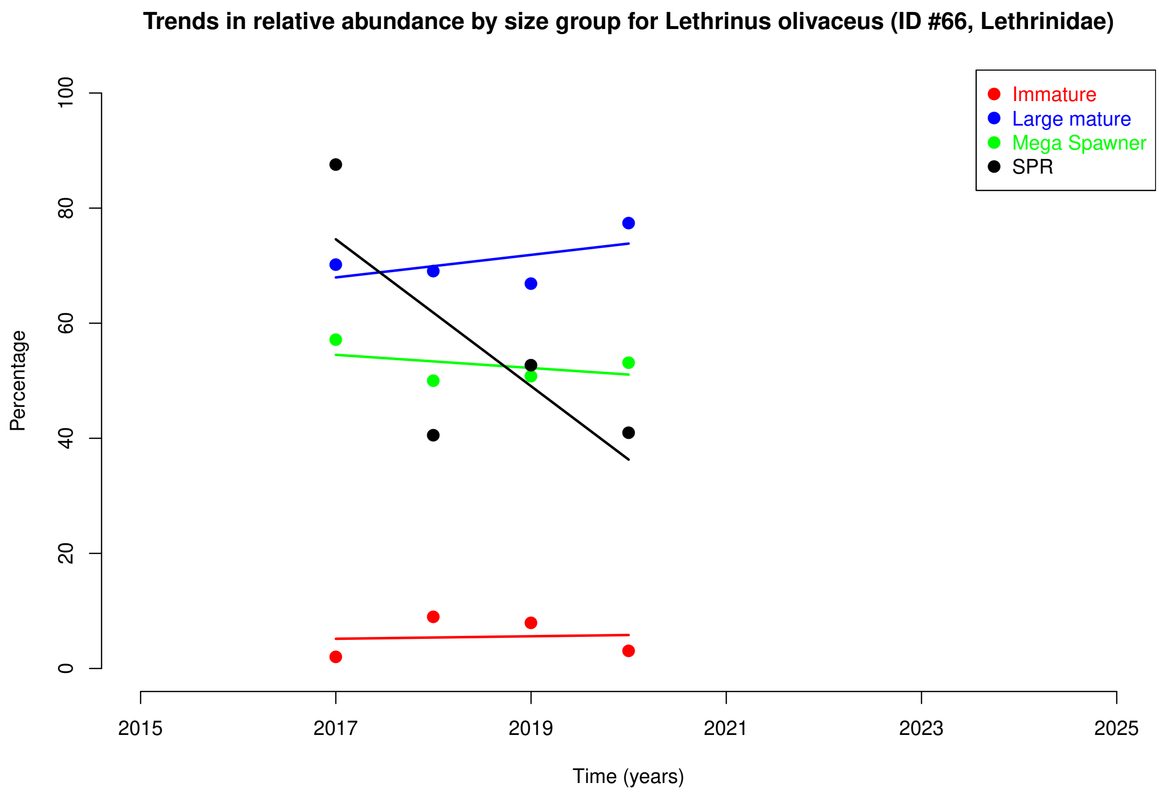
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

Less than 20% of the catch comprises of mega spawners. This indicates that the population may be severely affected by the fishery, and that there is a substantial risk of recruitment overfishing through over harvesting of the mega spawners, unless large numbers of mega spawners would be surviving at other habitats. There is no reason to assume that this is the case and therefore a reduction of fishing effort may be necessary in this fishery. Risk level is high.

SPR is less than 25%. The fishery probably over-exploits the stock, and there is a substantial risk that the fishery will cause severe decline of the stock if fishing effort is not reduced. Risk level is high.

Trends in relative abundance by size group for Pinjalo pinjalo (ID #23, Lutjanidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature falling over recent years, situation improving. P: 0.338
% Large Mature rising over recent years, situation improving. P: 0.409
% Mega Spawner rising over recent years, situation improving. P: 0.288
% SPR rising over recent years, situation improving. P: 0.634


Catch length frequency for Lethrinus olivaceus (ID #66, Lethrinidae)
Most Recent 365 Days. N (Catch) = 27,797, n (Sample) = 1,543.
5 %
22 %
73 %
Trade Limit 27 cm
L−maturity 44 cm
L−optimum 59 cm
L−infinity 87 cm
L−max 97 cm
L−median 65 cm
Lx−codrs 97 cm
SPR 46 %
Trade Limit
L−maturity
L−optimum
L−median
L−infinity
L−max
Frequency
Total Length (cm)


Trends in relative abundance by size group for Lethrinus olivaceus (ID #66, Lethrinidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
Time (years)

The percentages of Lethrinus olivaceus (ID #66, Lethrinidae) in most recent 365 days.
N (Catch) =27,797, n (Sample) = 1,543
Immature (< 44cm): 5%
Small mature (>= 44cm, < 59cm): 22%
Large mature (>= 59cm): 73%
Mega spawner (>= 64.9cm): 52% (subset of large mature fish)
Spawning Potential Ratio: 46 %

The trade limit is significantly lower than the length at first maturity. This means that the trade encourages capture of immature fish, which impairs sustainability. Risk level is high.

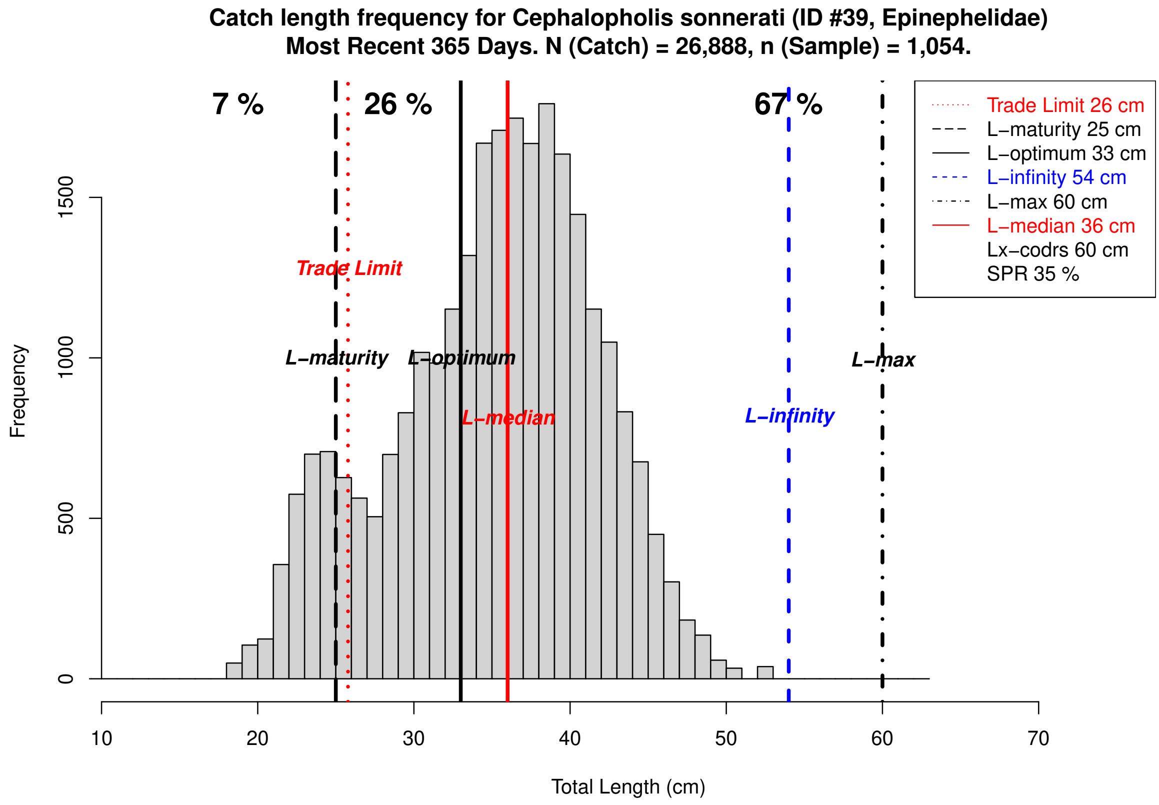
At least 90% of the fish in the catch are mature specimens that have spawned at least once before they were caught. The fishery does not depend on immature size classes for this species and is considered safe for this indicator. This fishery will not be causing overfishing through over harvesting of juveniles for this species. Risk level is low.

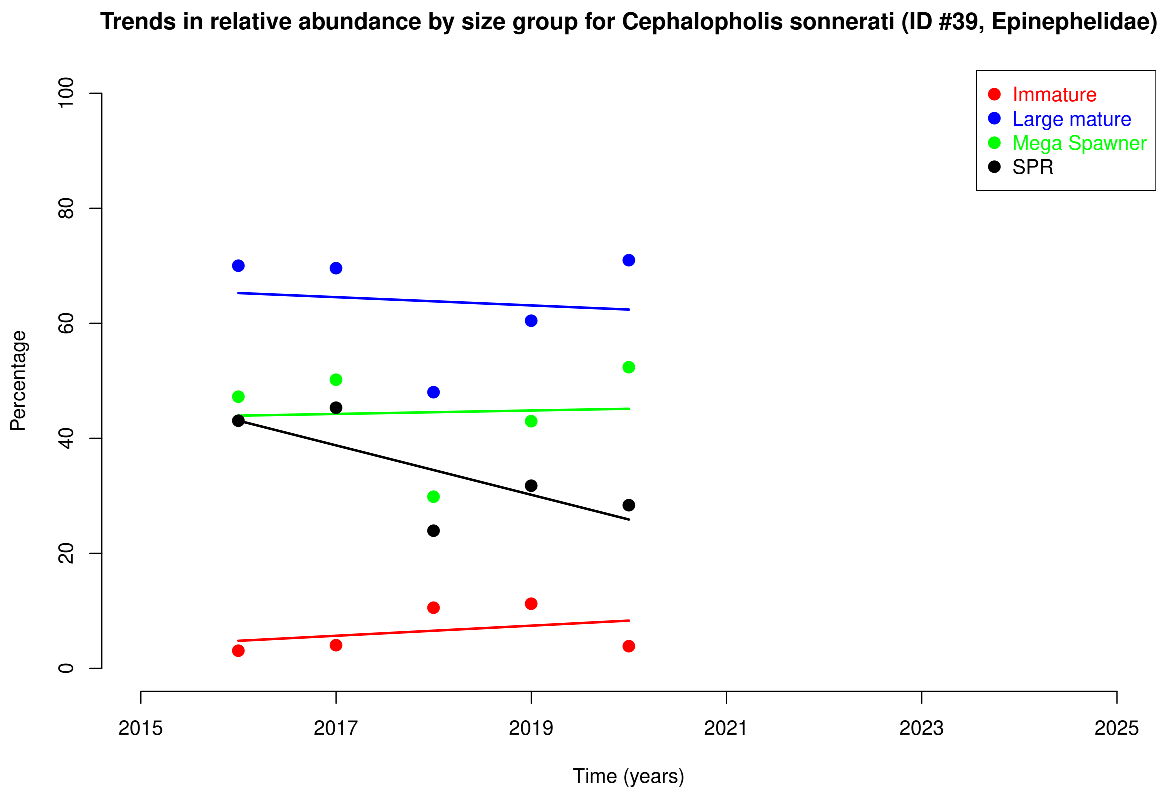
The majority of the catch consists of size classes around or above the optimum harvest size. This means that the impact of the fishery is minimized for this species. Potentially higher yields of this species could be achieved by catching them at somewhat smaller size, although capture of smaller specimen may take place already in other fisheries. Risk level is low.

More than 30% of the catch consists of mega spawners which indicates that this fish population is in good health unless large amounts of much smaller fish from the same population are caught by other fisheries. Risk level is low.

SPR is more than 40%. The stock is probably not over exploited, and the risk that the fishery will cause further stock decline is small. Risk level is low.

Trends in relative abundance by size group for Lethrinus olivaceus (ID #66, Lethrinidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature rising over recent years, situation deteriorating. P: 0.919
% Large Mature rising over recent years, situation improving. P: 0.444
% Mega Spawner falling over recent years, situation deteriorating. P: 0.539
% SPR falling over recent years, situation deteriorating. P: 0.255


Catch length frequency for Cephalopholis sonnerati (ID #39, Epinephelidae)
Most Recent 365 Days. N (Catch) = 26,888, n (Sample) = 1,054.
7 %
26 %
67 %
Trade Limit
L−maturity
L−optimum
L−median
L−infinity
L−max
Trade Limit 26 cm
L−maturity 25 cm
L−optimum 33 cm
L−infinity 54 cm
L−max 60 cm
L−median 36 cm
Lx−codrs 60 cm
SPR 35 %
Frequency
0
500
1000
1500
10
20
30
40
50
60
70
Total Length (cm)


Trends in relative abundance by size group for Cephalopholis sonnerati (ID #39, Epinephelidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
0
20
40
60
80
100
2015
2017
2019
2021
2023
2025
Time (years)

The percentages of Cephalopholis sonnerati (ID #39, Epinephelidae) in most recent 365 days.
N (Catch) =26,888, n (Sample) = 1,054
Immature (< 25cm): 7%
Small mature (>= 25cm, < 33cm): 26%
Large mature (>= 33cm): 67%
Mega spawner (>= 36.3cm): 49% (subset of large mature fish)
Spawning Potential Ratio: 35 %

The trade limit is about the same as the length at first maturity. This means that the trade puts a premium on fish that have spawned at least once, which improves sustainability of the fishery. Risk level is medium.

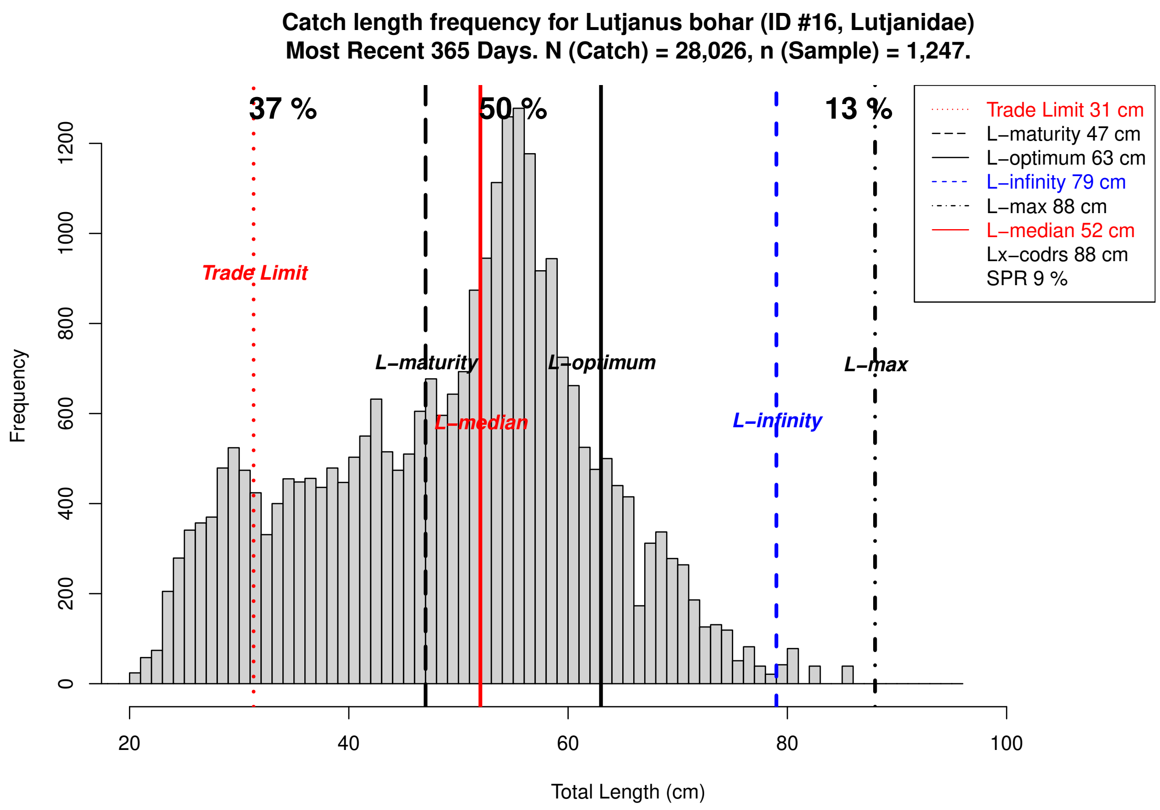
At least 90% of the fish in the catch are mature specimens that have spawned at least once before they were caught. The fishery does not depend on immature size classes for this species and is considered safe for this indicator. This fishery will not be causing overfishing through over harvesting of juveniles for this species. Risk level is low.

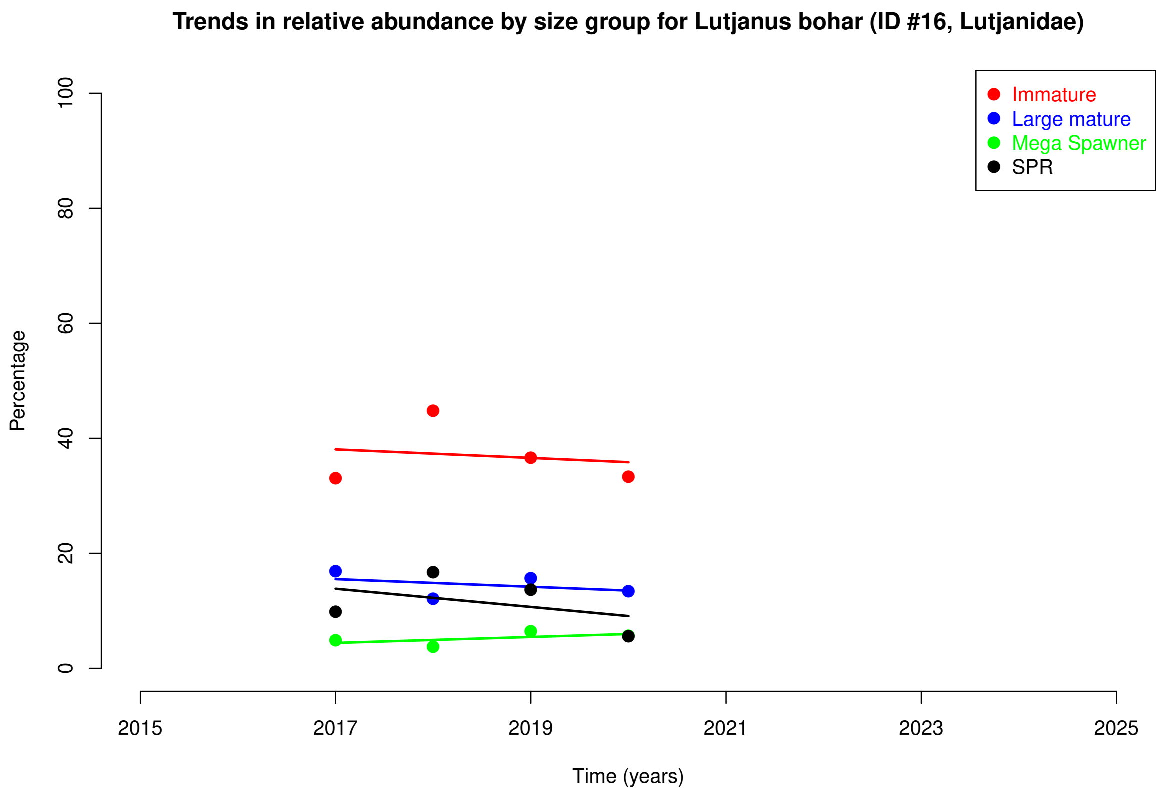
The majority of the catch consists of size classes around or above the optimum harvest size. This means that the impact of the fishery is minimized for this species. Potentially higher yields of this species could be achieved by catching them at somewhat smaller size, although capture of smaller specimen may take place already in other fisheries. Risk level is low.

More than 30% of the catch consists of mega spawners which indicates that this fish population is in good health unless large amounts of much smaller fish from the same population are caught by other fisheries. Risk level is low.

SPR is between 25% and 40%. The stock is heavily exploited, and there is some risk that the fishery will cause further decline of the stock. Risk level is medium.

Trends in relative abundance by size group for Cephalopholis sonnerati (ID #39, Epinephelidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature rising over recent years, situation deteriorating. P: 0.567
% Large Mature falling over recent years, situation deteriorating. P: 0.853
% Mega Spawner rising over recent years, situation improving. P: 0.933
% SPR falling over recent years, situation deteriorating. P: 0.162


Catch length frequency for Lutjanus bohar (ID #16, Lutjanidae)
Most Recent 365 Days. N (Catch) = 28,026, n (Sample) = 1,247.
37 %
50 %
13 %
Trade Limit 31 cm
L−maturity 47 cm
L−optimum 63 cm
L−infinity 79 cm
L−max 88 cm
L−median 52 cm
Lx−codrs 88 cm
SPR 9 %
Trade Limit
L−maturity
L−optimum
L−median
L−infinity
L−max
Frequency
Total Length (cm)
0
200
400
600
800
1000
1200
20
40
60
80
100


Trends in relative abundance by size group for Lutjanus bohar (ID #16, Lutjanidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
Time (years)
0
20
40
60
80
100
2015
2017
2019
2021
2023
2025

The percentages of Lutjanus bohar (ID #16, Lutjanidae) in most recent 365 days.
N (Catch) =28,026, n (Sample) = 1,247
Immature (< 47cm): 37%
Small mature (>= 47cm, < 63cm): 50%
Large mature (>= 63cm): 13%
Mega spawner (>= 69.3cm): 5% (subset of large mature fish)
Spawning Potential Ratio: 9 %

The trade limit is significantly lower than the length at first maturity. This means that the trade encourages capture of immature fish, which impairs sustainability. Risk level is high.

Between 30% and 50% of the fish in the catch are immature and have not had a chance to reproduce before capture. The fishery is in immediate danger of overfishing through overharvesting of juveniles, if fishing pressure is high. Catching small and immature fish needs to be actively avoided and a limit on overall fishing pressure is warranted. Risk level is high.

The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

Less than 20% of the catch comprises of mega spawners. This indicates that the population may be severely affected by the fishery, and that there is a substantial risk of recruitment overfishing through over harvesting of the mega spawners, unless large numbers of mega spawners would be surviving at other habitats. There is no reason to assume that this is the case and therefore a reduction of fishing effort may be necessary in this fishery. Risk level is high.

SPR is less than 25%. The fishery probably over-exploits the stock, and there is a substantial risk that the fishery will cause severe decline of the stock if fishing effort is not reduced. Risk level is high.

Trends in relative abundance by size group for Lutjanus bohar (ID #16, Lutjanidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature falling over recent years, situation improving. P: 0.825
% Large Mature falling over recent years, situation deteriorating. P: 0.601
% Mega Spawner rising over recent years, situation improving. P: 0.413
% SPR falling over recent years, situation deteriorating. P: 0.576

Table 4.1: Values of indicators over the most recent 365 days in length-based assessments for the top 50 most abundant species by total CODRS samples in WPP 713.

Rank	#ID	Species	Trade Limit Prop. Lmat	Immature %	Exploitation %	Mega Spawn %	SPR %
1	45	Epinephelus areolatus	1.31	2	50	30	13
2	17	Lutjanus malabaricus	0.66	56	92	3	4
3	27	Lutjanus vitta	1.20	6	92	1	1
4	7	Pristipomoides multidens	0.73	33	85	4	14
5	90	Diagramma pictum	1.02	7	47	40	83
6	18	Lutjanus sebae	0.61	88	99	0	0
7	1	Aphareus rutilans	0.78	53	87	6	9
8	63	Lethrinus lentjan	1.05	1	46	23	21
9	21	Lutjanus erythropterus	0.86	55	96	1	2
10	70	Gymnocranius grandoculis	0.85	36	70	21	36
11	8	Pristipomoides typus	0.80	39	92	1	8
12	19	Lutjanus timorensis	0.98	44	93	2	3
13	80	Caranx sexfasciatus	1.24	35	64	24	65
14	61	Plectropomus leopardus	1.08	4	40	43	65
15	75	Carangoides chrysophrys	1.17	38	79	12	28
16	22	Pinjalo lewisi	0.96	25	94	1	2
17	23	Pinjalo pinjalo	0.76	37	82	9	15
18	66	Lethrinus olivaceus	0.62	5	27	52	46
19	39	Cephalopholis sonnerati	1.03	7	33	49	35
20	16	Lutjanus bohar	0.67	37	87	5	9
21	50	Epinephelus coioides	0.96	7	61	24	40
22	28	Lutjanus boutton	1.20	0	42	24	37
23	15	Lutjanus argentimaculatus	0.62	12	72	9	19
24	5	Etelis radiosus	0.71	65	90	5	8
25	37	Cephalopholis miniata	1.55	0	4	83	63
26	67	Lethrinus amboinensis	1.00	3	50	31	25
27	6	Etelis coruscans	0.59	90	96	3	0
28	20	Lutjanus gibbus	1.07	8	64	21	24
29	62	Variola albimarginata	1.45	0	9	80	80
30	60	Plectropomus maculatus	0.91	14	63	25	42
31	4	Etelis sp.	0.50	57	86	8	13
32	9	Pristipomoides filamentosus	0.69	97	100	0	0
33	86	Argyrops spinifer	1.16	8	65	18	24
34	84	Seriola rivoliana	1.00	33	76	14	17
35	71	Gymnocranius griseus	1.53	0	42	38	41
36	76	Carangoides gymnostethus	1.09	1	78	18	15
37	72	Carangoides coeruleopinnatus	1.29	61	96	1	2
38	94	Sphyraena forsteri	1.45	14	66	21	28
39	25	Lutjanus russelli	1.02	5	77	5	7
40	81	Caranx tille	1.30	18	69	26	64
41	98	Rachycentron canadum	0.96	29	89	4	7
42	78	Caranx ignobilis	0.89	17	76	13	17
43	73	Carangoides fulvoguttatus	0.97	28	57	34	81
44	53	Epinephelus heniochus		unknown	unknown	unknown	unknown
45	33	Paracaesio xanthura	0.98	38	87	5	4
46	82	Elagatis bipinnulata	1.13	6	42	29	10
47	46	Epinephelus bleekeri	0.85	5	35	48	47
48	2	Aprion virescens	0.81	9	47	23	16
49	10	Pristipomoides sieboldii	0.83	58	100	0	0
50	31	Symphorus nematophorus		unknown	unknown	unknown	unknown

Table 4.2: Risk levels in the fisheries over the most recent 365 days
for the top 50 most abundant species by total CODRS samples in WPP 713.

Rank	#ID	Species	Trade Limit	Immature	Exploitation	Mega Spawn	SPR
1	45	Epinephelus areolatus	low	low	low	medium	high
2	17	Lutjanus malabaricus	high	high	high	high	high
3	27	Lutjanus vitta	low	low	high	high	high
4	7	Pristipomoides multidens	high	high	high	high	high
5	90	Diagramma pictum	medium	low	low	low	low
6	18	Lutjanus sebae	high	high	high	high	high
7	1	Aphareus rutilans	high	high	high	high	high
8	63	Lethrinus lentjan	medium	low	low	medium	high
9	21	Lutjanus erythropterus	high	high	high	high	high
10	70	Gymnocranius grandoculis	high	high	high	medium	medium
11	8	Pristipomoides typus	high	high	high	high	high
12	19	Lutjanus timorensis	medium	high	high	high	high
13	80	Caranx sexfasciatus	low	high	medium	medium	low
14	61	Plectropomus leopardus	medium	low	low	low	low
15	75	Carangoides chrysophrys	low	high	high	high	medium
16	22	Pinjalo lewisi	medium	medium	high	high	high
17	23	Pinjalo pinjalo	high	high	high	high	high
18	66	Lethrinus olivaceus	high	low	low	low	low
19	39	Cephalopholis sonnerati	medium	low	low	low	medium
20	16	Lutjanus bohar	high	high	high	high	high
21	50	Epinephelus coioides	medium	low	medium	medium	medium
22	28	Lutjanus boutton	low	low	low	medium	medium
23	15	Lutjanus argentimaculatus	high	medium	high	high	high
24	5	Etelis radiosus	high	high	high	high	high
25	37	Cephalopholis miniata	low	low	low	low	low
26	67	Lethrinus amboinensis	medium	low	low	low	high
27	6	Etelis coruscans	high	high	high	high	high
28	20	Lutjanus gibbus	medium	low	medium	medium	high
29	62	Variola albimarginata	low	low	low	low	low
30	60	Plectropomus maculatus	medium	medium	medium	medium	low
31	4	Etelis sp.	high	high	high	high	high
32	9	Pristipomoides filamentosus	high	high	high	high	high
33	86	Argyrops spinifer	low	low	medium	high	high
34	84	Seriola rivoliana	medium	high	high	high	high
35	71	Gymnocranius griseus	low	low	low	low	low
36	76	Carangoides gymnostethus	medium	low	high	high	high
37	72	Carangoides coeruleopinnatus	low	high	high	high	high
38	94	Sphyraena forsteri	low	medium	high	medium	medium
39	25	Lutjanus russelli	medium	low	high	high	high
40	81	Caranx tille	low	medium	high	medium	low
41	98	Rachycentron canadum	medium	medium	high	high	high
42	78	Caranx ignobilis	high	medium	high	high	high
43	73	Carangoides fulvoguttatus	medium	medium	medium	low	low
44	53	Epinephelus heniochus	unknown	unknown	unknown	unknown	unknown
45	33	Paracaesio xanthura	medium	high	high	high	high
46	82	Elagatis bipinnulata	low	low	low	medium	high
47	46	Epinephelus bleekeri	high	low	low	low	low
48	2	Aprion virescens	high	low	low	medium	high
49	10	Pristipomoides sieboldii	high	high	high	high	high
50	31	Symphorus nematophorus	unknown	unknown	unknown	unknown	unknown

Table 4.3: Trends during recent years for SPR and relative abundance by size group for the top 50 most abundant species by total CODRS samples in WPP 713.

Rank	#ID	Species	% Immature	% Large Mature	% Mega Spawner	% SPR
1	45	Epinephelus areolatus	**stable**	**deteriorating**	**deteriorating**	**deteriorating**
2	17	Lutjanus malabaricus	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
3	27	Lutjanus vitta	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
4	7	Pristipomoides multidens	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
5	90	Diagramma pictum	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
6	18	Lutjanus sebae	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
7	1	Aphareus rutilans	**improving**	**improving**	**improving**	**deteriorating**
8	63	Lethrinus lentjan	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
9	21	Lutjanus erythropterus	**improving**	**deteriorating**	**deteriorating**	**deteriorating**
10	70	Gymnocranius grandoculis	**stable**	**improving**	**improving**	**improving**
11	8	Pristipomoides typus	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
12	19	Lutjanus timorensis	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
13	80	Caranx sexfasciatus	**deteriorating**	**deteriorating**	**deteriorating**	**improving**
14	61	Plectropomus leopardus	**improving**	**deteriorating**	**deteriorating**	**deteriorating**
15	75	Carangoides chrysophrys	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
16	22	Pinjalo lewisi	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
17	23	Pinjalo pinjalo	**improving**	**improving**	**improving**	**improving**
18	66	Lethrinus olivaceus	**deteriorating**	**improving**	**deteriorating**	**deteriorating**
19	39	Cephalopholis sonnerati	**deteriorating**	**deteriorating**	**improving**	**deteriorating**
20	16	Lutjanus bohar	**improving**	**deteriorating**	**improving**	**deteriorating**
21	50	Epinephelus coioides	**improving**	**deteriorating**	**deteriorating**	**deteriorating**
22	28	Lutjanus boutton	**improving**	**deteriorating**	**deteriorating**	**improving**
23	15	Lutjanus argentimaculatus	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
24	5	Etelis radiosus	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
25	37	Cephalopholis miniata	**stable**	**improving**	**improving**	**improving**
26	67	Lethrinus amboinensis	**improving**	**deteriorating**	**deteriorating**	**improving**
27	6	Etelis coruscans	**deteriorating**	**improving**	**improving**	**stable**
28	20	Lutjanus gibbus	**improving**	**improving**	**improving**	**stable**
29	62	Variola albimarginata	**stable**	**improving**	**improving**	**improving**
30	60	Plectropomus maculatus	**unknown**	**unknown**	**unknown**	**unknown**
31	4	Etelis sp.	**improving**	**improving**	**improving**	**improving**
32	9	Pristipomoides filamentosus	**improving**	**improving**	**improving**	**stable**
33	86	Argyrops spinifer	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
34	84	Seriola rivoliana	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
35	71	Gymnocranius griseus	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
36	76	Carangoides gymnostethus	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
37	72	Carangoides coeruleopinnatus	**improving**	**improving**	**deteriorating**	**improving**
38	94	Sphyraena forsteri	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
39	25	Lutjanus russelli	**deteriorating**	**improving**	**deteriorating**	**deteriorating**
40	81	Caranx tille	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
41	98	Rachycentron canadum	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
42	78	Caranx ignobilis	**improving**	**improving**	**improving**	**improving**
43	73	Carangoides fulvoguttatus	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
44	53	Epinephelus heniochus	**improving**	**deteriorating**	**deteriorating**	**deteriorating**
45	33	Paracaesio xanthura	**improving**	**improving**	**improving**	**improving**
46	82	Elagatis bipinnulata	**deteriorating**	**improving**	**improving**	**improving**
47	46	Epinephelus bleekeri	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
48	2	Aprion virescens	**unknown**	**unknown**	**unknown**	**unknown**
49	10	Pristipomoides sieboldii	**unknown**	**unknown**	**unknown**	**unknown**
50	31	Symphorus nematophorus	**unknown**	**unknown**	**unknown**	**unknown**

5 Discussion and conclusions

Bottom long line fishing for snappers, groupers, emperors and grunts in WPP 713 occurs on the shelf areas and tops of slopes mainly on the West side of the Makassar Strait, with effort concentrated on the boundary of WPP 713 and WPP 712 in the Java Sea. Preferred bottom long line fishing grounds have a relatively flat bottom profile at depths ranging from 50 to 150 meters. Drop line fishing for the same general species spectrum occurs around deep reefs on the shelf and down steeper slopes into the Makassar Strait and into the Bali Sea, Flores Sea and Gulf of Bone, mainly at depths between 50 and 500 meters. Snappers, groupers and emperors in WPP 713 are also targeted with deep set bottom gillnets, as well as in mixed gear fisheries, which operate multiple gear types simultaneously. Hook and line and gillnet fishing grounds in WPP 713 overlap in the Java Sea with those heavily fished by Danish seine, a dragging gear type locally known as "cantrang". Species overlap is not extensive between these gear types but gear interactions do create problems. Danish seine operations have been spreading to shelf areas along the coast of South Sulawesi since 2017.

The deep water drop line fishery for snappers, groupers and emperors is a fairly clean fishery when it comes to the species spectrum in the catch, even though it is much more species-rich then sometimes is assumed, also within the snapper category, which forms the main target group. The bottom long line fishery is characterized by a more substantial by-catch of small sharks, cobia and trevallies (Table 5.7 and Table 5.8). By-catch species are usually sold into separate supply lines, outside of the catch of snappers, groupers and emperors, which goes to the traders supplying middle and higher end local and export markets.

Drop line fisheries are characterized by a very low impact on habitat at the fishing grounds, whereas some more (but still very limited) impact from entanglement can be expected from bottom long lines. Nothing near the habitat impact from destructive dragging gears is evident from either one of the two deep hook and line fisheries. However, due to limited available habitat (fishing grounds) and predictable locations of fish concentrations, combined with a very high fishing effort on the best known fishing grounds, as well as the targeting of juveniles, there is a very high potential for overfishing in the demersal fisheries for snappers groupers and emperors.

Risks of overfishing are high for all the larger snappers which are commonly targeted on deep slopes in WPP 713 (Table 4.1 and Table 4.2), and SPR is dangerously low (Table 5.1) especially for those species which complete their life cycle in the habitats covered by the fishing grounds and which at the same time are easily caught with drop line and bottom long line gears. Snapper feeding aggregations are at predictable and well known locations and the snappers are therefore among the most vulnerable species in these fisheries. Fishing mortality (from deep slope hook and line fisheries combined with trap and gillnet fisheries) among all major target snapper species seems to be unacceptably high while the catches of these species include large percentages of relatively small and immature specimen. For many species of snappers, sizes are consistently targeted and landed well below the size where these fish reach maturity. Large specimen of the major target species are already becoming extremely rare on the main fishing grounds.

Fishing effort and fishing mortality have been far too high in recent years in WPP 713 and the situation is currently not improving. Time trends for the top 10 snapper species (ranked by abundance) either show continued decline of the stocks or unclear patterns, judging from trends in size based indicators (Table 4.3). Those trends in length based indicators can also be compared with trends in CpUE by gear types and boat size category (Tables 5.2 to 5.6), although fishing at aggregating sites (including bottom FADs) may be masking the direct effect on CpUE. We do see that for many fleet segments the CpUE is lower in WPP 713 than in some of the Eastern fisheries management areas, which may be part of the reason that more and more vessels from Western Indonesia are moving their operations to the East, all the way to the Arafura Sea in WPP 718.

Overall we are currently looking mainly at a high risk of overfishing for all major snapper species in WPP 713, combined with a worrisome trend of deterioration in these snapper stocks, based on the size based stock assessments from the bottom long line fisheries. Interestingly though, the groupers seem to be less vulnerable to the deep slope hook and line fisheries than the snappers are. Impact by the deep slope drop line and long line fisheries on grouper populations is limited compared to the snappers. This may be because most groupers are staying closer to high rugosity bottom habitat, which is avoided by long line vessels due to risk of entanglement, while drop line fishers are targeting schooling snappers that are hovering higher in the water column, above the grouper habitat.

Fishing mortality (from deep slope hook and line fisheries) in large mature groupers seems to be considerably lower than what we see for the snappers. Groupers generally mature as females at a size relative to their maximum size which is lower than for snappers. This strategy enables them to reproduce before they are being caught, although fecundity is still relatively low at sizes below the optimum length. Fecundity for the population as a whole peaks at the optimum size for each species, and this is also the size around which sex change from females to males happens in groupers. Separate analysis of all grouper data shows that most groupers have already reached or passed their optimum size (and the size where sex change takes place) when they are caught by the deep slope hook and line fisheries.

For those grouper species which spend all or most of their life cycle in these habitats, the relatively low vulnerability to the deep slope hook and line fisheries is very good news. For other grouper species which spend major parts of their life cycle in shallower habitats, like coral reefs or mangroves or estuaries for example, the reality is that their populations in general are in extremely bad shape due to excessive fishing pressure by small scale fisheries in those shallower habitats. This situation is also evident for a few snapper species such as for example the mangrove jack.

Overall there is a clear scope for some straightforward fisheries improvements supported by relatively uncomplicated fisheries management policies and regulations. Our first recommendation for industry-led fisheries improvements is for traders to adjust trading limits (incentives to fishers) species by species (which they are basically doing already) to the length at maturity for each species. For a number of important species the trade limits need adjustments upwards, with government support through regulations on minimum allowable sizes. Many of the deep water snappers are traded at sizes that are too small, and this impairs sustainability. The impact is clearly visible already in landed catches.

Adjustment upwards of trading limits towards the size at first maturity would be a straightforward improvement in these fisheries. By refusing undersized fish in high value supply lines, the market can provide incentives for captains of fishing boats to target larger specimen. The captains can certainly do this by using their day to day experiences, selecting locations, fishing depths, habitat types, hook sizes, etc. Literature data shows habitat separation between size groups in many species, as well as size selectivity of specific hook sizes. Captains know about this from experience.

Market preference for certain (small) size classes (like "plate size" and "golden size" fillets) could potentially be adjusted by awareness campaigns that clarify to the public that such sizes for many species actually represent immature juveniles and targeting these specifically will impair fisheries sustainability. Filleting techniques for larger fish can be adjusted to relatively thin slicing under an angle to produce similar cuts as plate size fillets (skinless "natural cuts"), instead of the currently more common cutting of thick "portions" from large fillets, which are less preferred in some markets. Such industry-led improvements would need to be supported by size based policies and regulations like minimum sizes to ensure effectiveness across the market.

Some of the less well known snapper species (such as some of the Paracaesio species) are actually good quality fish that are caught in great quantities, but are under-valued in the trade as they are simply not known by high end buyers and lack the valuable color red. Awareness campaigns (including tasting tests) on the quality of these species could help to support fishing companies obtain better prices for these species and offset with that some of the temporary losses that may occur when undersized fish will be actively avoided.

Besides size selectivity, fishing effort is a very important factor in resulting overall catch and size frequency of the catch. All major target snappers show a rapid decline in numbers above the size where the species becomes most vulnerable to the fisheries. This rapid decline in numbers, as visible in the LFD graphs, indicates a high fishing mortality for the vulnerable size classes. Fishing effort is probably too high to be sustainable and many species seem to be at risk in the deep drop and long line fisheries, judging from a number of indicators as presented in this report. At present these fisheries show clear signs of over-exploitation in WPP 713.

One urgently needed fisheries management intervention is to cap fishing effort (number of boats) at current level and to start looking at incentives for effort reductions. A reduction of effort will need to be supported and implemented by government to ensure an even playing field among fishing companies. An improved licensing system and an effort control system based on the Indonesia's mandatory Vessel Monitoring System, using more accurate data on Gross Tonnage for all fishing boats, could be used to better manage fishing effort. Continuous monitoring of trends in the various presented indicators will show in which direction these fisheries are heading and what the effects are of any fisheries management measures in future years.

Government policies and regulations are needed and can be formulated to support fishers and traders with the implementation of improvements across the sector. Our recommendations for supporting government policies in relation to the snapper fisheries include:

- Use scientific (Latin) fish names in fisheries management and in trade.
- Incorporate length-based assessments in management of specific fisheries.
- Develop species-specific length based regulations for these fisheries.
- Implement a controlled access management system for regulation of fishing effort on specific fishing grounds.
- Increase public awareness on unknown species and preferred size classes by species.
- Incorporate traceability systems in fleet management by fisheries and by fishing ground.

Recommendations for specific regulations may include:

- Make mandatory correct display of scientific name (correct labeling) of all traded fish (besides market name).
- Adopt legal minimum sizes for specific or even all traded species, at the length at maturity for each species.
- Make mandatory for each fishing vessel of all sizes to carry a simple GPS tracking device that needs to be functioning at all times. Indonesia already has a mandatory Vessel Monitoring System for vessels larger than 30 GT, so Indonesia could consider expanding this requirement to fishing vessels of smaller sizes.
- Cap fishing effort in the snapper fisheries at the current level and explore options to reduce effort to more sustainable levels.

Table 5.1: SPR values over the period 2016 to 2024 for the top 20 most abundant species in CODRS samples in WPP 713, based on total catch LFD analysis, for all gear types combined and adjusted for relative effort by gear type.

Rank	Species	2016	2017	2018	2019	2020	2021	2022	2023	2024
1	Epinephelus areolatus	27	13	11	10	13	NA	NA	NA	NA
2	Lutjanus malabaricus	20	12	4	4	5	NA	NA	NA	NA
3	Lutjanus vitta	19	1	0	0	1	NA	NA	NA	NA
4	Pristipomoides multidens	20	30	12	15	11	NA	NA	NA	NA
5	Diagramma pictum	100	85	100	75	68	NA	NA	NA	NA
6	Lutjanus sebae	1	1	0	1	1	NA	NA	NA	NA
7	Aphareus rutilans	NA	NA	9	3	9	NA	NA	NA	NA
8	Lethrinus lentjan	NA	41	17	19	25	NA	NA	NA	NA
9	Lutjanus erythropterus	NA	2	3	1	1	NA	NA	NA	NA
10	Gymnocranius grandoculis	16	20	12	32	41	NA	NA	NA	NA
11	Pristipomoides typus	20	8	4	7	7	NA	NA	NA	NA
12	Lutjanus timorensis	18	9	6	4	3	NA	NA	NA	NA
13	Caranx sexfasciatus	NA	NA	45	40	51	NA	NA	NA	NA
14	Plectropomus leopardus	NA	74	50	54	55	NA	NA	NA	NA
15	Carangoides chrysophrys	NA	24	41	23	14	NA	NA	NA	NA
16	Pinjalo lewisi	NA	2	5	1	1	NA	NA	NA	NA
17	Pinjalo pinjalo	NA	NA	18	10	28	NA	NA	NA	NA
18	Lethrinus olivaceus	NA	88	41	53	41	NA	NA	NA	NA
19	Cephalopholis sonnerati	43	45	24	32	28	NA	NA	NA	NA
20	Lutjanus bohar	NA	10	17	14	6	NA	NA	NA	NA

Table 5.2: CpUE (kg/GT/day) trends by fleet segment for Aphareus rutilans in WPP 713

CpUE	2016	2017	2018	2019	2020	2021	2022	2023	2024
Nano Dropline	0.0	0.1	2.0	4.1	38.5	NA	NA	NA	NA
Nano Longline	0.0	0.1	0.8	1.1	6.0	NA	NA	NA	NA
Small Dropline	0.0	0.3	1.3	0.9	2.2	NA	NA	NA	NA
Small Longline	0.0	NA	0.0	0.1	0.3	NA	NA	NA	NA
Medium Dropline	0.0	0.1	0.5	0.8	0.1	NA	NA	NA	NA
Medium Longline	0.0	0.0	0.0	0.0	0.3	NA	NA	NA	NA
Large Dropline	0.0	0.1	1.0	1.1	6.0	NA	NA	NA	NA
Large Longline	0.0	0.0	0.8	1.1	6.0	NA	NA	NA	NA

Table 5.3: CpUE (kg/GT/day) trends by fleet segment for Lutjanus malabaricus in WPP 713

CpUE	2016	2017	2018	2019	2020	2021	2022	2023	2024
Nano Dropline	0.6	1.0	NA	0.4	0.2	NA	NA	NA	NA
Nano Longline	0.6	1.0	0.9	1.1	1.2	NA	NA	NA	NA
Small Dropline	0.6	0.3	0.3	0.5	0.7	NA	NA	NA	NA
Small Longline	0.6	3.6	1.6	0.6	0.1	NA	NA	NA	NA
Medium Dropline	0.6	1.0	0.8	0.6	1.0	NA	NA	NA	NA
Medium Longline	0.7	0.8	1.5	2.2	2.5	NA	NA	NA	NA
Large Dropline	0.6	1.0	NA	1.1	1.2	NA	NA	NA	NA
Large Longline	0.3	0.2	0.9	1.1	1.2	NA	NA	NA	NA

Table 5.4: CpUE (kg/GT/day) trends by fleet segment for Pristipomoides multidens in WPP 713

CpUE	2016	2017	2018	2019	2020	2021	2022	2023	2024
Nano Dropline	2.1	1.0	NA	3.7	0.6	NA	NA	NA	NA
Nano Longline	2.1	1.0	0.4	1.1	0.5	NA	NA	NA	NA
Small Dropline	2.1	0.0	0.1	0.2	0.3	NA	NA	NA	NA
Small Longline	2.1	0.3	0.1	4.8	4.1	NA	NA	NA	NA
Medium Dropline	2.1	1.0	0.2	0.5	0.0	NA	NA	NA	NA
Medium Longline	2.3	1.6	1.0	0.3	0.2	NA	NA	NA	NA
Large Dropline	2.1	1.0	NA	1.1	0.5	NA	NA	NA	NA
Large Longline	0.7	0.5	0.4	1.1	0.5	NA	NA	NA	NA

Table 5.5: CpUE (kg/GT/day) trends by fleet segment for Etelis sp. in WPP 713

CpUE	2016	2017	2018	2019	2020	2021	2022	2023	2024
Nano Dropline	NA	0.0	NA	1.1	0.0	NA	NA	NA	NA
Nano Longline	NA	0.0	0.1	0.5	0.3	NA	NA	NA	NA
Small Dropline	NA	0.0	0.4	0.5	0.3	NA	NA	NA	NA
Small Longline	NA	NA	NA	NA	NA	NA	NA	NA	NA
Medium Dropline	NA	0.0	0.1	1.3	1.0	NA	NA	NA	NA
Medium Longline	NA	0.0	0.0	NA	0.0	NA	NA	NA	NA
Large Dropline	NA	0.0	NA	0.5	0.3	NA	NA	NA	NA
Large Longline	NA	NA	0.1	0.5	0.3	NA	NA	NA	NA

Table 5.6: CpUE (kg/GT/day) trends by fleet segment for all species in WPP 713

CpUE	2016	2017	2018	2019	2020	2021	2022	2023	2024
Nano Dropline	3.7	4.5	4.5	22.4	46.4	NA	NA	NA	NA
Nano Longline	3.7	4.5	5.9	9.9	12.9	NA	NA	NA	NA
Small Dropline	3.7	4.6	9.1	10.4	12.4	NA	NA	NA	NA
Small Longline	3.7	9.7	5.6	11.4	12.5	NA	NA	NA	NA
Medium Dropline	3.7	4.5	5.2	7.2	4.2	NA	NA	NA	NA
Medium Longline	4.0	4.0	4.8	5.9	6.4	NA	NA	NA	NA
Large Dropline	3.7	4.5	3.8	9.9	12.9	NA	NA	NA	NA
Large Longline	1.4	0.9	5.9	9.9	12.9	NA	NA	NA	NA

Table 5.7: Sample sizes over the period 2016 to 2024 for the others species in WPP 713 Dropline

Family Name	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total	%Catch
Acanthuridae	0	0	31	47	32	0	0	0	0	110	0.024
Ariidae	0	0	17	33	30	0	0	0	0	80	0.017
Ariommatidae	0	0	0	4	20	0	0	0	0	24	0.005
Balistidae	0	0	288	734	405	0	0	0	0	1427	0.306
Caesionidae	0	3	101	499	123	0	0	0	0	726	0.156
Carangidae	0	90	3179	6494	5918	0	0	0	0	15681	3.368
Chaetodontidae	0	0	0	5	1	0	0	0	0	6	0.001
Coryphaenidae	0	0	33	16	2	0	0	0	0	51	0.011
Ephippidae	0	0	11	5	1	0	0	0	0	17	0.004
Epinephelidae	0	25	342	350	176	0	0	0	0	893	0.192
Gempylidae	0	0	0	15	7	0	0	0	0	22	0.005
Glaucosomatidae	0	0	2	0	0	0	0	0	0	2	0.000
Haemulidae	0	2	7	11	10	0	0	0	0	30	0.006
Holocentridae	0	4	72	48	16	0	0	0	0	140	0.030
Istiophoridae	0	0	0	0	1	0	0	0	0	1	0.000
Labridae	0	0	5	6	2	0	0	0	0	13	0.003
Latidae	0	0	0	0	0	0	0	0	0	0	0.000
Lethrinidae	0	38	1129	1219	914	0	0	0	0	3300	0.709
Lutjanidae	0	41	943	553	265	0	0	0	0	1802	0.387
Malacanthidae	0	0	5	1	1	0	0	0	0	7	0.002
Monacanthidae	0	0	0	0	0	0	0	0	0	0	0.000
Mullidae	0	0	1	3	1	0	0	0	0	5	0.001
Muraenesocidae	0	0	0	0	0	0	0	0	0	0	0.000
Nemipteridae	0	59	396	877	283	0	0	0	0	1615	0.347
Other	0	345	808	341	97	0	0	0	0	1591	0.342
Pomacanthidae	0	0	0	0	0	0	0	0	0	0	0.000
Priacanthidae	0	0	134	118	77	0	0	0	0	329	0.071
Rachycentridae	0	0	0	0	5	0	0	0	0	5	0.001
Rays	0	0	8	1	3	0	0	0	0	12	0.003
Scaridae	0	0	6	13	19	0	0	0	0	38	0.008
Sciaenidae	0	0	0	0	0	0	0	0	0	0	0.000
Scombridae	0	1	2377	2102	1177	0	0	0	0	5657	1.215
Scorpaenidae	0	0	2	0	0	0	0	0	0	2	0.000
Serranidae	0	3	9	41	46	0	0	0	0	99	0.021
Sharks	0	2	53	15	16	0	0	0	0	86	0.018
Siganidae	0	0	1	0	0	0	0	0	0	1	0.000
Sparidae	0	0	0	1	0	0	0	0	0	1	0.000
Sphyraenidae	0	1	9	6	10	0	0	0	0	26	0.006
Sphyrnidae	0	0	0	0	0	0	0	0	0	0	0.000
Tetraodontidae	0	0	0	0	1	0	0	0	0	1	0.000
Trichiuridae	0	0	2	7	8	0	0	0	0	17	0.004
Total	0	614	9971	13565	9667	0	0	0	0	33817	7.262

Table 5.8: Sample sizes over the period 2016 to 2024 for the others species in WPP 713 Longline

Family Name	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total	%Catch
Acanthuridae	0	0	3	0	8	0	0	0	0	11	0.002
Ariidae	2	224	467	307	83	0	0	0	0	1083	0.233
Ariommatidae	0	0	0	0	0	0	0	0	0	0	0.000
Balistidae	0	0	57	64	13	0	0	0	0	134	0.029
Caesionidae	0	0	1	2	0	0	0	0	0	3	0.001
Carangidae	32	202	795	877	171	0	0	0	0	2077	0.446
Chaetodontidae	0	0	0	0	0	0	0	0	0	0	0.000
Coryphaenidae	0	0	8	2	0	0	0	0	0	10	0.002
Ephippidae	0	0	15	0	1	0	0	0	0	16	0.003
Epinephelidae	13	114	274	143	34	0	0	0	0	578	0.124
Gempylidae	0	0	0	0	2	0	0	0	0	2	0.000
Glaucosomatidae	0	0	0	0	0	0	0	0	0	0	0.000
Haemulidae	1	3	15	6	5	0	0	0	0	30	0.006
Holocentridae	1	64	53	33	1	0	0	0	0	152	0.033
Istiophoridae	0	0	0	0	0	0	0	0	0	0	0.000
Labridae	0	0	1	0	2	0	0	0	0	3	0.001
Latidae	0	0	0	0	0	0	0	0	0	0	0.000
Lethrinidae	49	201	649	808	172	0	0	0	0	1879	0.404
Lutjanidae	5	99	205	150	32	0	0	0	0	491	0.105
Malacanthidae	5	16	0	5	3	0	0	0	0	29	0.006
Monacanthidae	0	0	0	0	0	0	0	0	0	0	0.000
Mullidae	0	0	0	1	0	0	0	0	0	1	0.000
Muraenesocidae	0	0	0	0	1	0	0	0	0	1	0.000
Nemipteridae	5	182	1195	993	91	0	0	0	0	2466	0.530
Other	55	740	735	226	11	0	0	0	0	1767	0.379
Pomacanthidae	0	0	1	0	0	0	0	0	0	1	0.000
Priacanthidae	0	82	41	42	5	0	0	0	0	170	0.037
Rachycentridae	0	0	0	1	0	0	0	0	0	1	0.000
Rays	0	78	86	78	5	0	0	0	0	247	0.053
Scaridae	0	0	4	0	13	0	0	0	0	17	0.004
Sciaenidae	0	0	1	0	0	0	0	0	0	1	0.000
Scombridae	4	24	45	92	80	0	0	0	0	245	0.053
Scorpaenidae	0	0	0	1	0	0	0	0	0	1	0.000
Serranidae	0	0	12	5	16	0	0	0	0	33	0.007
Sharks	1	695	1611	737	130	0	0	0	0	3174	0.682
Siganidae	0	0	0	0	0	0	0	0	0	0	0.000
Sparidae	0	0	0	1	0	0	0	0	0	1	0.000
Sphyraenidae	9	18	64	103	24	0	0	0	0	218	0.047
Sphyrnidae	0	0	5	0	0	0	0	0	0	5	0.001
Tetraodontidae	0	0	2	0	0	0	0	0	0	2	0.000
Trichiuridae	0	0	0	0	0	0	0	0	0	0	0.000
Total	182	2742	6345	4677	903	0	0	0	0	14849	3.189

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