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Length-Based Stock Assessment Of A Species Complex In Deepwater Demersal Fisheries Targeting Snappers In Indonesia Fishery Management Area WPP 712

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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) 712, covering the Java Sea in between the North coast of Java and the South coast of Kalimantan (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 on the deeper parts of the Java Sea shelf from the Southern tip of Sumatra in the West to the deep slopes dropping into the Makassar Strait and the Bali Sea in the East. The majority of fleets and vessels on the fishing grounds in WPP 712 originate from the North coast of Java and they generally fish at depths ranging from 50 meters on the shelf to 250 meters down the deep slopes in the East.

Drop line, long line, fish trap and deep demersal gillnet vessels operate in WPP 712 alongside a number of other gear types including bottom dragging gear such as Danish seines, locally known as "cantrang". Danish seine catches include a different species spectrum than what we find in our target fisheries but gear interactions are a common problem here. Drop Line and bottom long line are by far the most important gear types in the fisheries targeting snappers, groupers, emperors and grunts. Bottom long line vessels fish on the shelf area as well as on the top of the slopes that drop to deeper waters, 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 Sea. The drop line fishery is an active vertical hook and line fishery operating at depths from 50 to 250 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 712 form a continuous habitat with the shelf area of the South China Sea to the West and the deep slope fishing grounds of the Makassar Strait in the East. The fisheries on those neighbouring fishing grounds will be assessed separately under WPP 711 (South China Sea) and WPP 713 (Makassar Strait). 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 and beyond the boundary between WPP 712 and WPP 713 utilize the same fishing grounds as vessels originating from Galesong in South Sulawesi. Vessels originating from islands inside WPP 711 often operate in WPP 712, while some fleets based within WPP 712 boundaries, especially the larger sized long liners from Probolinggo, operate mostly in Eastern Indonesia in WPP 718 and sometimes in WPP 573. This report only analyses catches from fishing grounds within WPP 712 boundaries, regardless of origin of fishing vessel.

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

Data in this report represent catches realized within WPP 712 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.

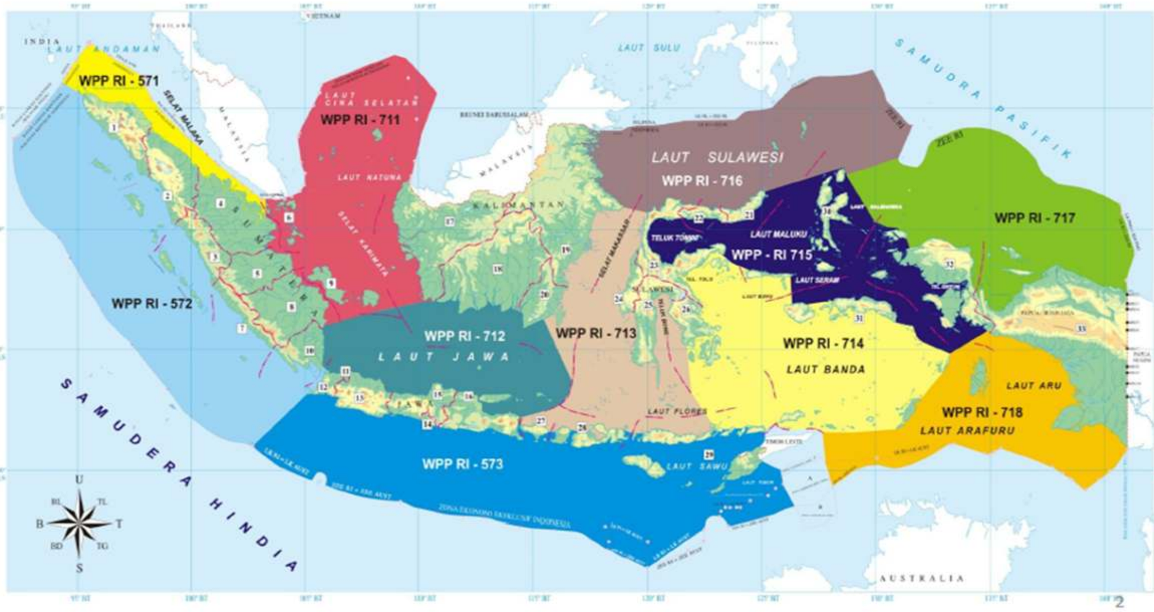


Figure 1.1: Fisheries Management Areas (*Wilayah Pengelolaan Perikanan* or WPP) in Indonesian marine waters.

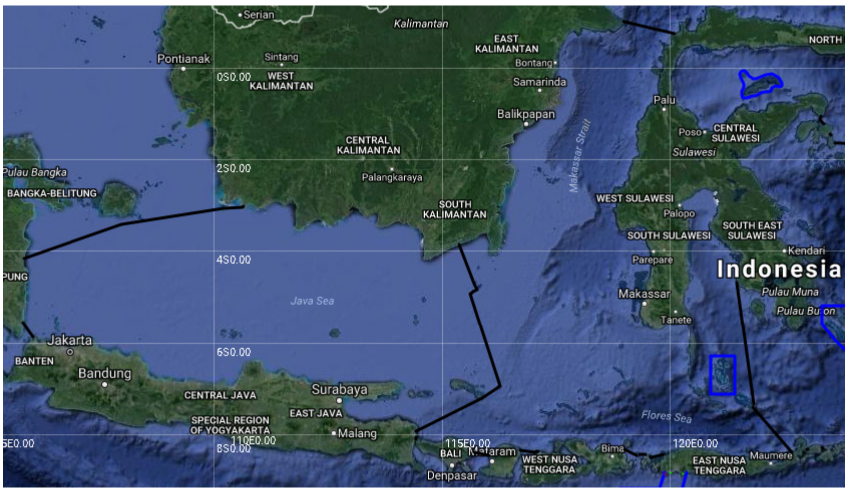


Figure 1.2: Bathymetric map of the Java Sea and the Makassar Strait, WPP 712 and WPP 713, in Central Indonesia. Black lines are WPP border, blue lines are MPAs.

[1] http://72.14.187.103:8080/ifish/pub/TNC_FishID.pdf
[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 712

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	17	Lutjanus malabaricus	500	0.009	3.137	FL	33.11	33.11	167695
2	45	Epinephelus areolatus	300	0.011	3.048	FL	28.18	28.77	77763
3	21	Lutjanus erythropterus	500	0.024	2.870	FL	31.79	31.79	64346
4	7	Pristipomoides multidens	500	0.020	2.944	FL	31.18	34.92	24183
5	27	Lutjanus vitta	300	0.017	2.978	FL	26.72	27.64	19356
6	23	Pinjalo pinjalo	300	0.014	2.970	FL	28.42	31.16	14578
7	90	Diagramma pictum	500	0.014	2.988	FL	33.08	36.71	13884
8	60	Plectropomus maculatus	500	0.016	3.000	FL	31.76	31.76	10608
9	75	Carangoides chrysophrys	1000	0.027	2.902	FL	37.68	42.12	10028
10	50	Epinephelus coioides	1500	0.011	3.084	TL	46.94	46.94	9511
11	63	Lethrinus lentjan	300	0.020	2.986	FL	25.16	26.35	9081
12	18	Lutjanus sebae	500	0.009	3.208	FL	29.97	31.26	8548
13	8	Pristipomoides typus	500	0.014	2.916	TL	36.16	36.16	4694
14	70	Gymnocranius grandoculis	500	0.032	2.885	FL	28.43	30.53	4547
15	24	Lutjanus johnii	300	0.020	2.907	FL	27.28	28.49	3494
16	46	Epinephelus bleekeri	300	0.009	3.126	TL	28.09	28.09	3346
17	76	Carangoides gymnostethus	1000	0.046	2.746	FL	37.88	41.55	2347
18	25	Lutjanus russelli	300	0.020	2.907	FL	27.28	28.49	1977
19	98	Rachycentron canadum	1000	0.003	3.088	FL	60.67	67.28	1950
20	81	Caranx tille	2000	0.032	2.930	FL	43.43	49.51	1936
21	72	Carangoides coeruleopinnatus	1000	0.032	2.902	FL	35.35	40.12	1890
22	39	Cephalopholis sonnerati	300	0.015	3.058	TL	25.78	25.78	1611
23	80	Caranx sexfasciatus	2000	0.032	2.930	FL	43.43	49.51	1539
24	19	Lutjanus timorensis	500	0.009	3.137	FL	33.11	33.34	674
25	95	Sphyraena putnamae	1500	0.008	2.931	FL	64.24	70.92	486
26	53	Epinephelus heniochus	300	0.061	2.624	FL	25.59	25.59	479
27	71	Gymnocranius griseus	500	0.032	2.885	FL	28.43	30.56	477
28	61	Plectropomus leopardus	500	0.012	3.060	FL	32.56	33.38	415
29	66	Lethrinus olivaceus	300	0.029	2.851	FL	25.49	27.50	353
30	94	Sphyraena forsteri	500	0.005	3.034	FL	43.51	49.16	341
31	15	Lutjanus argentimaculatus	500	0.034	2.792	FL	31.22	31.78	310
32	28	Lutjanus boutton	300	0.034	3.000	FL	20.75	21.56	295
33	91	Pomadasys kaakan	300	0.017	2.985	TL	26.57	26.57	286
34	41	Epinephelus latifasciatus	1500	0.010	3.088	TL	48.00	48.00	170
35	86	Argyrops spinifer	300	0.055	2.670	TL	25.11	27.87	162
36	9	Pristipomoides filamentosus	500	0.038	2.796	FL	29.70	33.27	156
37	78	Caranx ignobilis	2000	0.027	2.913	FL	46.78	54.36	147
38	82	Elagatis bipinnulata	1000	0.013	2.920	FL	46.53	55.37	142
39	58	Epinephelus amblycephalus	1500	0.012	3.057	TL	45.99	45.99	137
40	2	Aprion virescens	1000	0.023	2.886	FL	40.49	45.90	130
41	31	Symphorus nematophorus	1000	0.015	3.046	FL	38.63	40.18	130
42	26	Lutjanus lemniscatus	300	0.020	2.907	FL	27.28	28.49	122
43	97	Ostichthys japonicus	300	0.018	3.020	FL	25.10	26.23	103
44	84	Seriola rivoliana	2000	0.006	3.170	FL	54.23	60.03	93
45	55	Epinephelus epistictus	1500	0.009	3.126	TL	47.01	47.01	87
46	62	Variola albimarginata	300	0.012	3.079	FL	26.68	30.44	86
47	67	Lethrinus amboinensis	300	0.029	2.851	FL	25.49	28.06	78
48	99	Protonibea diacanthus	1000	0.013	2.940	TL	46.15	46.15	78
49	37	Cephalopholis miniata	300	0.026	2.864	TL	26.35	26.35	73
50	16	Lutjanus bohar	500	0.016	3.059	FL	29.70	31.31	72

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 712

Rank	Species	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
1	Lutjanus malabaricus	1534	7526	46033	69623	42979	0	0	0	0	167695
2	Epinephelus areolatus	2945	5351	20203	36626	12638	0	0	0	0	77763
3	Lutjanus erythropterus	40	1816	17367	25398	19725	0	0	0	0	64346
4	Pristipomoides multidens	7219	3255	3561	6232	3916	0	0	0	0	24183
5	Lutjanus vitta	579	858	4567	10664	2688	0	0	0	0	19356
6	Pinjalo pinjalo	0	126	3510	8971	1971	0	0	0	0	14578
7	Diagramma pictum	99	485	4003	7337	1960	0	0	0	0	13884
8	Plectropomus maculatus	4	138	3566	5022	1878	0	0	0	0	10608
9	Carangoides chrysophrys	45	271	1822	5854	2036	0	0	0	0	10028
10	Epinephelus coioides	9	105	1780	5733	1884	0	0	0	0	9511
11	Lethrinus lentjan	39	243	2309	4301	2189	0	0	0	0	9081
12	Lutjanus sebae	390	492	1934	3990	1742	0	0	0	0	8548
13	Pristipomoides typus	805	937	649	1577	726	0	0	0	0	4694
14	Gymnocranius grandoculis	609	531	783	1802	822	0	0	0	0	4547
15	Lutjanus johnii	0	310	554	1973	657	0	0	0	0	3494
16	Epinephelus bleekeri	34	115	686	1820	691	0	0	0	0	3346
17	Carangoides gymnostethus	8	153	677	935	574	0	0	0	0	2347
18	Lutjanus russelli	16	43	491	1011	416	0	0	0	0	1977
19	Rachycentron canadum	21	120	527	812	470	0	0	0	0	1950
20	Caranx tille	4	154	25	1056	697	0	0	0	0	1936
21	Carangoides coeruleopinnatus	0	251	1184	331	124	0	0	0	0	1890
22	Cephalopholis sonnerati	148	182	320	661	300	0	0	0	0	1611
23	Caranx sexfasciatus	13	4	272	1095	155	0	0	0	0	1539
24	Lutjanus timorensis	180	216	63	119	96	0	0	0	0	674
25	Sphyraena putnamae	0	27	219	150	90	0	0	0	0	486
26	Epinephelus heniochus	314	126	1	14	24	0	0	0	0	479
27	Gymnocranius griseus	58	226	26	105	62	0	0	0	0	477
28	Plectropomus leopardus	43	65	98	152	57	0	0	0	0	415
29	Lethrinus olivaceus	40	93	22	127	71	0	0	0	0	353
30	Sphyraena forsteri	0	13	203	102	23	0	0	0	0	341
31	Lutjanus argentimaculatus	52	29	32	118	79	0	0	0	0	310
32	Lutjanus boutton	33	54	106	74	28	0	0	0	0	295
33	Pomadasys kaakan	0	25	235	16	10	0	0	0	0	286
34	Epinephelus latifasciatus	64	26	18	24	38	0	0	0	0	170
35	Argyrops spinifer	22	88	7	15	30	0	0	0	0	162
36	Pristipomoides filamentosus	26	31	0	6	93	0	0	0	0	156
37	Caranx ignobilis	18	22	27	52	28	0	0	0	0	147
38	Elagatis bipinnulata	0	3	52	62	25	0	0	0	0	142
39	Epinephelus amblycephalus	44	61	4	8	20	0	0	0	0	137
40	Aprion virescens	46	18	0	19	47	0	0	0	0	130
41	Symphorus nematophorus	29	15	21	39	26	0	0	0	0	130
42	Lutjanus lemniscatus	2	5	12	77	26	0	0	0	0	122
43	Ostichthys japonicus	71	17	5	6	4	0	0	0	0	103
44	Seriola rivoliana	23	19	11	27	13	0	0	0	0	93
45	Epinephelus epistictus	38	28	3	2	16	0	0	0	0	87
46	Variola albimarginata	20	23	0	14	29	0	0	0	0	86
47	Lethrinus amboinensis	31	19	2	7	19	0	0	0	0	78
48	Protonibea diacanthus	0	1	14	20	43	0	0	0	0	78
49	Cephalopholis miniata	2	6	15	30	20	0	0	0	0	73
50	Lutjanus bohar	41	17	2	2	10	0	0	0	0	72

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.

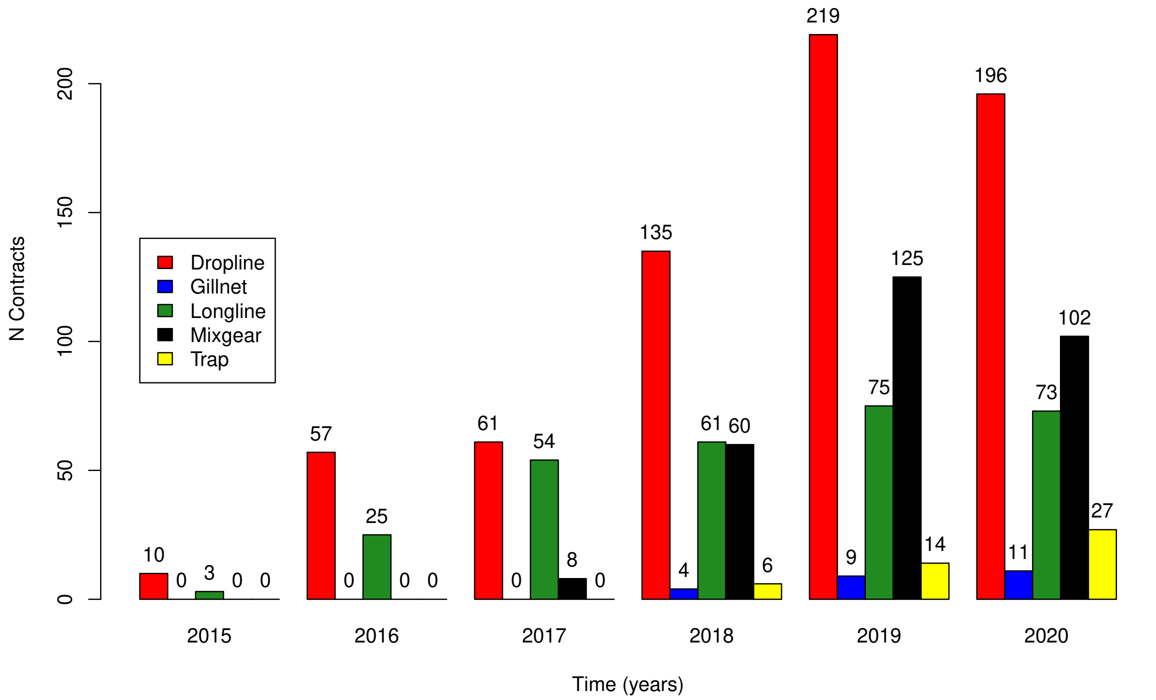


Figure 2.3: Number of CODRS contractors by gear type actively fishing in Indonesian waters.

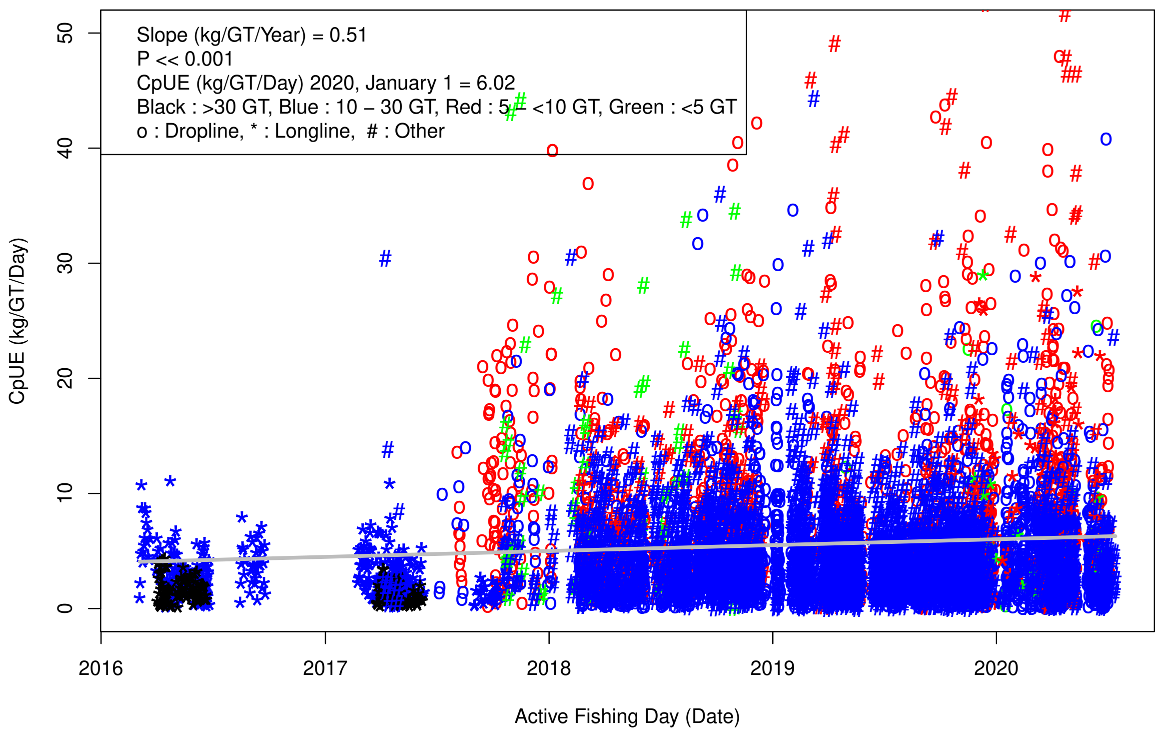


Figure 2.4: Catch per Unit of Effort in WPP 712.

Table 2.1: Number of CODRS deployed by gear type and boat size category in WPP 712

N	Dropline	Longline	Gillnet	Trap	Mix Gear	Total
Nano	1	1	NA	0	0	2
Small	9	4	NA	1	2	16
Medium	0	0	NA	NA	24	24
Large	NA	0	NA	NA	NA	0
Total	10	5	0	1	26	42

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 712 for the most recent 365 days

kg/GT/Day	Dropline	Longline	Gillnet	Trap	Mix Gear
Nano	9.37	6.02	NA	10.28	10.28
Small	12.63	10.55	NA	20.39	13.68
Medium	4.81	10.28	NA	NA	4.16
Large	NA	10.28	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 712 for the most recent 365 days

N	Dropline	Longline	Gillnet	Trap	Mix Gear
Nano	14	36	NA	2873	2873
Small	353	88	NA	55	42
Medium	1212	2873	34	672	367
Large	NA	2873	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 712

Number of Boat	Dropline	Longline	Gillnet	Trap	Mix Gear	Total
Nano Dedicated	29	22	0	2	14	67
Nano Seasonal	0	0	0	0	0	0
Small Dedicated	265	56	0	13	73	407
Small Seasonal	300	0	0	0	0	300
Medium Dedicated	47	48	0	0	77	172
Medium Seasonal	0	0	0	0	0	0
Large Dedicated	0	43	0	0	0	43
Large Seasonal	0	0	0	0	0	0
Total	641	169	0	15	164	989

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 712

Total GT	Dropline	Longline	Gillnet	Trap	Mix Gear	Total
Nano Dedicated	96	67	0	7	53	224
Nano Seasonal	0	0	0	0	0	0
Small Dedicated	1882	442	0	70	527	2922
Small Seasonal	2700	0	0	0	0	2700
Medium Dedicated	631	1150	0	0	1206	2986
Medium Seasonal	0	0	0	0	0	0
Large Dedicated	0	2202	0	0	0	2202
Large Seasonal	0	0	0	0	0	0
Total	5309	3861	0	77	1786	11033

Table 2.7: Total catch in metric tons per year by fishing gear and boat size category in WPP 712 for the most recent 365 days

Total Catch	Dropline	Longline	Gillnet	Trap	Mix Gear	Total
Nano Dedicated	181	95	0	14	144	435
Nano Seasonal	0	0	0	0	0	0
Small Dedicated	5063	1203	0	396	1738	8399
Small Seasonal	3648	0	0	0	0	3648
Medium Dedicated	619	2518	0	0	1013	4150
Medium Seasonal	0	0	0	0	0	0
Large Dedicated	0	5364	0	0	0	5364
Large Seasonal	0	0	0	0	0	0
Total	9511	9179	0	410	2895	21996

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 712 for the most recent 365 days.

Species	Weight MT	Weight %	Cumulative % Weight	Immature % Number	Immature % Weight	Risk Immature
Lutjanus malabaricus	7855	36	36	71	35	High
Pristipomoides multidens	6114	28	64	55	24	High
Epinephelus coioides	1614	7	71	21	5	Med
Lutjanus erythropterus	999	5	75	49	26	High
Epinephelus areolatus	856	4	79	2	0	Low
Pristipomoides typus	695	3	82	45	22	High
Epinephelus bleekeri	330	2	84	0	0	Low
Diagramma pictum	318	1	85	60	25	High
Gymnocranius grandoculis	312	1	87	52	26	High
Lutjanus johnii	305	1	88	83	49	High
Plectropomus maculatus	298	1	90	10	2	Low
Lutjanus sebae	257	1	91	89	60	High
Caranx sexfasciatus	191	1	92	11	3	Med
Carangoides chrysophrys	162	1	92	20	6	Med
Lutjanus vitta	141	1	93	21	9	Med
Aprion virescens	127	1	94	7	2	Low
Lutjanus argentimaculatus	126	1	94	NA	NA	
Caranx tille	119	1	95	1	0	Low
Lethrinus lentjan	104	0	95	2	1	Low
Caranx ignobilis	92	0	96	NA	NA	
Total Top 20 Species	21017	96	96	49	26	High
Total Top 100 Species	21996	100	100	49	25	High

Table 2.9: Top 20 species by volume in Dropline fisheries with % immature fish in the catch in WPP 712 for the most recent 365 days.

Species	Weight MT	Weight %	Cumulative % Weight	Immature % Number	Immature % Weight	Risk Immature
Lutjanus malabaricus	3585	38	38	63	31	High
Pristipomoides multidens	3241	34	72	58	26	High
Lutjanus erythropterus	532	6	77	39	18	High
Epinephelus areolatus	434	5	82	1	0	Low
Pristipomoides typus	362	4	86	48	25	High
Epinephelus bleekeri	162	2	87	0	0	Low
Epinephelus coioides	150	2	89	22	5	Med
Lutjanus sebae	119	1	90	88	59	High
Caranx sexfasciatus	119	1	91	11	3	Med
Gymnocranius grandoculis	87	1	92	67	51	High
Carangoides chrysophrys	66	1	93	23	7	Med
Diagramma pictum	62	1	94	46	18	High
Lutjanus argentimaculatus	61	1	94	NA	NA	
Plectropomus maculatus	55	1	95	13	2	Med
Lutjanus vitta	49	1	95	7	3	Low
Caranx ignobilis	47	0	96	NA	NA	
Pinjalo pinjalo	42	0	96	63	27	High
Cephalopholis sonnerati	41	0	97	0	0	Low
Rachycentron canadum	39	0	97	26	9	Med
Lethrinus lentjan	36	0	98	2	0	Low
Total Top 20 Species	9288	98	98	45	25	High
Total Top 100 Species	9511	100	100	45	25	High

Table 2.10: Top 20 species by volume in Longline fisheries with % immature fish in the catch in WPP 712 for the most recent 365 days.

Species	Weight MT	Weight %	Cumulative % Weight	Immature % Number	Immature % Weight	Risk Immature
Lutjanus malabaricus	2838	31	31	NA	NA	
Pristipomoides multidens	2796	30	61	28	11	Med
Epinephelus coioides	607	7	68	NA	NA	
Lutjanus erythropterus	359	4	72	NA	NA	
Pristipomoides typus	328	4	75	20	9	Med
Epinephelus areolatus	326	4	79	0	0	Low
Gymnocranius grandoculis	220	2	81	16	4	Med
Diagramma pictum	136	1	83	NA	NA	
Aprion virescens	126	1	84	7	2	Low
Epinephelus bleekeri	118	1	86	NA	NA	
Lutjanus sebae	112	1	87	NA	NA	
Lutjanus johnii	109	1	88	NA	NA	
Plectropomus maculatus	108	1	89	NA	NA	
Carangoides chrysophrys	81	1	90	NA	NA	
Lethrinus olivaceus	76	1	91	NA	NA	
Caranx sexfasciatus	69	1	92	NA	NA	
Pristipomoides filamentosus	64	1	92	61	33	High
Lutjanus argentimaculatus	62	1	93	NA	NA	
Symphorus nematophorus	61	1	94	NA	NA	
Lutjanus vitta	53	1	94	NA	NA	
Total Top 20 Species	8649	94	94	24	10	Medium
Total Top 100 Species	9179	100	100	24	10	Medium

Table 2.11: Top 20 species by volume in Gillnet fisheries with % immature fish in the catch in WPP 712 for the most recent 365 days.

Species	Weight MT	Weight %	Cumulative % Weight	Immature % Number	Immature % Weight	Risk Immature
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
NA	NA	NA	NA	NA	NA	NA
Total Top 20 Species	0	0	0	NA	NA	NA
Total Top 100 Species	0	0	0	NA	NA	NA

Table 2.12: Top 20 species by volume in Trap fisheries with % immature fish in the catch in WPP 712 for the most recent 365 days.

Species	Weight MT	Weight %	Cumulative % Weight	Immature % Number	Immature % Weight	Risk Immature
Lutjanus malabaricus	185	45	45	88	59	High
Epinephelus coioides	94	23	68	20	6	Med
Plectropomus maculatus	41	10	78	12	2	Med
Lutjanus johnii	31	8	86	82	55	High
Epinephelus areolatus	12	3	89	5	1	Low
Lutjanus erythropterus	12	3	91	82	69	High
Diagramma pictum	11	3	94	67	33	High
Pristipomoides multidens	6	1	96	NA	NA	
Lutjanus sebae	5	1	97	97	82	High
Lutjanus vitta	4	1	98	29	13	Med
Epinephelus bleekeri	4	1	99	NA	NA	
Lethrinus lentjan	2	0	99	NA	NA	
Lutjanus russelli	1	0	99	NA	NA	
Pristipomoides typus	0	0	99	NA	NA	
Pinjalo pinjalo	0	0	100	NA	NA	
Lutjanus argentimaculatus	0	0	100	NA	NA	
Gymnocranius grandoculis	0	0	100	NA	NA	
Rachycentron canadum	0	0	100	NA	NA	
Caranx sexfasciatus	0	0	100	NA	NA	
Gymnocranius griseus	0	0	100	NA	NA	
Total Top 20 Species	409	100	100	69	37	High
Total Top 100 Species	410	100	100	69	37	High

Table 2.13: Top 20 species by volume in Mixgears fisheries with % immature fish in the catch in WPP 712 for the most recent 365 days.

Species	Weight MT	Weight %	Cumulative % Weight	Immature % Number	Immature % Weight	Risk Immature
Lutjanus malabaricus	1247	43	43	82	45	High
Epinephelus coioides	763	26	69	20	5	Med
Lutjanus johnii	131	5	74	86	52	High
Diagramma pictum	109	4	78	64	28	High
Lutjanus erythropterus	97	3	81	78	65	High
Plectropomus maculatus	94	3	84	4	1	Low
Epinephelus areolatus	83	3	87	3	1	Low
Pristipomoides multidens	71	2	90	51	26	High
Caranx tille	57	2	92	1	0	Low
Epinephelus bleekeri	46	2	93	1	0	Low
Carangoides gymnostethus	38	1	95	0	0	Low
Lutjanus vitta	35	1	96	31	16	High
Lethrinus lentjan	27	1	97	4	2	Low
Lutjanus sebae	21	1	97	93	62	High
Carangoides chrysophrys	15	1	98	5	1	Low
Lutjanus russelli	13	0	98	26	12	Med
Rachycentron canadum	10	0	99	23	8	Med
Pinjalo pinjalo	7	0	99	73	38	High
Gymnocranius grandoculis	6	0	99	81	70	High
Pristipomoides typus	5	0	99	NA	NA	
Total Top 20 Species	2876	99	99	61	29	High
Total Top 100 Species	2895	100	100	61	29	High

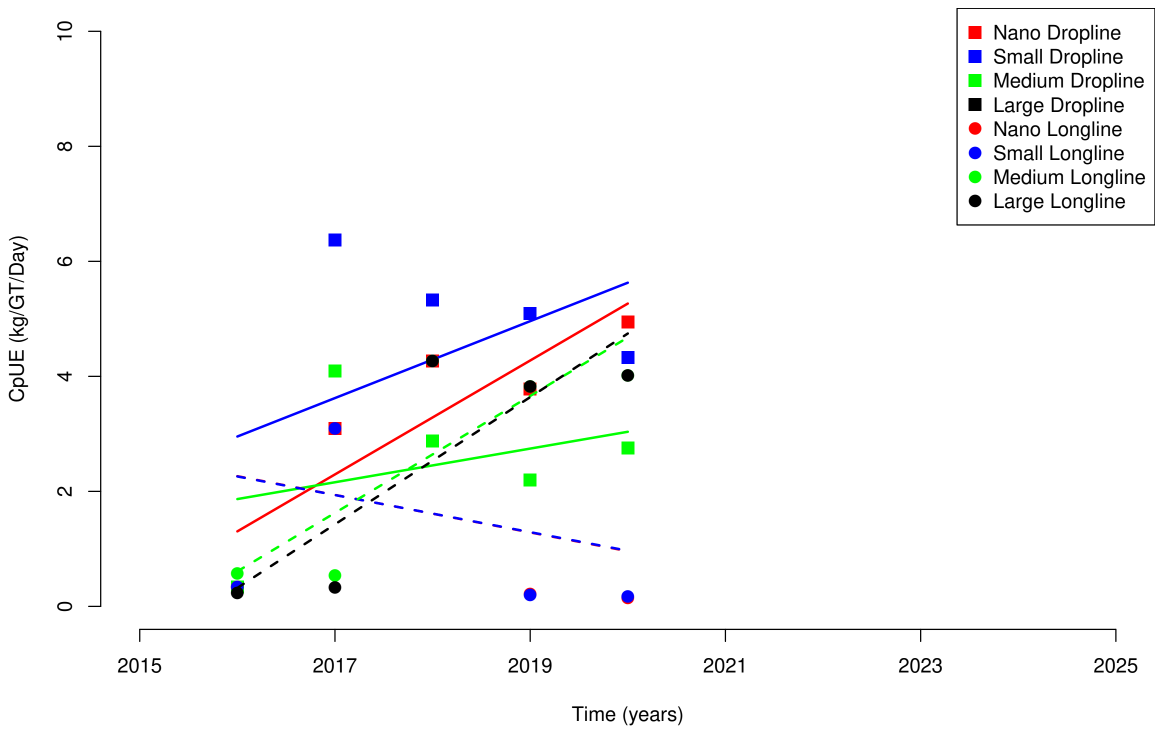


Figure 2.5: Catch per Unit of Effort per calendar year for Lutjanus malabaricus in WPP 712 for Dropline and Longline catches by fleet segment.
Solid lines and dashed lines for trends in Dropline CpUE and Longline CpUE respectively.

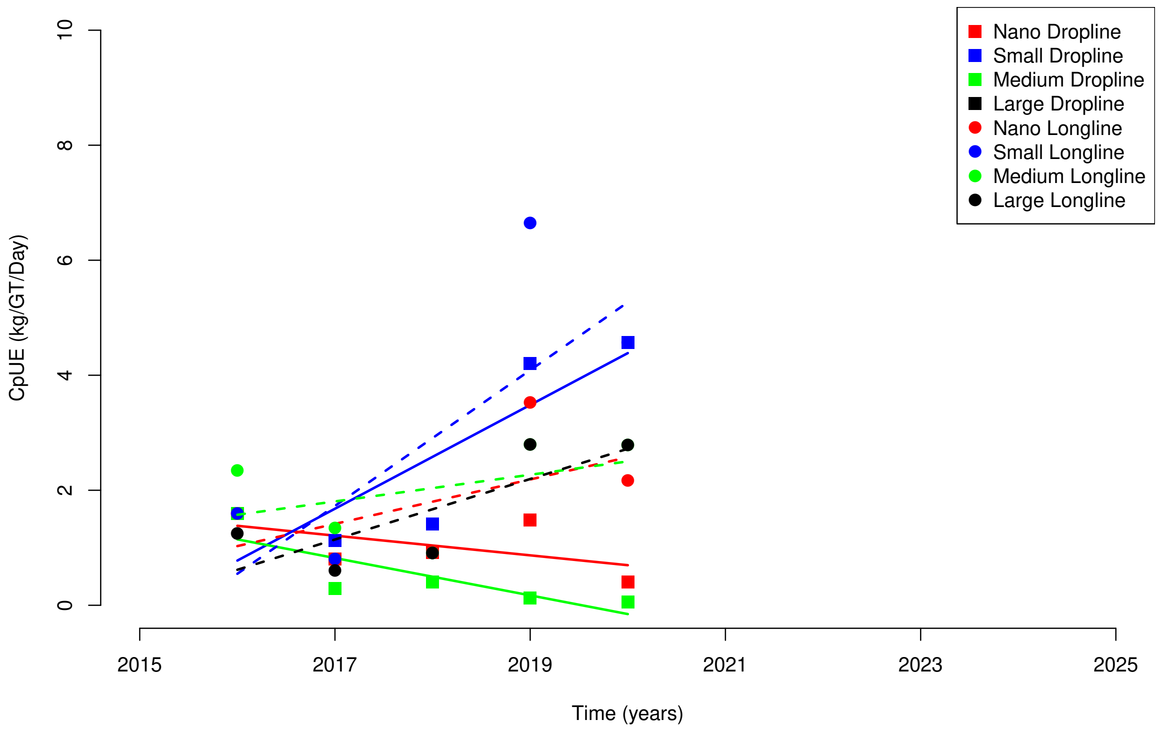


Figure 2.6: Catch per Unit of Effort per calendar year for Pristipomoides multidens in WPP 712 for Dropline and Longline catches by fleet segment.
Solid lines and dashed lines for trends in Dropline CpUE and Longline CpUE respectively.

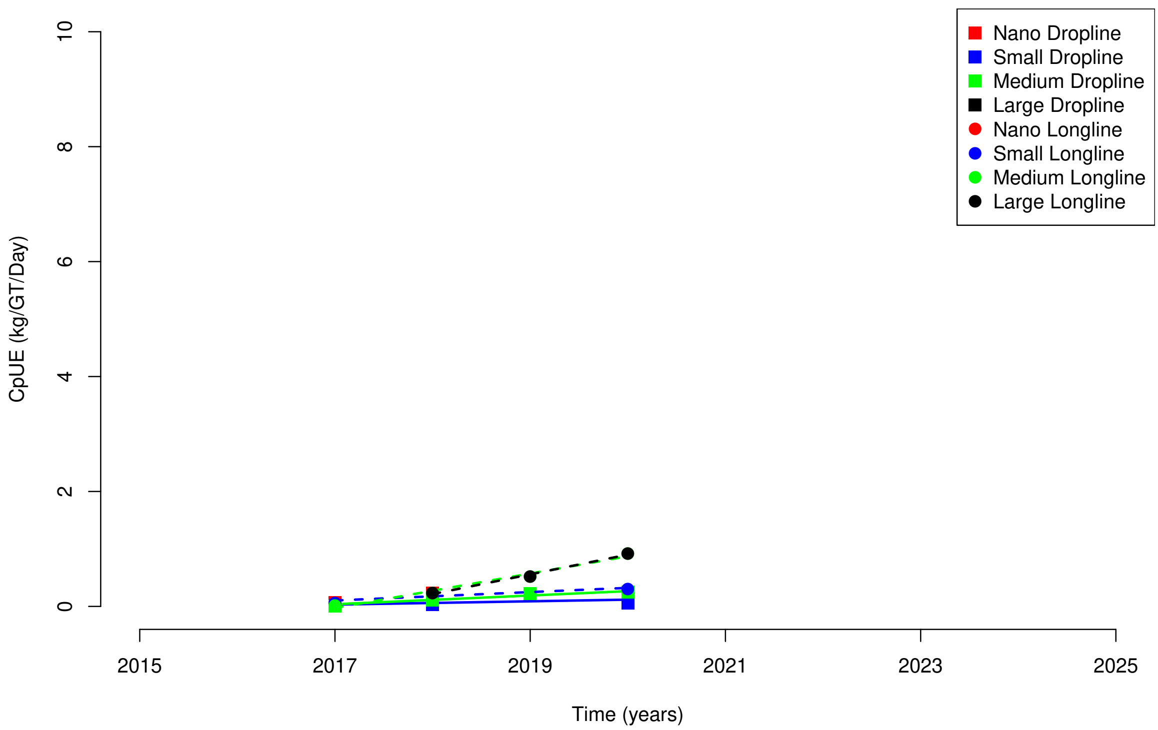


Figure 2.7: Catch per Unit of Effort per calendar year for Epinephelus coioides in WPP 712 for Dropline and Longline catches by fleet segment.
Solid lines and dashed lines for trends in Dropline CpUE and Longline CpUE respectively.

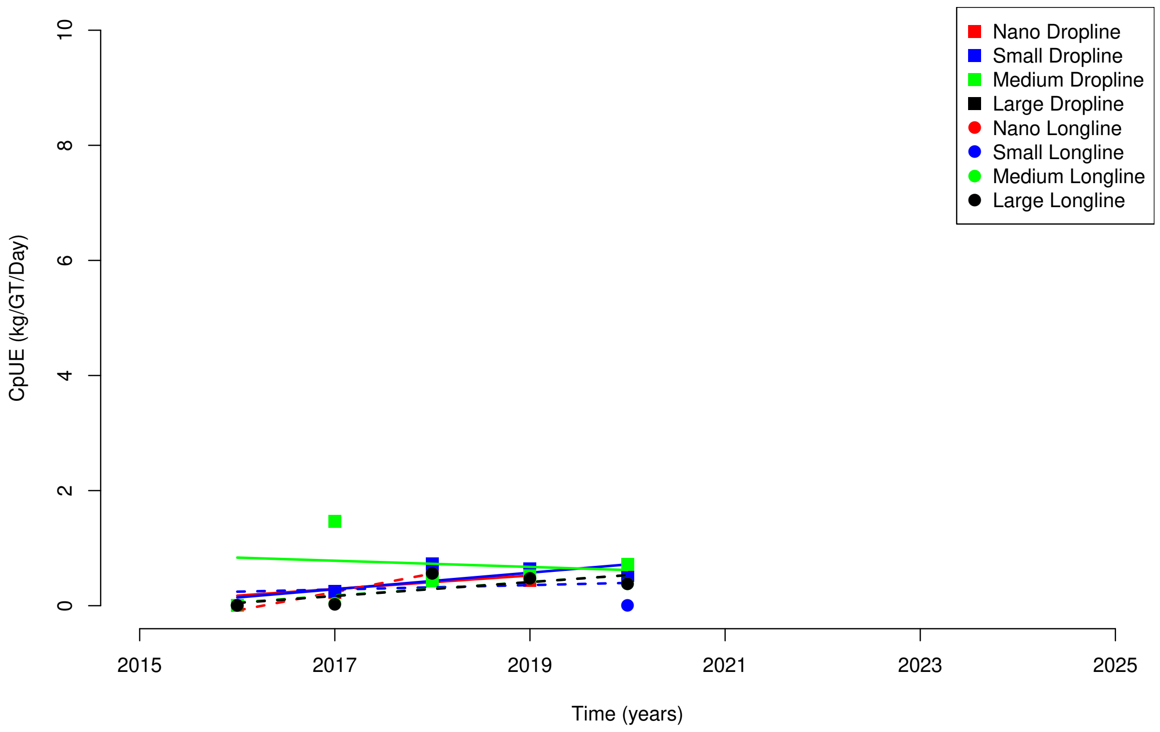


Figure 2.8: Catch per Unit of Effort per calendar year for Lutjanus erythropterus
in WPP 712 for Dropline and Longline catches by fleet segment.
Solid lines and dashed lines for trends in Dropline CpUE and Longline CpUE respectively.

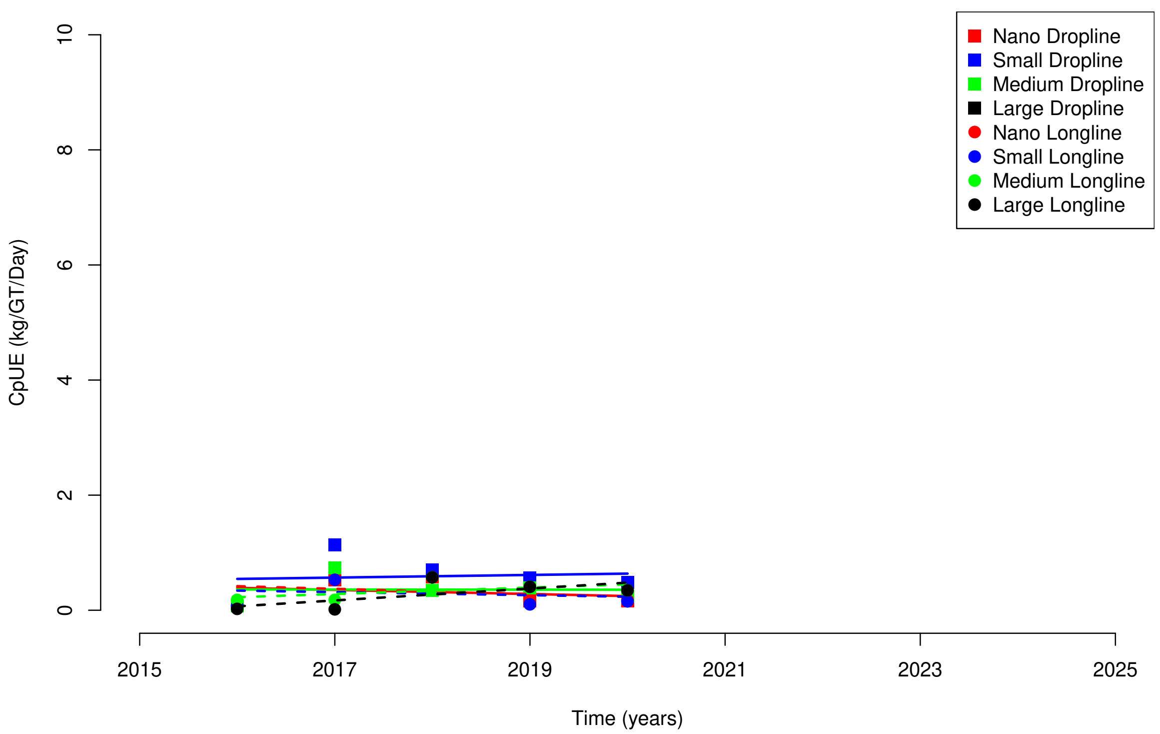


Figure 2.9: Catch per Unit of Effort per calendar year for Epinephelus areolatus
in WPP 712 for Dropline and Longline catches by fleet segment.
Solid lines and dashed lines for trends in Dropline CpUE and Longline CpUE respectively.

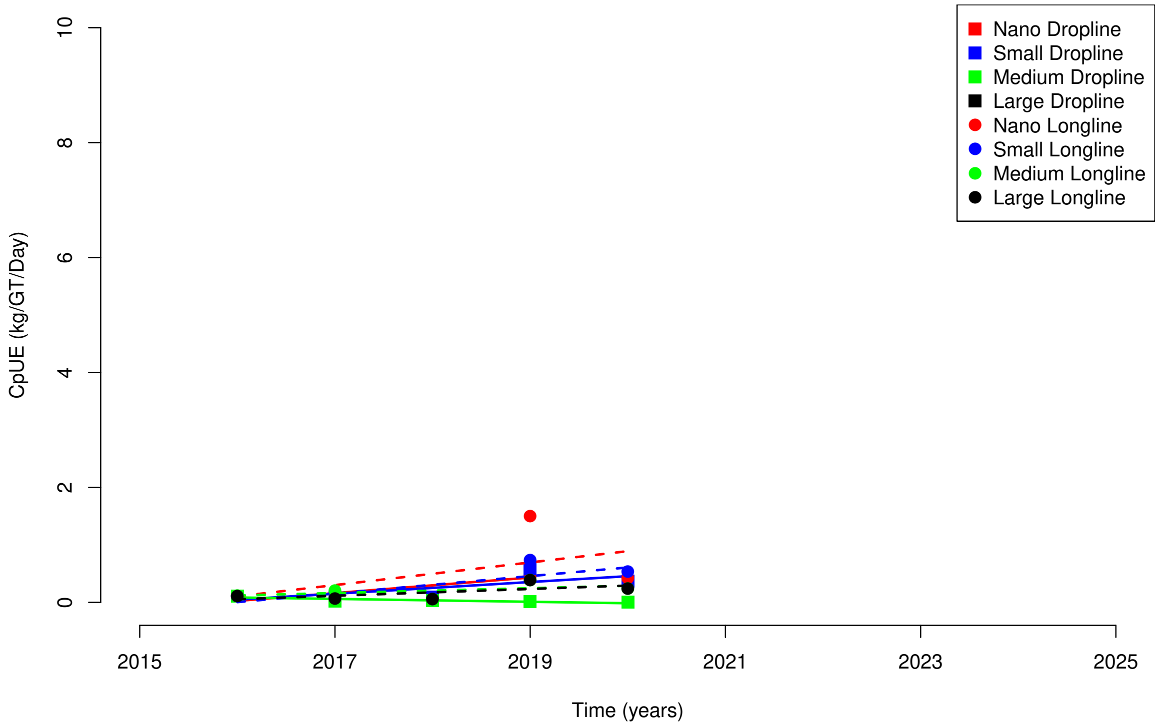


Figure 2.10: Catch per Unit of Effort per calendar year for Pristipomoides typus in WPP 712 for Dropline and Longline catches by fleet segment. Solid lines and dashed lines for trends in Dropline CpUE and Longline CpUE respectively.

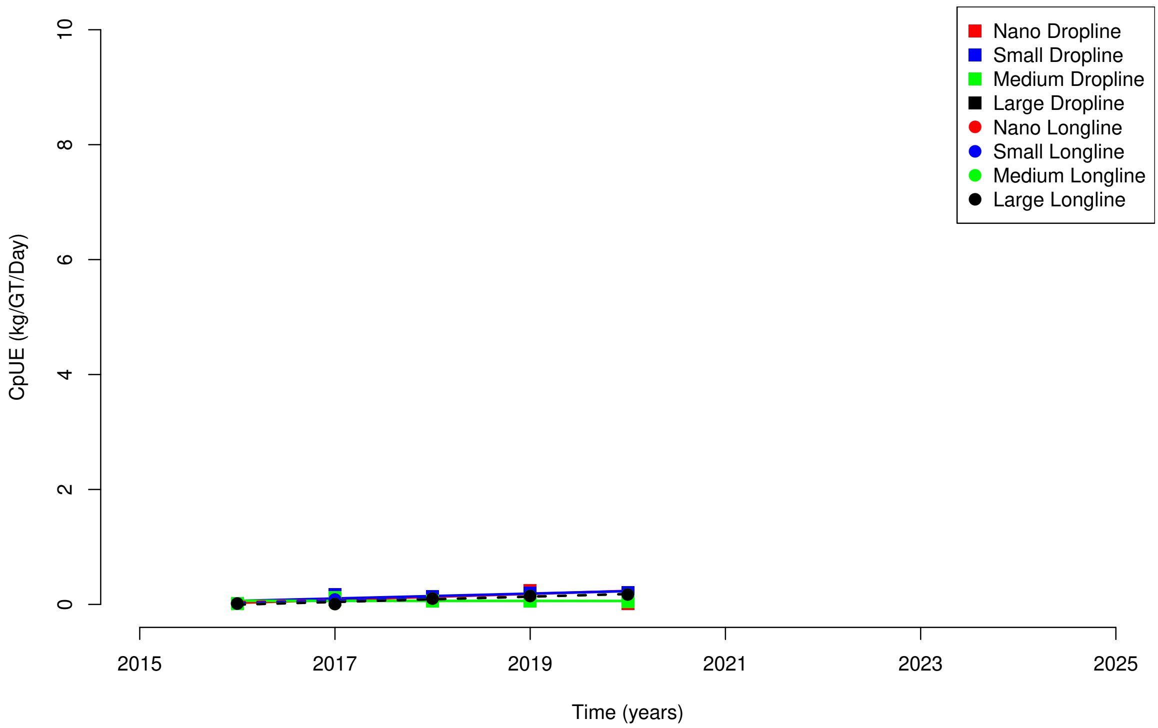


Figure 2.11: Catch per Unit of Effort per calendar year for Epinephelus bleekeri in WPP 712 for Dropline and Longline catches by fleet segment. Solid lines and dashed lines for trends in Dropline CpUE and Longline CpUE respectively.

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 Java, on the coast of WPP 712 and in South Sulawesi, on the coast of WPP 713. 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 Probolinggo in East Java, on the coast of WPP 712. These fish commonly originate from a number of different fleets that can operate throughout the waters of Central and Eastern Indonesian, including on distant fishing grounds in the Arafura Sea (WPP 718) and the Timor Sea (WPP 573).

The current report with length based stock assessments for groupers, snappers, emperors and grunts in WPP 712 is based on catches that were actually made on WPP 712 fishing grounds only, regardless of vessel origin or landing place. Some of these fish were caught by fleets from South Sulawesi for example, and processed in Makassar, but caught within WPP 712 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 Java Sea (Figures 3.4 to 3.6) operate in WPP 712 as well as in neighbouring WPP like WPP 711 and 713, and further from home in WPP 573 and WPP 718. 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, 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.

Fish processed in Java may be mixed supply from various Indonesian fisheries management areas, including WPP 711, WPP 712, WPP 713, WPP 573 and WPP 718. Potential IUU issues related to fish landed at ports in WPP 712 include the illegal operation by various fleets outside Indonesian waters in the East Timorese - Australian Joint Petroleum Development Area (JPDA). Additional issues include the under marking of medium scale vessels to below 30GT, the licensing of the various fleets for various WPP and the operation of fleets inside Marine Protected Areas in Eastern Indonesia. 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.

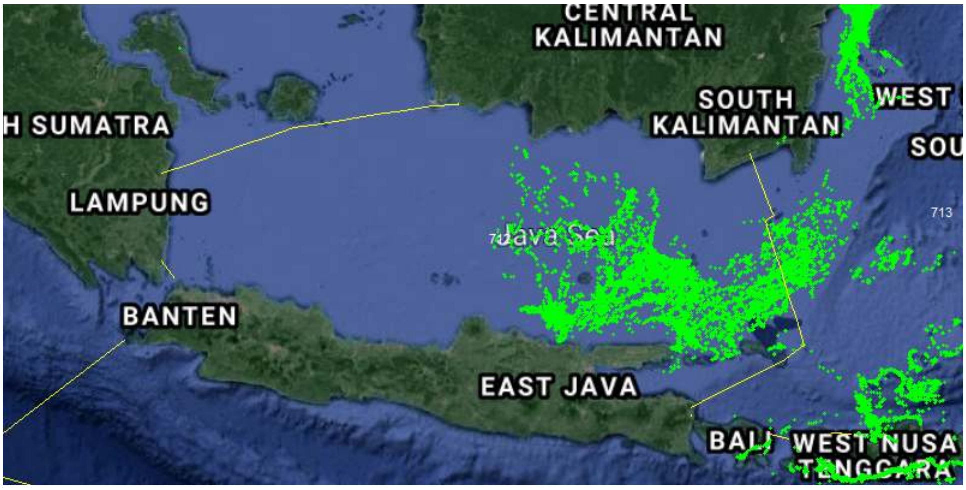


Figure 3.1: Fishing positions of dropliners participating in the CODRS program over the years 2014 - 2019 in WPP 712, as reported by Spot Trace. Reported positions during steaming, anchoring, or docking are excluded from this map.

Figure 3.2: Fishing positions of longliners participating in the CODRS program over the years 2014 - 2019 in WPP 712, as reported by Spot Trace. Reported positions during steaming, anchoring, or docking are excluded from this map.

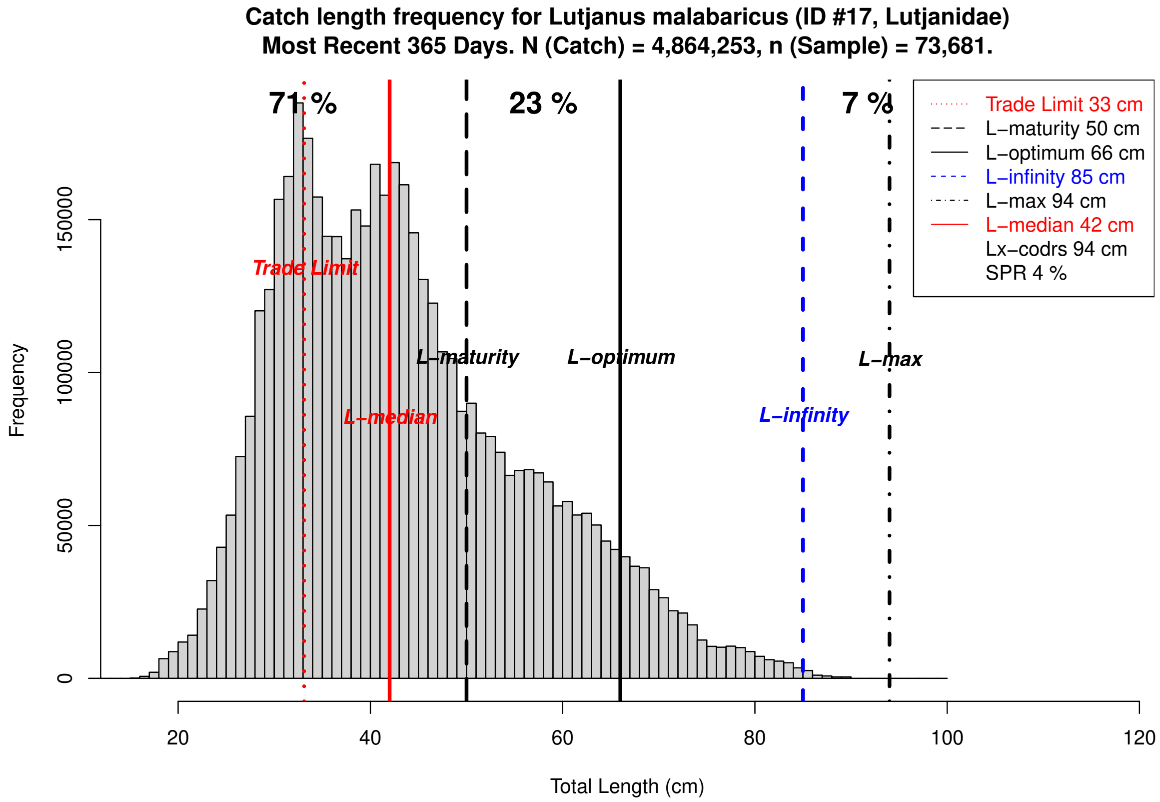
Figure 3.3: Fishing positions of vessels applying more than one gear, participating in the CODRS program over the years 2014 - 2019 in WPP 712, as reported by Spot Trace. Gears used by the vessels in this group are a combination of droplines, longlines, traps, and gillnets. Reported positions during steaming, anchoring, or docking are excluded from this map.

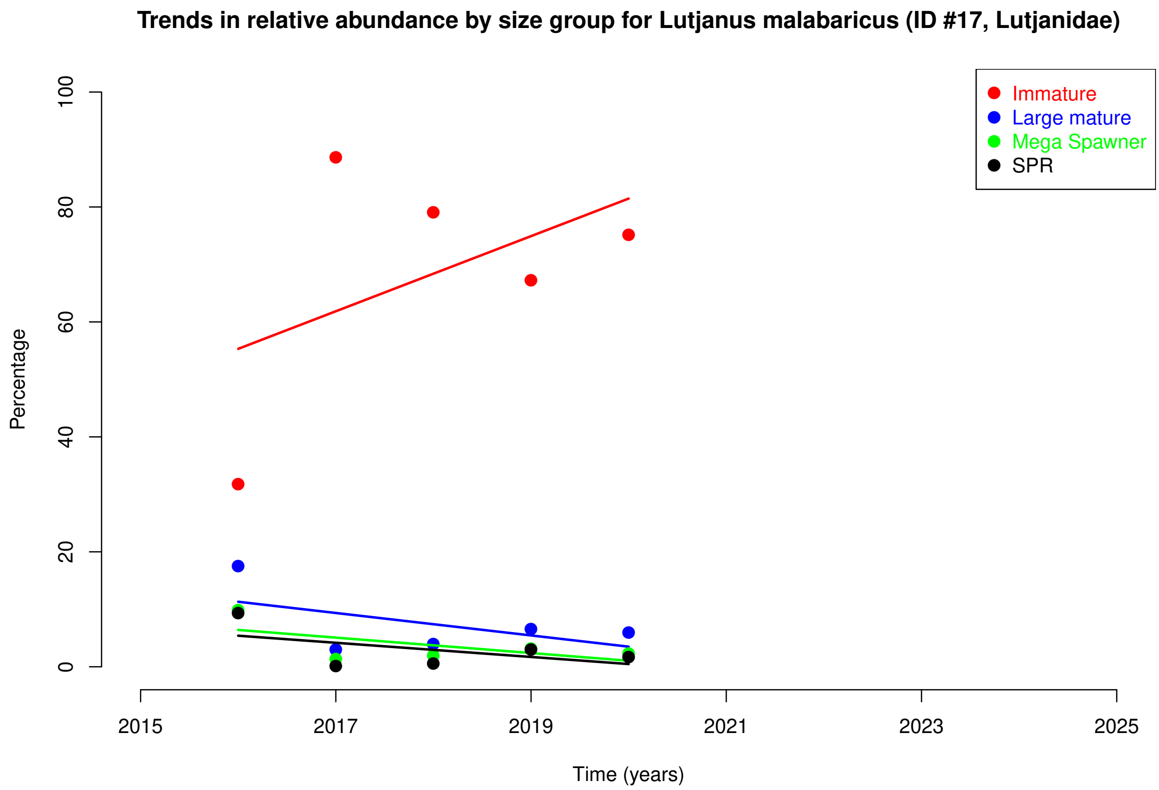
Figure 3.4: A typical snapper fishing boat from Probolinggo, Jawa Timur, operating in the Java Sea (WPP 712) and on nearby fishing grounds.

Figure 3.5: A typical snapper fishing boat from Kandang Semangkon, Lamongan, Jawa Timur, operating in the Java Sea (WPP 712) and on nearby fishing grounds.

Figure 3.6: A typical snapper fishing boat from Karang Serang, Tanggerang, Banten, operating in the Java Sea (WPP 712) and on nearby fishing grounds.

4 Length-based assessments of Top 20 most abundant species in CODRS samples including all years in WPP 712





The percentages of Lutjanus malabaricus (ID #17, Lutjanidae) in most recent 365 days.
N (Catch) =4,864,253, n (Sample) = 73,681
Immature (< 50cm): 71%
Small mature (>= 50cm, < 66cm): 23%
Large mature (>= 66cm): 7%
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.

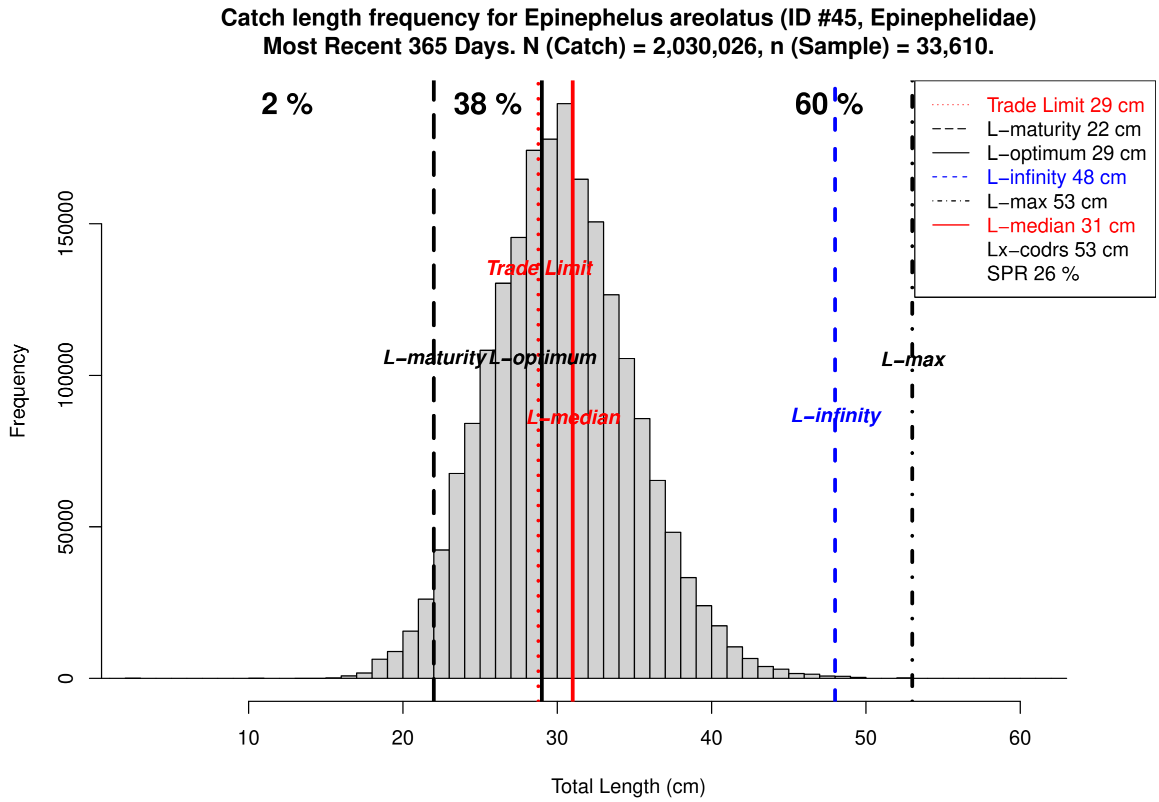
The majority of the fish in the catch have not had a chance to reproduce before capture. This fishery is most likely overfished already if fishing mortality is high for all size classes in the population. An immediate shift away from targeting juvenile fish and a reduction in overall fishing pressure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

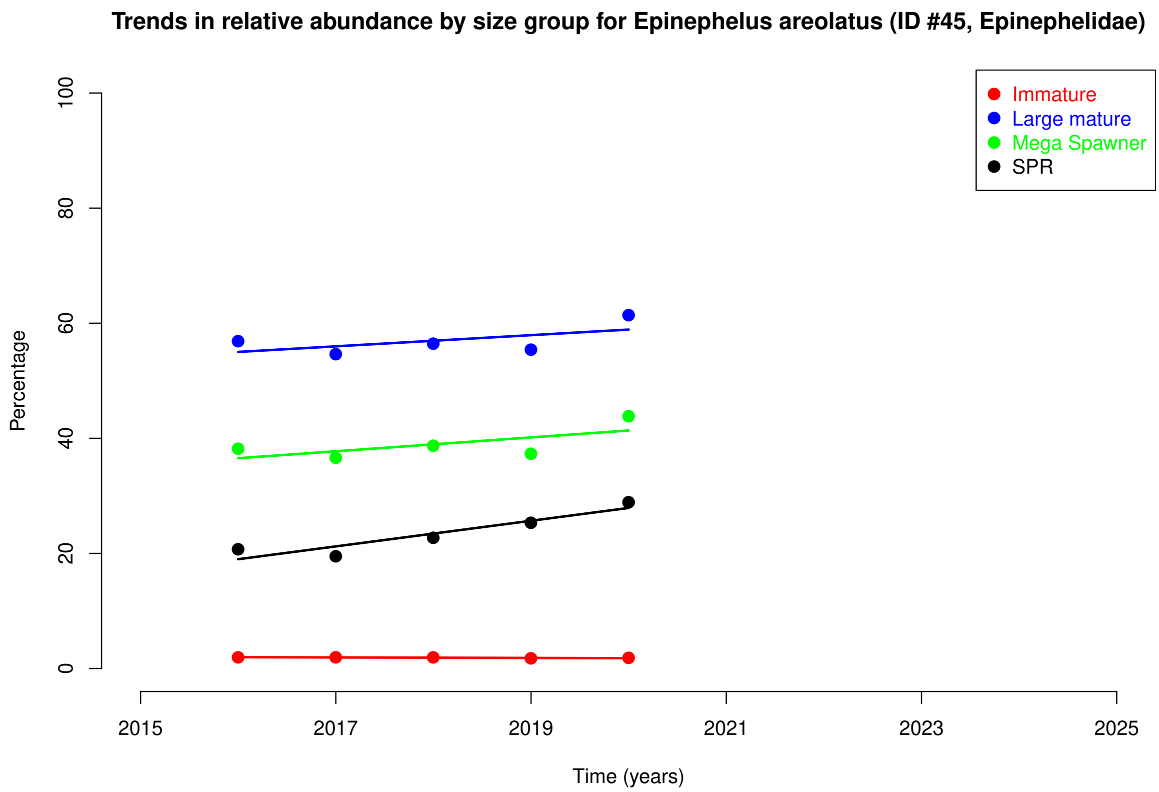
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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: 0.422
% Large Mature falling over recent years, situation deteriorating. P: 0.359
% Mega Spawner falling over recent years, situation deteriorating. P: 0.280
% SPR falling over recent years, situation deteriorating. P: 0.368


Catch length frequency for Epinephelus areolatus (ID #45, Epinephelidae)
Most Recent 365 Days. N (Catch) = 2,030,026, n (Sample) = 33,610.
2 %
38 %
60 %
Trade Limit 29 cm
L−maturity 22 cm
L−optimum 29 cm
L−infinity 48 cm
L−max 53 cm
L−median 31 cm
Lx−codrs 53 cm
SPR 26 %
Trade Limit
L−maturity
L−optimum
L−median
L−infinity
L−max
Frequency
0
50000
100000
150000
10
20
30
40
50
60
Total Length (cm)


Trends in relative abundance by size group for Epinephelus areolatus (ID #45, 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 Epinephelus areolatus (ID #45, Epinephelidae) in most recent 365 days.
N (Catch) =2,030,026, n (Sample) = 33,610
Immature (< 22cm): 2%
Small mature (>= 22cm, < 29cm): 38%
Large mature (>= 29cm): 60%
Mega spawner (>= 31.9cm): 42% (subset of large mature fish)
Spawning Potential Ratio: 26 %

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.

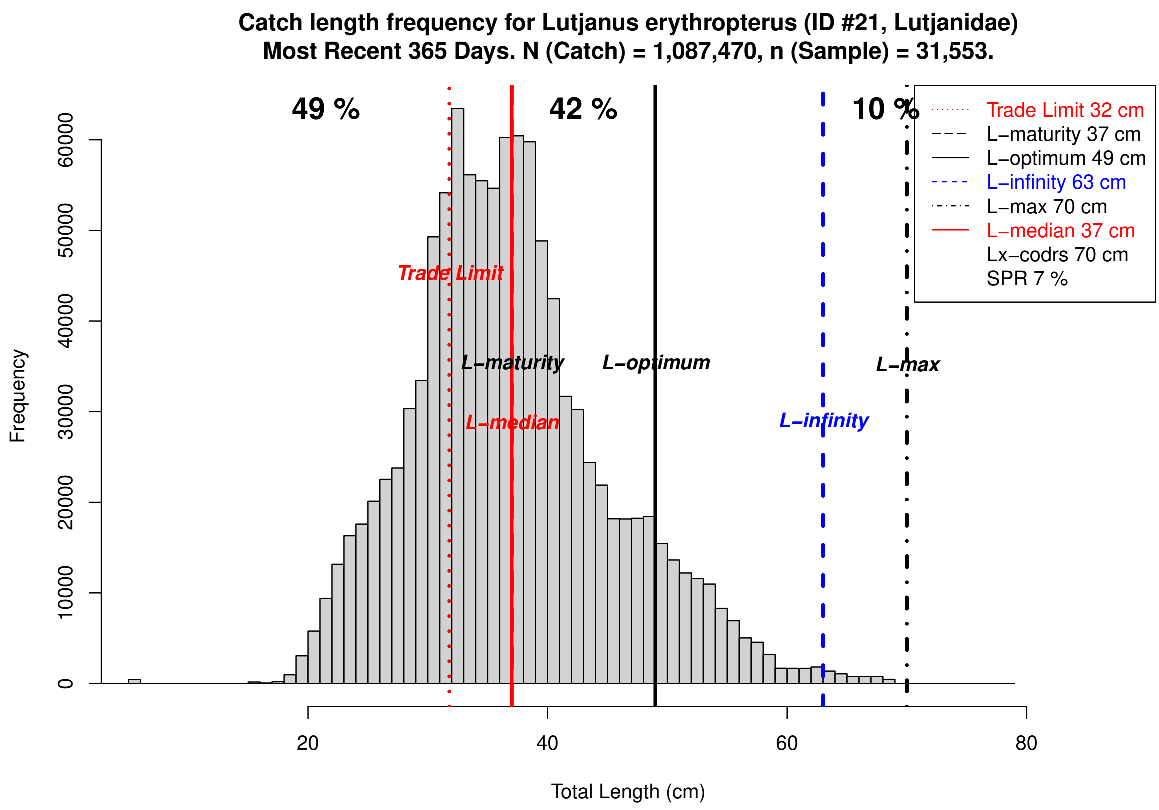
At least 90% of the fish in the catch are mature specimens that have spawned at least once before they were caught. The fishery does not depend on immature size classes for this species and is considered safe for this indicator. This fishery will not be causing overfishing through over harvesting of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

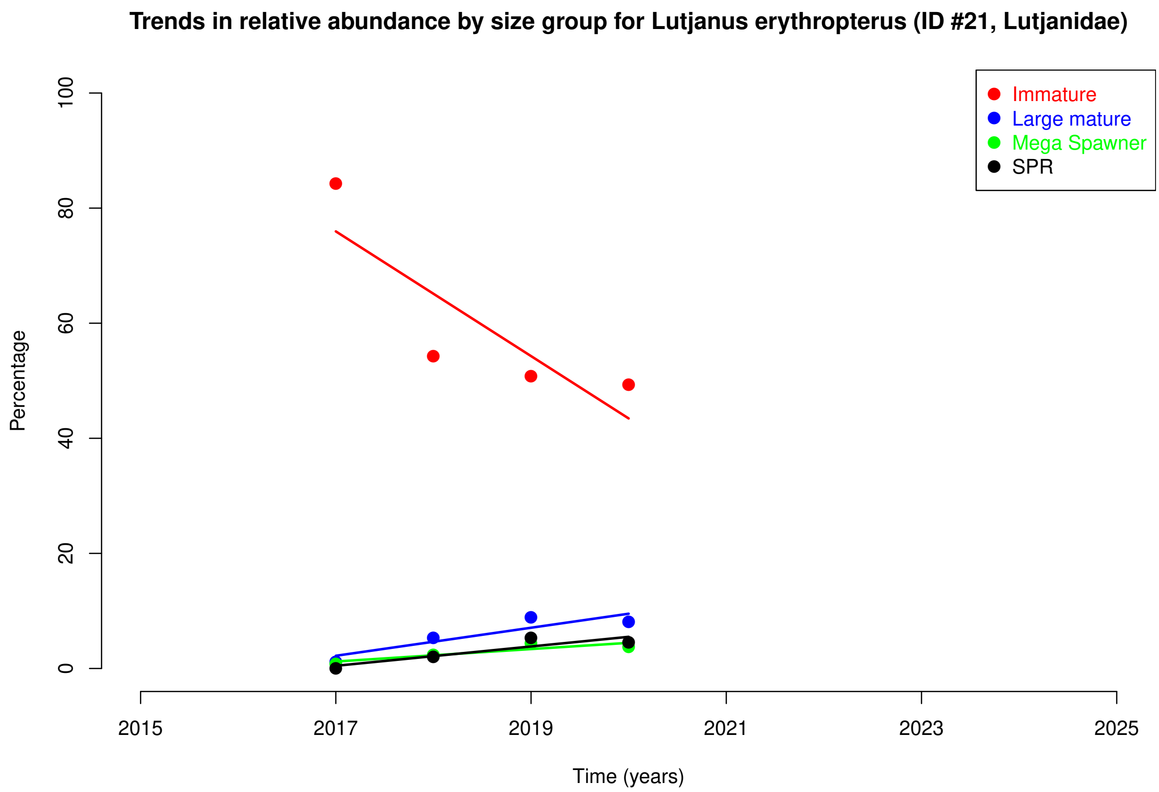
The majority of the catch consists of size classes around or above the optimum harvest size. This means that the impact of the fishery is minimized for this species. Potentially higher yields of this species could be achieved by catching them at somewhat smaller size, although capture of smaller specimen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

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 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: 0.141
% Large Mature rising over recent years, situation improving. P: 0.301
% Mega Spawner rising over recent years, situation improving. P: 0.220
% SPR rising over recent years, situation improving. P: 0.021


Catch length frequency for Lutjanus erythropterus (ID #21, Lutjanidae)
Most Recent 365 Days. N (Catch) = 1,087,470, n (Sample) = 31,553.
49 %
42 %
10 %
Trade Limit 32 cm
L–maturity 37 cm
L–optimum 49 cm
L–infinity 63 cm
L–max 70 cm
L–median 37 cm
Lx–codrs 70 cm
SPR 7 %
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 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) =1,087,470, n (Sample) = 31,553
Immature (< 37cm): 49%
Small mature (>= 37cm, < 49cm): 42%
Large mature (>= 49cm): 10%
Mega spawner (>= 53.9cm): 5% (subset of large mature fish)
Spawning Potential Ratio: 7 %

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.

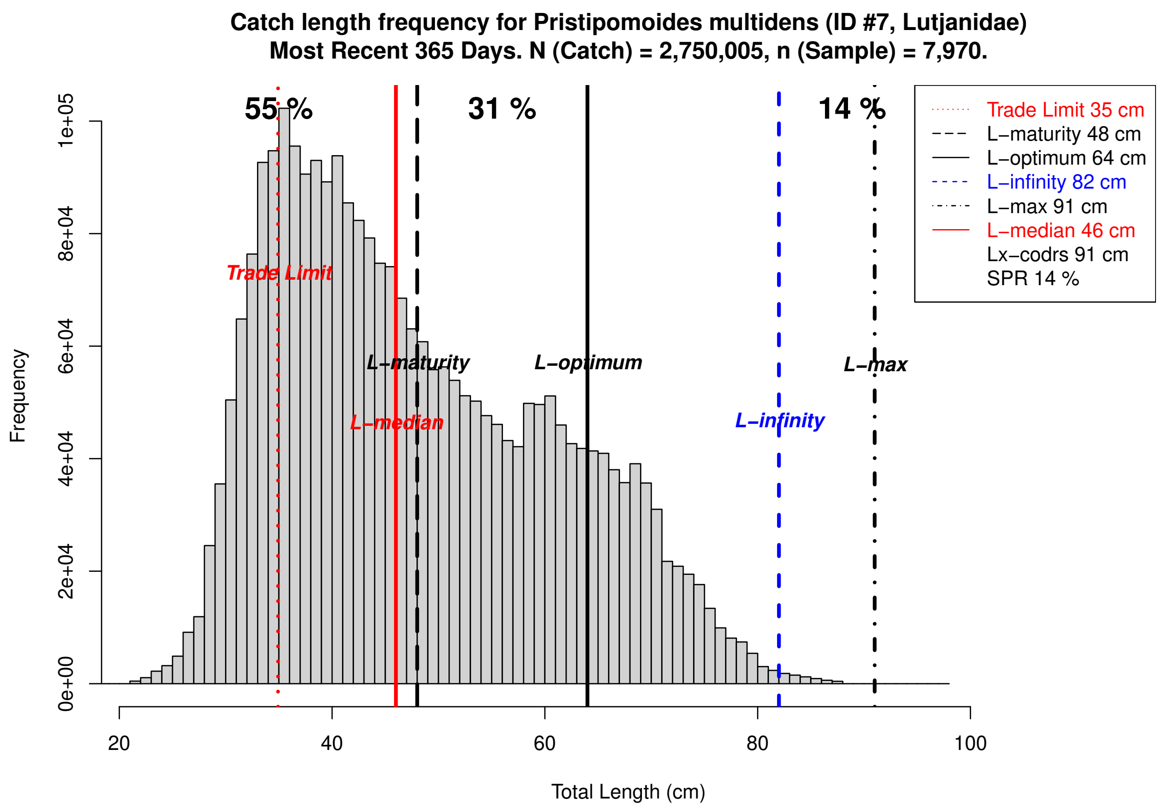
Between 30% and 50% of the fish in the catch are immature and have not had a chance to reproduce before capture. The fishery is in immediate danger of overfishing through overharvesting of juveniles, if fishing pressure is high. Catching small and immature fish needs to be actively avoided and a limit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

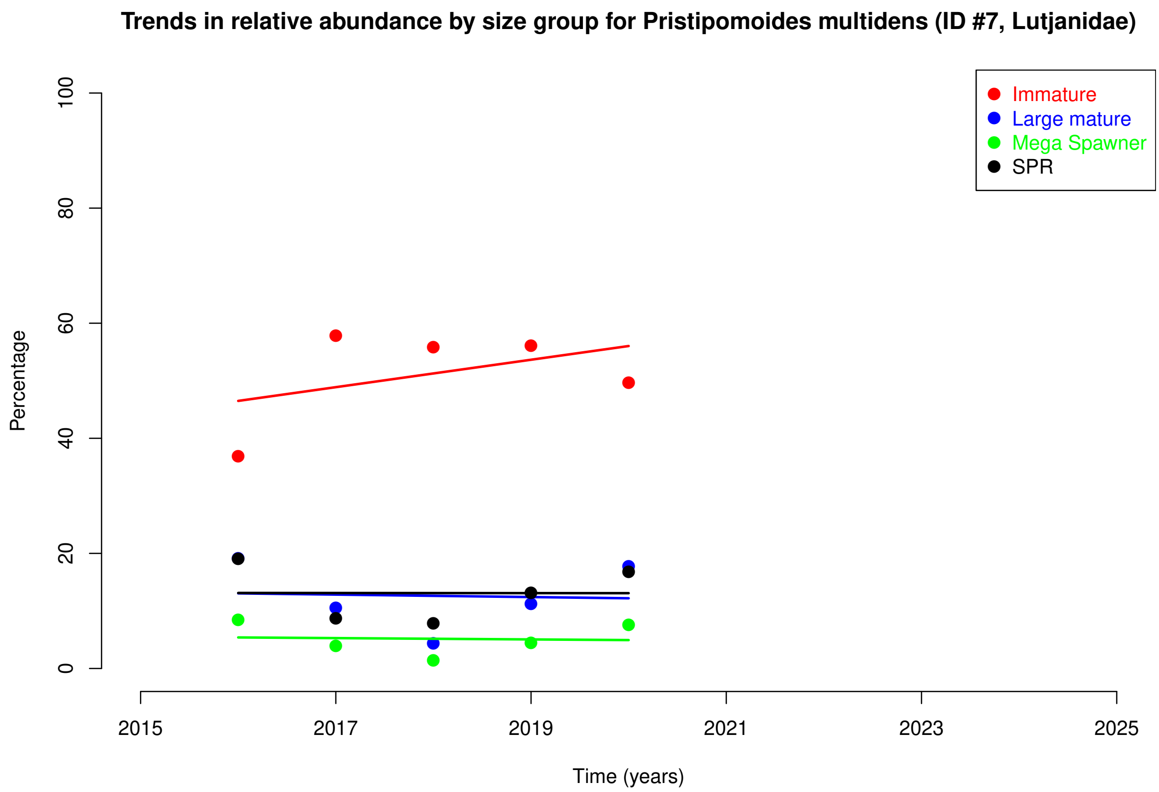
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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 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: 0.154
% Large Mature rising over recent years, situation improving. P: 0.101
% Mega Spawner rising over recent years, situation improving. P: 0.113
% SPR rising over recent years, situation improving. P: 0.105


Catch length frequency for Pristipomoides multidens (ID #7, Lutjanidae)
Most Recent 365 Days. N (Catch) = 2,750,005, n (Sample) = 7,970.
55 %
31 %
14 %
Trade Limit 35 cm
L−maturity 48 cm
L−optimum 64 cm
L−infinity 82 cm
L−max 91 cm
L−median 46 cm
Lx−codrs 91 cm
SPR 14 %
Trade Limit
L−maturity
L−optimum
L−median
L−infinity
L−max
Frequency
0e+00
2e+04
4e+04
6e+04
8e+04
1e+05
20
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) =2,750,005, n (Sample) = 7,970
Immature (< 48cm): 55%
Small mature (>= 48cm, < 64cm): 31%
Large mature (>= 64cm): 14%
Mega spawner (>= 70.4cm): 6% (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.

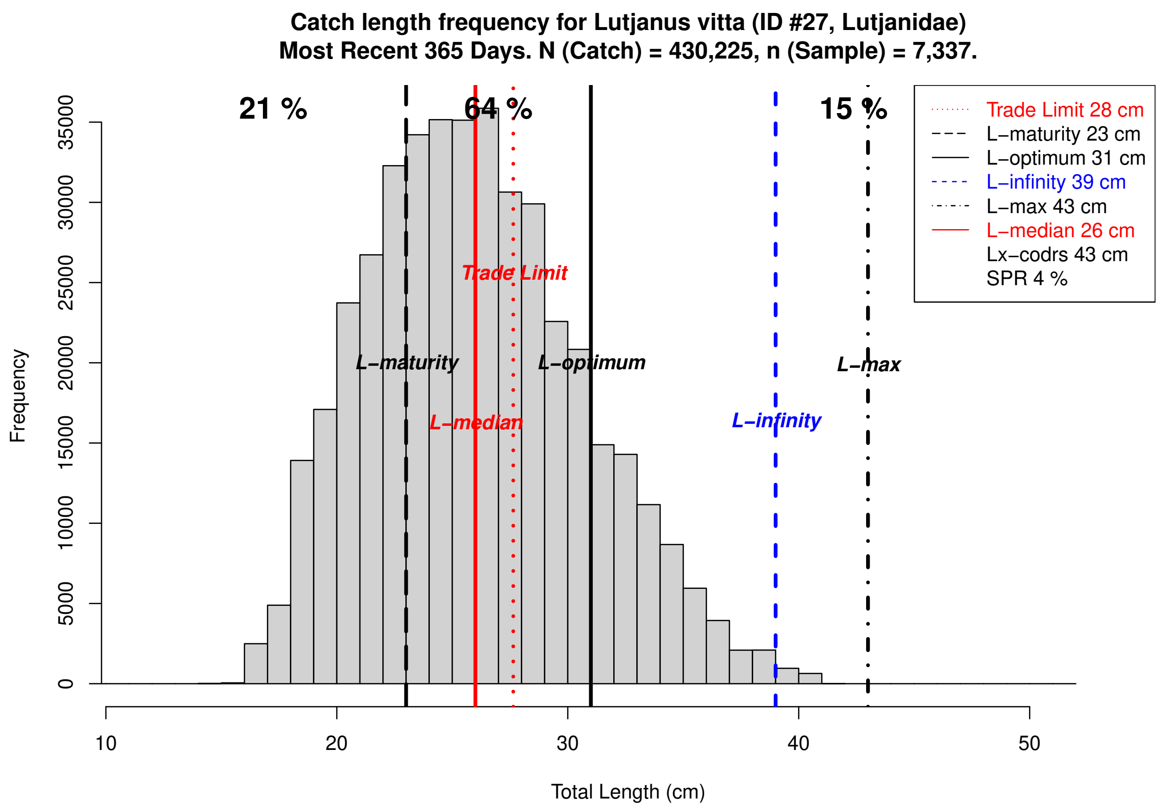
The majority of the fish in the catch have not had a chance to reproduce before capture. This fishery is most likely overfished already if fishing mortality is high for all size classes in the population. An immediate shift away from targeting juvenile fish and a reduction in overall fishing pressure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

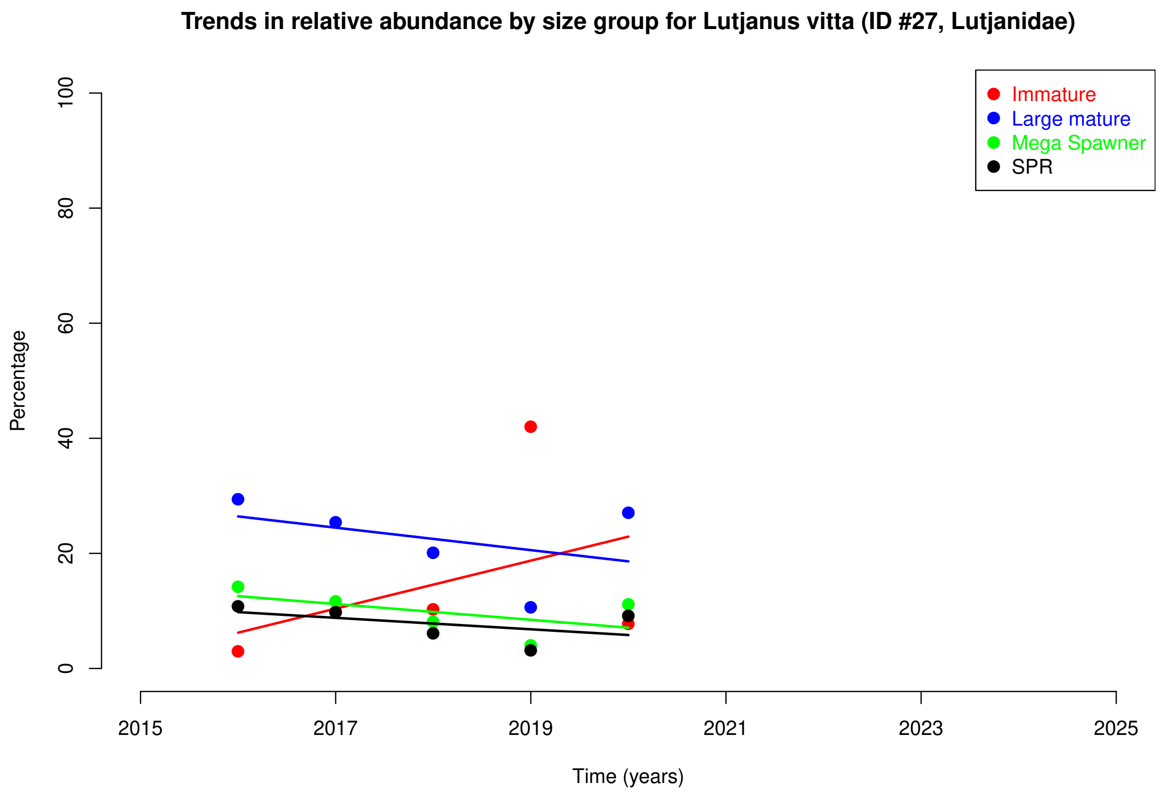
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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 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: 0.461
% Large Mature falling over recent years, situation deteriorating. P: 0.929
% Mega Spawner falling over recent years, situation deteriorating. P: 0.919
% SPR no trend over recent years, situation stable. P: 0.996


Catch length frequency for Lutjanus vitta (ID #27, Lutjanidae)
Most Recent 365 Days. N (Catch) = 430,225, n (Sample) = 7,337.
21 %
64 %
15 %
Trade Limit 28 cm
L−maturity 23 cm
L−optimum 31 cm
L−infinity 39 cm
L−max 43 cm
L−median 26 cm
Lx−codrs 43 cm
SPR 4 %
Trade Limit
L−maturity
L−optimum
L−max
L−median
L−infinity
Frequency
0
5000
10000
15000
20000
25000
30000
35000
10
20
30
40
50
Total Length (cm)


Trends in relative abundance by size group for Lutjanus vitta (ID #27, 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 vitta (ID #27, Lutjanidae) in most recent 365 days.
N (Catch) =430,225, n (Sample) = 7,337
Immature (< 23cm): 21%
Small mature (>= 23cm, < 31cm): 64%
Large mature (>= 31cm): 15%
Mega spawner (>= 34.1cm): 6% (subset of large mature fish)
Spawning Potential Ratio: 4 %

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.

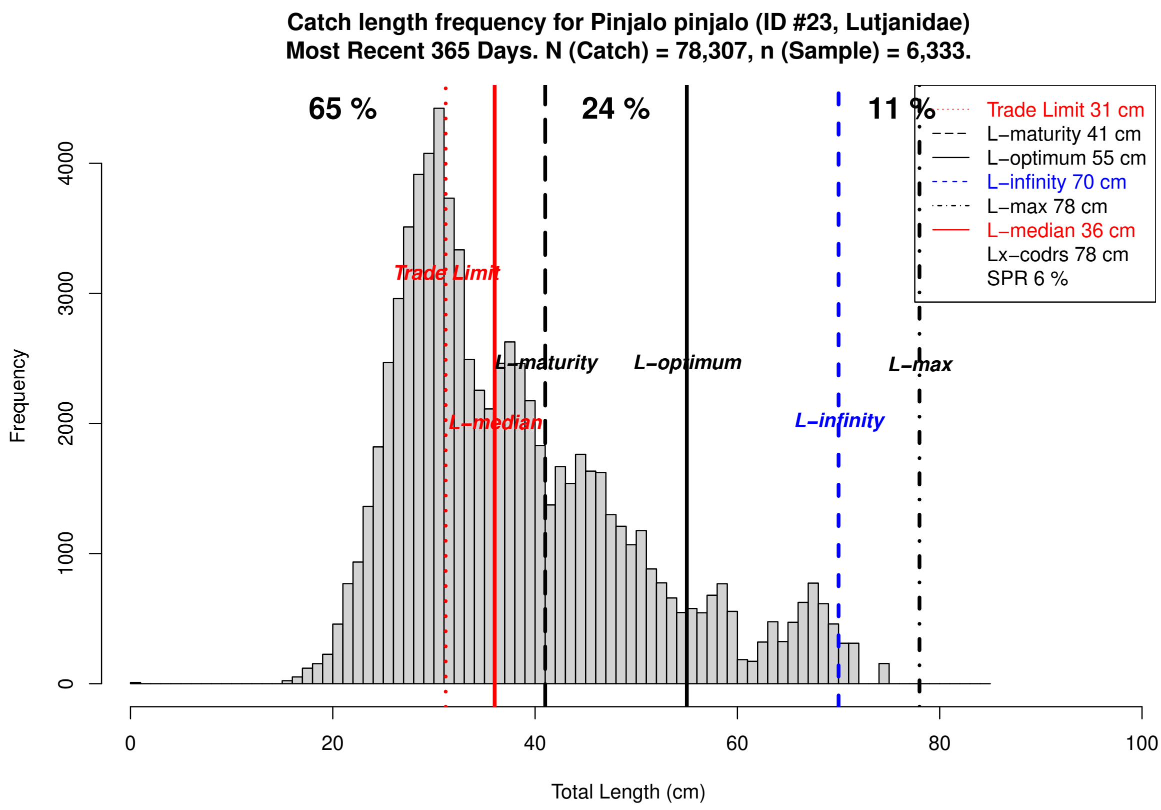
Between 20% and 30% of the fish in the catch are specimens that have not yet reproduced. This is reason for concern in terms of potential overfishing through overharvesting of juveniles, if fishing pressure is high and percentages immature fish would further rise. Targeting larger fish and avoiding small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

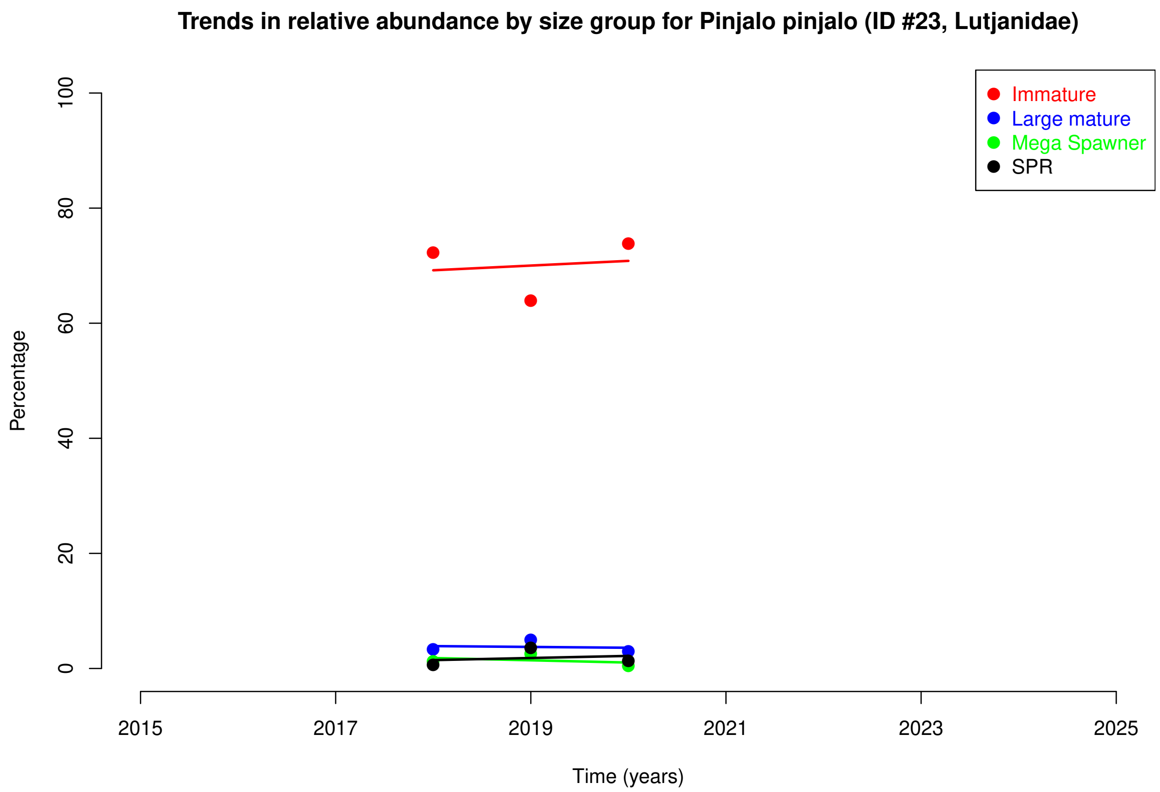
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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 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: 0.479
% Large Mature falling over recent years, situation deteriorating. P: 0.489
% Mega Spawner falling over recent years, situation deteriorating. P: 0.328
% SPR falling over recent years, situation deteriorating. P: 0.389


Catch length frequency for Pinjalo pinjalo (ID #23, Lutjanidae)
Most Recent 365 Days. N (Catch) = 78,307, n (Sample) = 6,333.
65 %
24 %
11 %
Trade Limit
L−maturity
L−optimum
L−max
L−median
L−infinity
Trade Limit 31 cm
L−maturity 41 cm
L−optimum 55 cm
L−infinity 70 cm
L−max 78 cm
L−median 36 cm
Lx−codrs 78 cm
SPR 6 %
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) =78,307, n (Sample) = 6,333
Immature (< 41cm): 65%
Small mature (>= 41cm, < 55cm): 24%
Large mature (>= 55cm): 11%
Mega spawner (>= 60.5cm): 7% (subset of large mature fish)
Spawning Potential Ratio: 6 %

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.

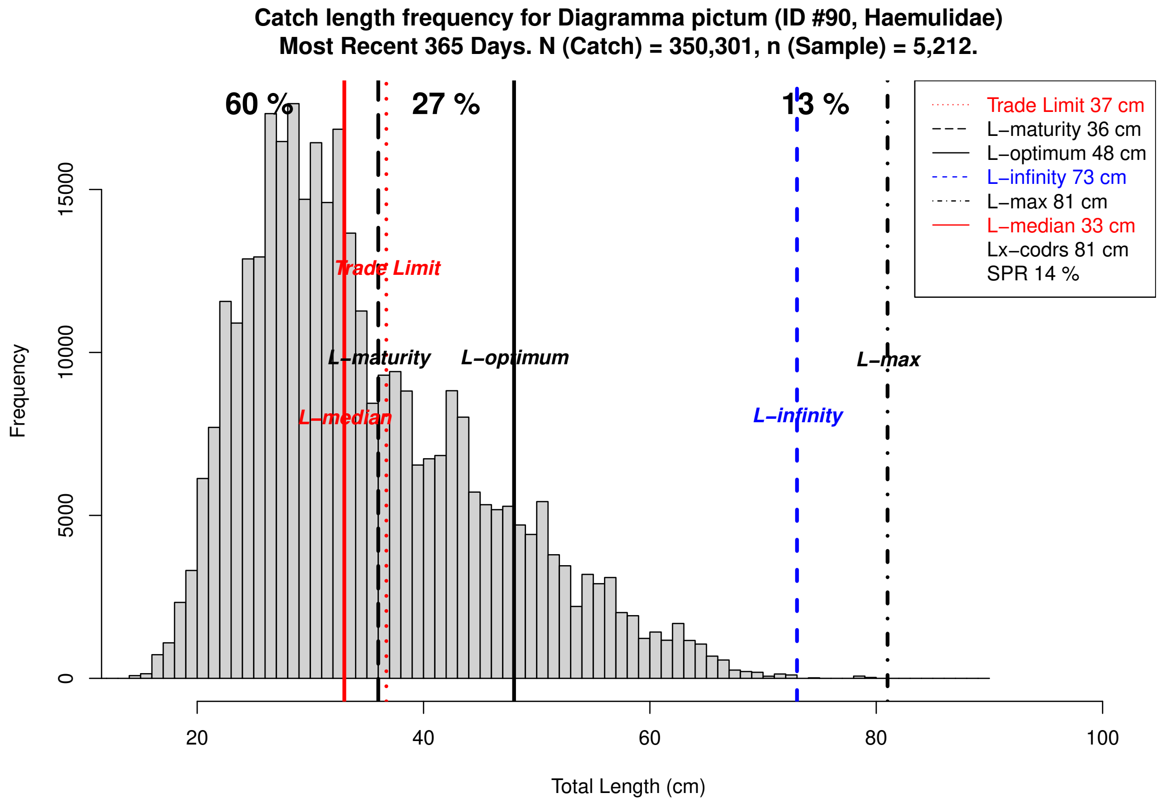
The majority of the fish in the catch have not had a chance to reproduce before capture. This fishery is most likely overfished already if fishing mortality is high for all size classes in the population. An immediate shift away from targeting juvenile fish and a reduction in overall fishing pressure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

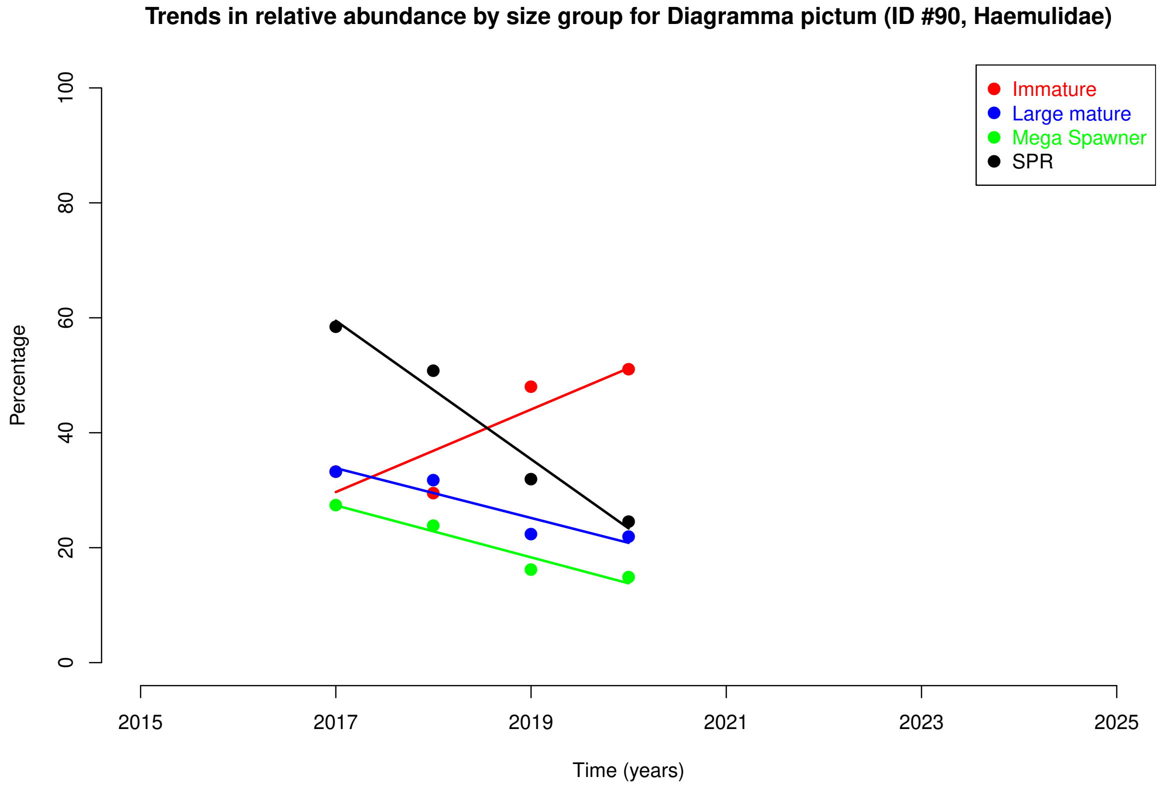
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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 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 rising over recent years, situation deteriorating. P: 0.902
% Large Mature falling over recent years, situation deteriorating. P: 0.912
% Mega Spawner falling over recent years, situation deteriorating. P: 0.760
% SPR rising over recent years, situation improving. P: 0.848


Catch length frequency for Diagramma pictum (ID #90, Haemulidae)
Most Recent 365 Days. N (Catch) = 350,301, n (Sample) = 5,212.
60 %
27 %
13 %
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 33 cm
Lx–codrs 81 cm
SPR 14 %
Frequency
0
5000
10000
15000
20
40
60
80
100
Total Length (cm)


Trends in relative abundance by size group for Diagramma pictum (ID #90, Haemulidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
0
20
40
60
80
100
2015
2017
2019
2021
2023
2025
Time (years)

The percentages of Diagramma pictum (ID #90, Haemulidae) in most recent 365 days.
N (Catch) =350,301, n (Sample) = 5,212
Immature (< 36cm): 60%
Small mature (>= 36cm, < 48cm): 27%
Large mature (>= 48cm): 13%
Mega spawner (>= 52.8cm): 8% (subset of large mature fish)
Spawning Potential Ratio: 14 %

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.

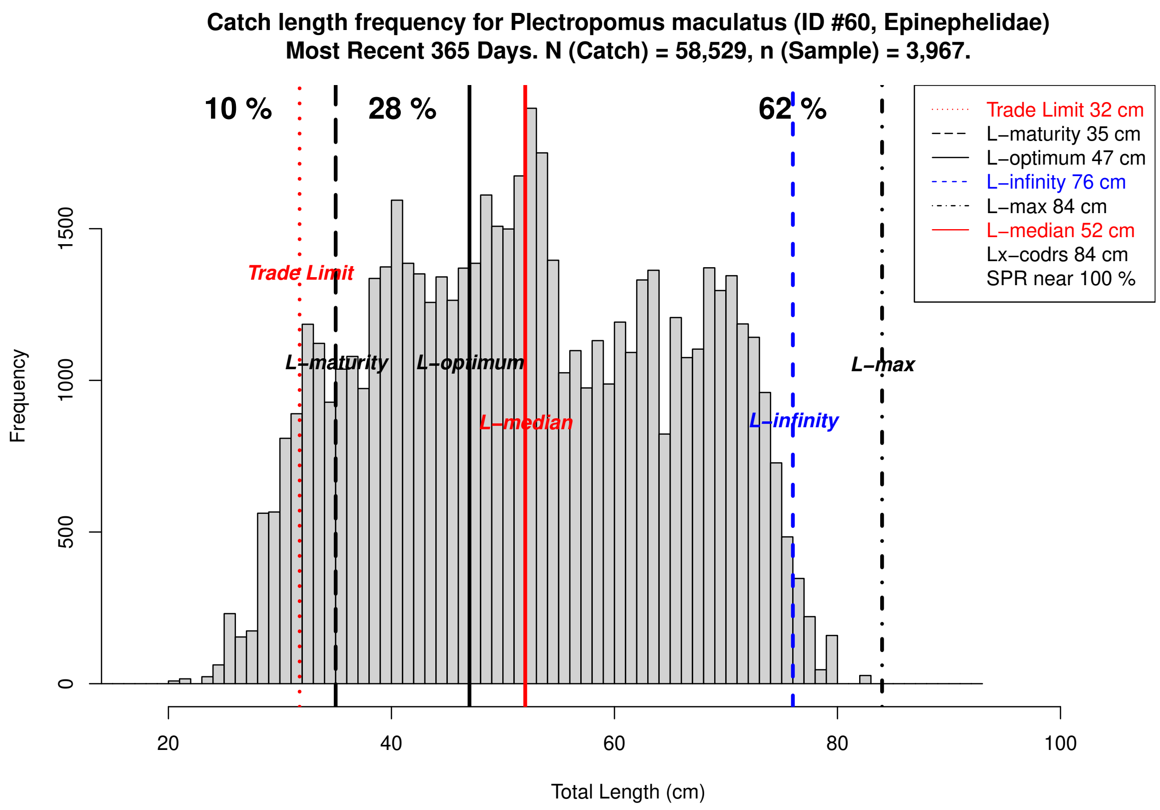
The majority of the fish in the catch have not had a chance to reproduce before capture. This fishery is most likely overfished already if fishing mortality is high for all size classes in the population. An immediate shift away from targeting juvenile fish and a reduction in overall fishing pressure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

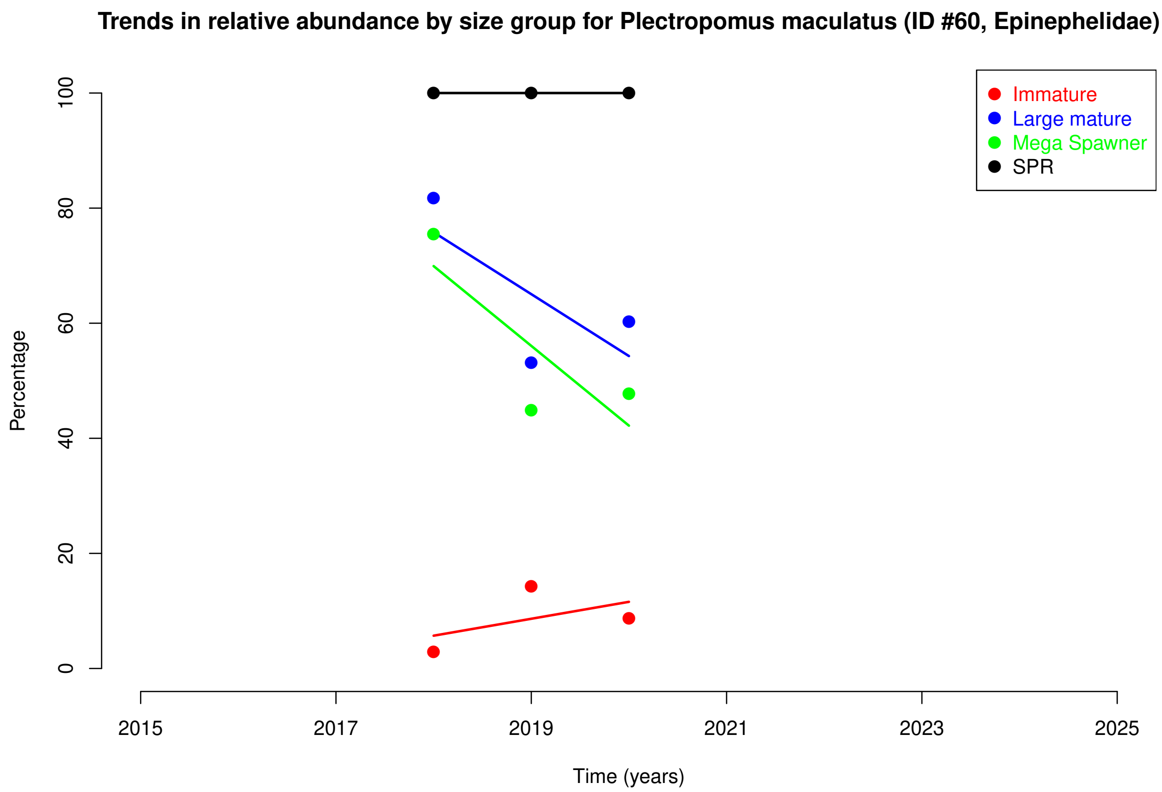
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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 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: 0.130
% Large Mature falling over recent years, situation deteriorating. P: 0.068
% Mega Spawner falling over recent years, situation deteriorating. P: 0.030
% SPR falling over recent years, situation deteriorating. P: 0.017


Catch length frequency for Plectropomus maculatus (ID #60, Epinephelidae)
Most Recent 365 Days. N (Catch) = 58,529, n (Sample) = 3,967.
10 %
28 %
62 %
Trade Limit 32 cm
L−maturity 35 cm
L−optimum 47 cm
L−infinity 76 cm
L−max 84 cm
L−median 52 cm
Lx−codrs 84 cm
SPR near 100 %
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 maculatus (ID #60, Epinephelidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
Time (years)

The percentages of Plectropomus maculatus (ID #60, Epinephelidae) in most recent 365 days.
N (Catch) =58,529, n (Sample) = 3,967
Immature (< 35cm): 10%
Small mature (>= 35cm, < 47cm): 28%
Large mature (>= 47cm): 62%
Mega spawner (>= 51.7cm): 52% (subset of large mature fish)
Spawning Potential Ratio: near 100 %

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.

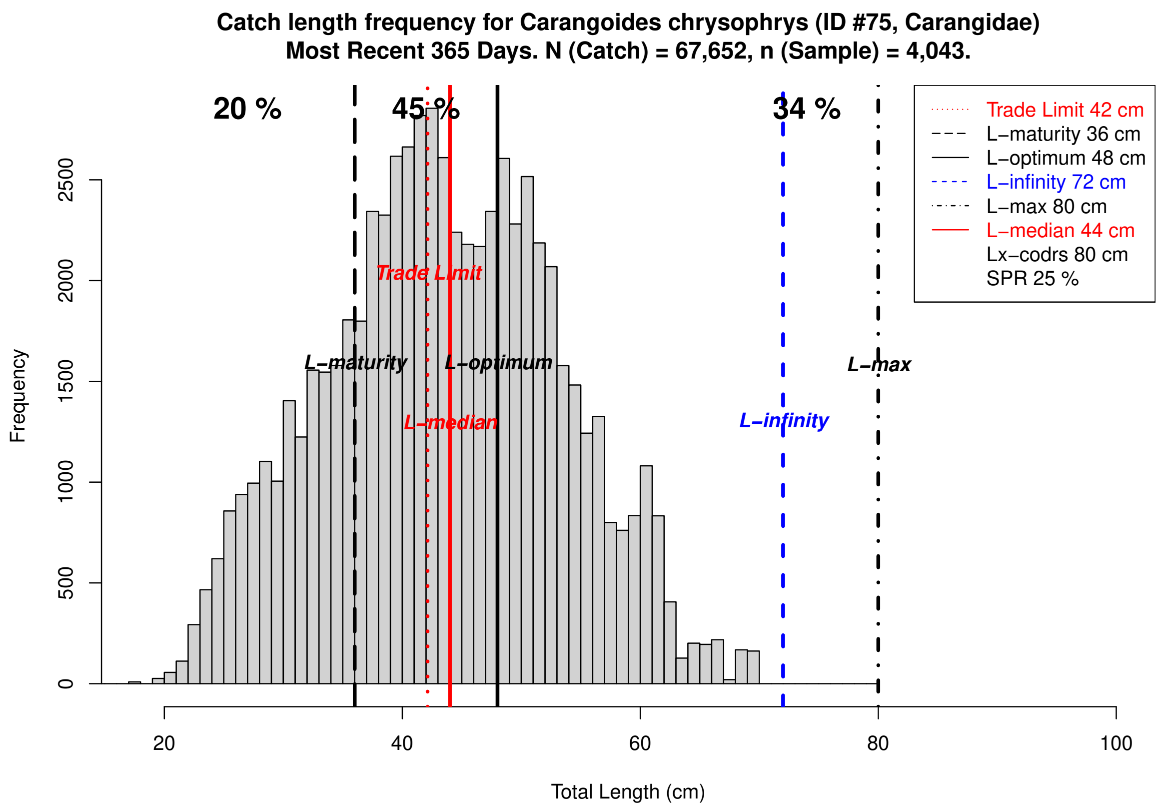
At least 90% of the fish in the catch are mature specimens that have spawned at least once before they were caught. The fishery does not depend on immature size classes for this species and is considered safe for this indicator. This fishery will not be causing overfishing through over harvesting of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

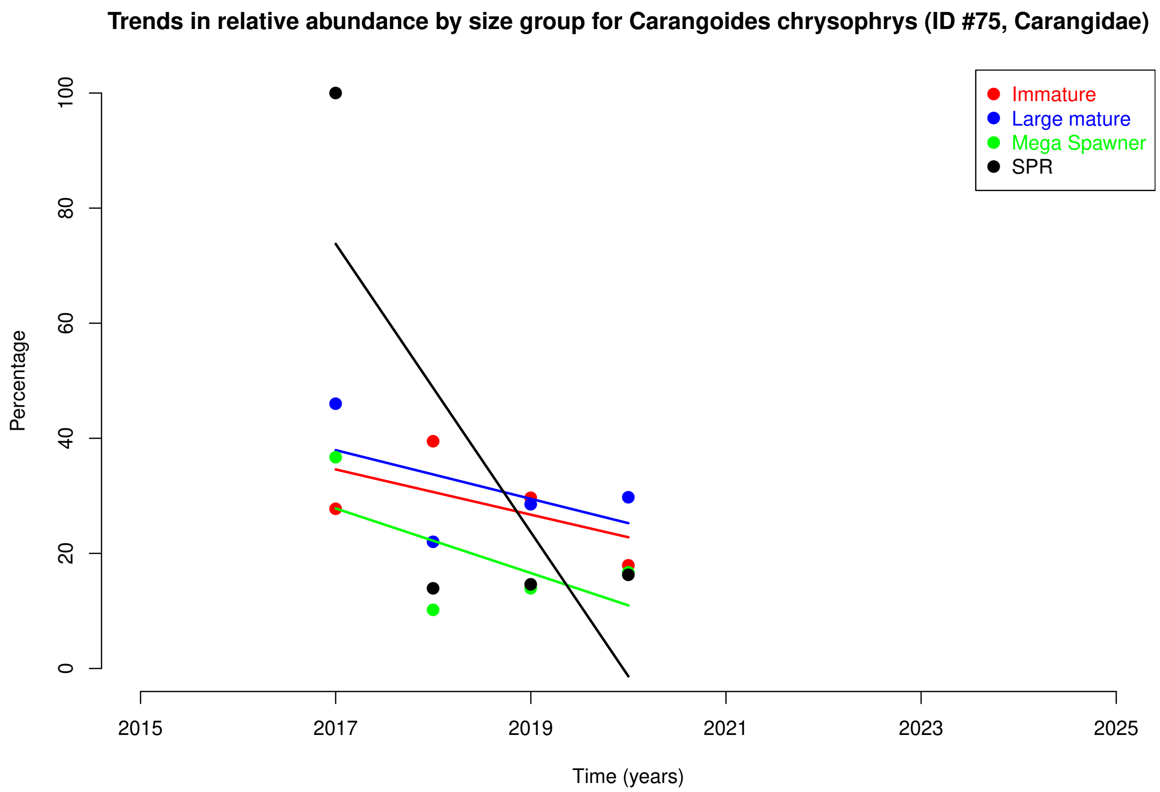
The majority of the catch consists of size classes around or above the optimum harvest size. This means that the impact of the fishery is minimized for this species. Potentially higher yields of this species could be achieved by catching them at somewhat smaller size, although capture of smaller specimen 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 maculatus (ID #60, 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: 0.657
% Large Mature falling over recent years, situation deteriorating. P: 0.487
% Mega Spawner falling over recent years, situation deteriorating. P: 0.387
% SPR no trend over recent years, situation stable. P: 0.333


Catch length frequency for Carangoides chrysophrys (ID #75, Carangidae)
Most Recent 365 Days. N (Catch) = 67,652, n (Sample) = 4,043.
20 %
45 %
34 %
Trade Limit 42 cm
L–maturity 36 cm
L–optimum 48 cm
L–infinity 72 cm
L–max 80 cm
L–median 44 cm
Lx–codrs 80 cm
SPR 25 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
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) =67,652, n (Sample) = 4,043
Immature (< 36cm): 20%
Small mature (>= 36cm, < 48cm): 45%
Large mature (>= 48cm): 34%
Mega spawner (>= 52.8cm): 20% (subset of large mature fish)
Spawning Potential Ratio: 25 %

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.

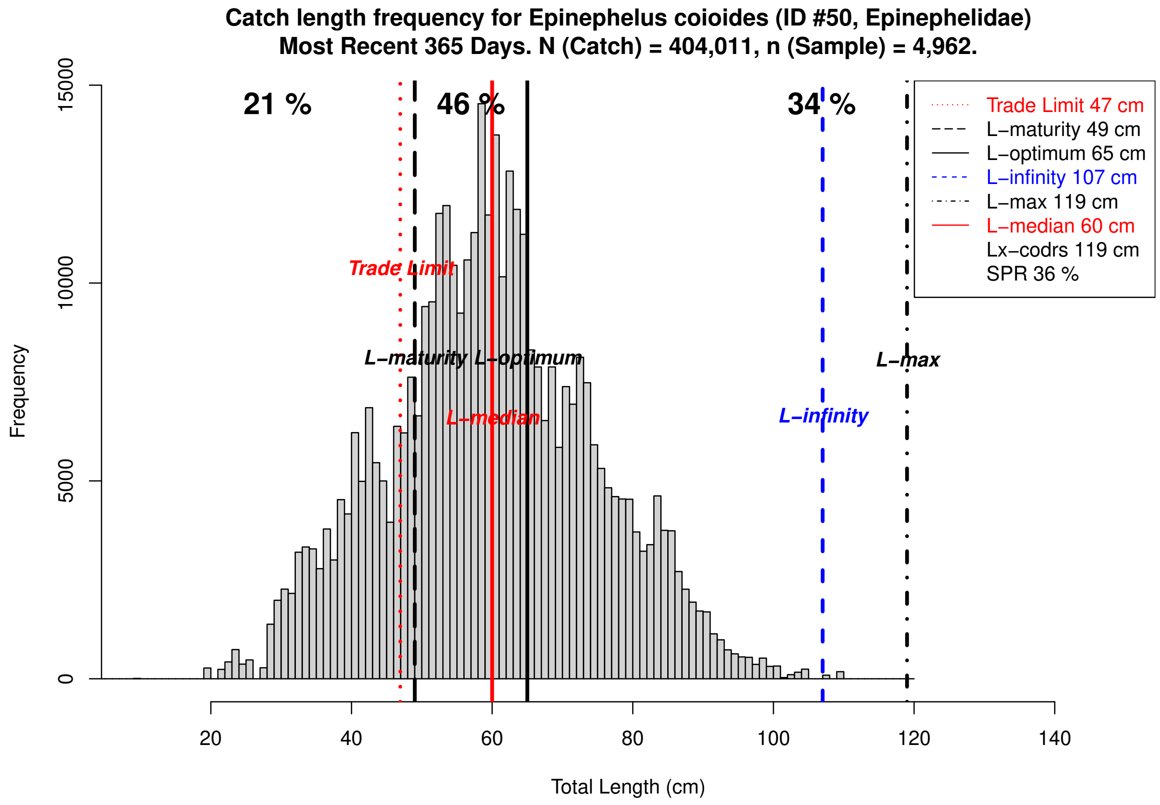
Between 20% and 30% of the fish in the catch are specimens that have not yet reproduced. This is reason for concern in terms of potential overfishing through overharvesting of juveniles, if fishing pressure is high and percentages immature fish would further rise. Targeting larger fish and avoiding small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

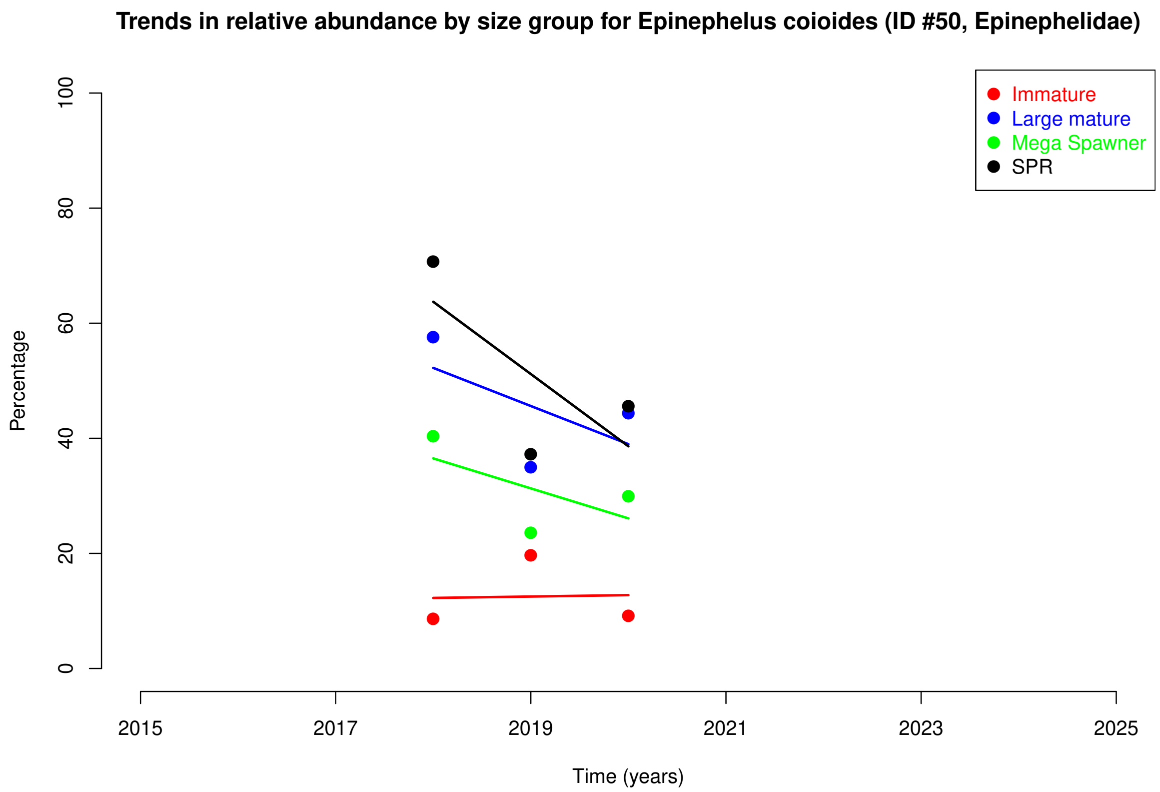
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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 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 falling over recent years, situation improving. P: 0.425
% Large Mature falling over recent years, situation deteriorating. P: 0.465
% Mega Spawner falling over recent years, situation deteriorating. P: 0.388
% SPR falling over recent years, situation deteriorating. P: 0.240


Catch length frequency for Epinephelus coioides (ID #50, Epinephelidae)
Most Recent 365 Days. N (Catch) = 404,011, n (Sample) = 4,962.
21 %
46 %
34 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
Trade Limit 47 cm
L–maturity 49 cm
L–optimum 65 cm
L–infinity 107 cm
L–max 119 cm
L–median 60 cm
Lx–codrs 119 cm
SPR 36 %
Frequency
0
5000
10000
15000
20
40
60
80
100
120
140
Total Length (cm)


Trends in relative abundance by size group for Epinephelus coioides (ID #50, 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 Epinephelus coioides (ID #50, Epinephelidae) in most recent 365 days.
N (Catch) =404,011, n (Sample) = 4,962
Immature (< 49cm): 21%
Small mature (>= 49cm, < 65cm): 46%
Large mature (>= 65cm): 34%
Mega spawner (>= 71.5cm): 23% (subset of large mature fish)
Spawning Potential Ratio: 36 %

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.

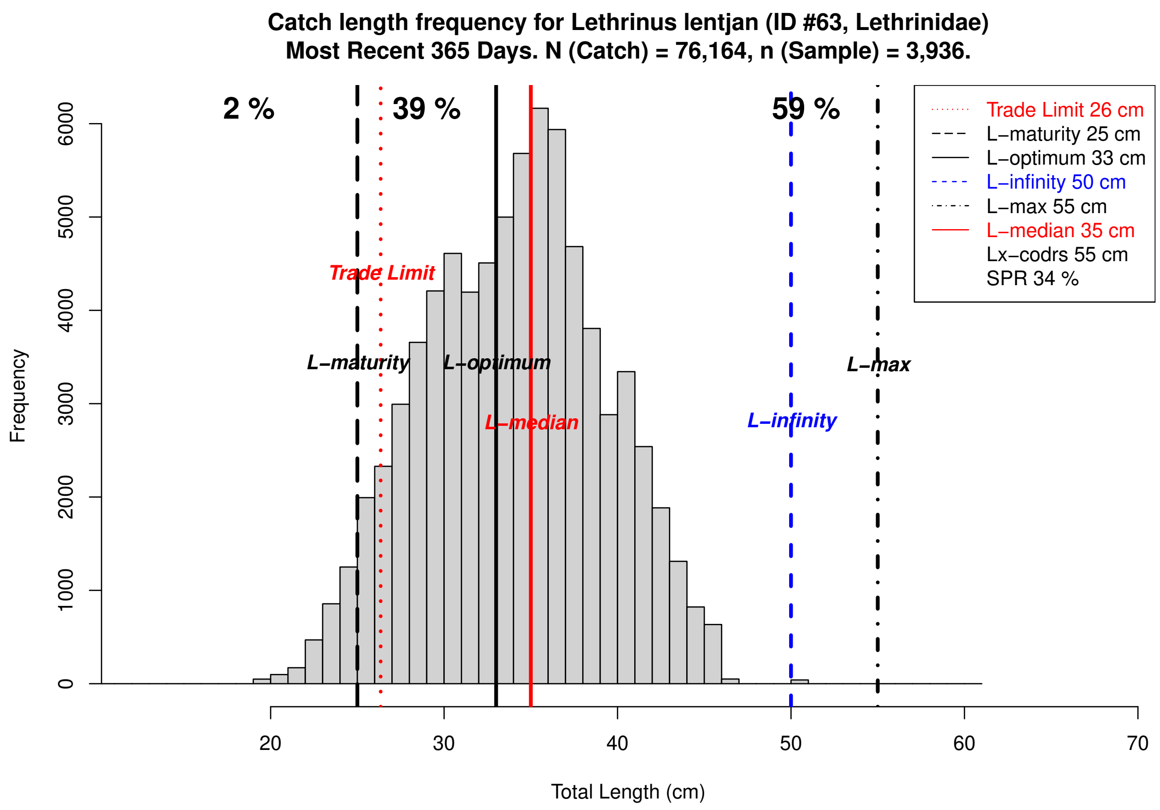
Between 20% and 30% of the fish in the catch are specimens that have not yet reproduced. This is reason for concern in terms of potential overfishing through overharvesting of juveniles, if fishing pressure is high and percentages immature fish would further rise. Targeting larger fish and avoiding small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

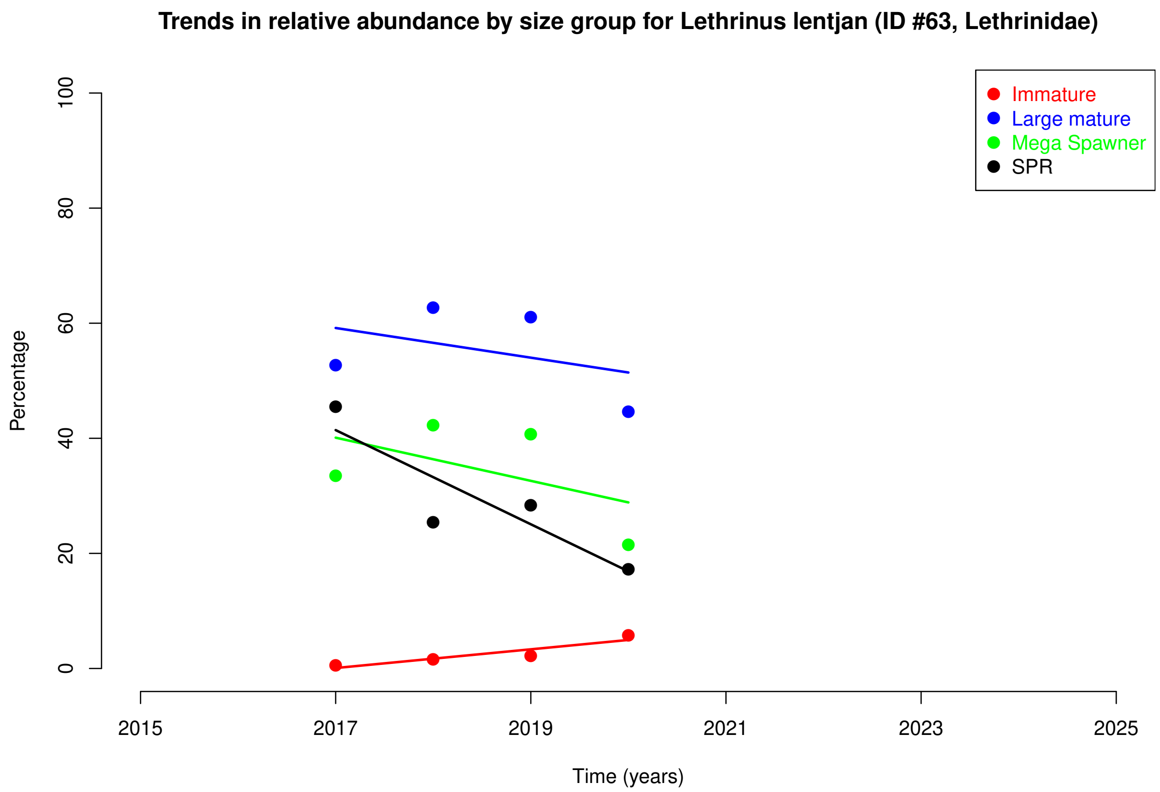
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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 Epinephelus coioides (ID #50, 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: 0.975
% Large Mature falling over recent years, situation deteriorating. P: 0.604
% Mega Spawner falling over recent years, situation deteriorating. P: 0.577
% SPR falling over recent years, situation deteriorating. P: 0.487


Catch length frequency for Lethrinus lentjan (ID #63, Lethrinidae)
Most Recent 365 Days. N (Catch) = 76,164, n (Sample) = 3,936.
2 %
39 %
59 %
Trade Limit 26 cm
L−maturity 25 cm
L−optimum 33 cm
L−infinity 50 cm
L−max 55 cm
L−median 35 cm
Lx−codrs 55 cm
SPR 34 %
Trade Limit
L−maturity
L−optimum
L−median
L−infinity
L−max
Frequency
0
1000
2000
3000
4000
5000
6000
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) =76,164, n (Sample) = 3,936
Immature (< 25cm): 2%
Small mature (>= 25cm, < 33cm): 39%
Large mature (>= 33cm): 59%
Mega spawner (>= 36.3cm): 37% (subset of large mature fish)
Spawning Potential Ratio: 34 %

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.

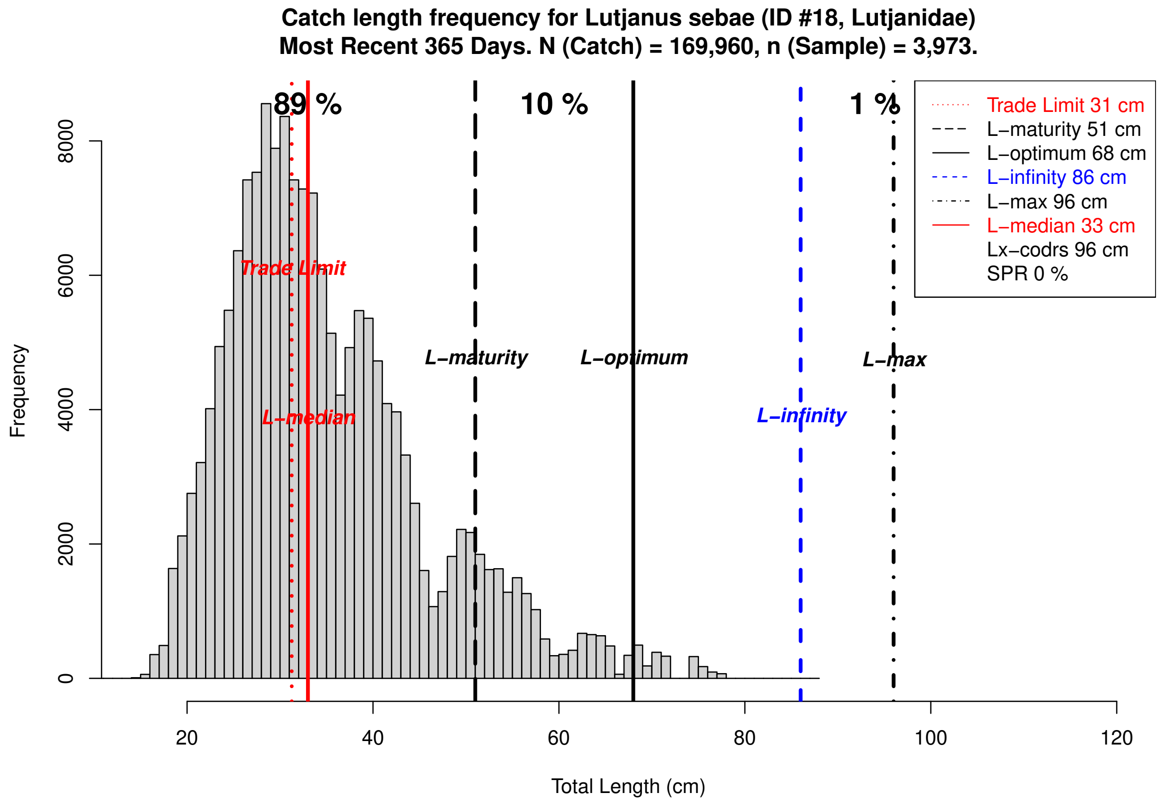
At least 90% of the fish in the catch are mature specimens that have spawned at least once before they were caught. The fishery does not depend on immature size classes for this species and is considered safe for this indicator. This fishery will not be causing overfishing through over harvesting of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

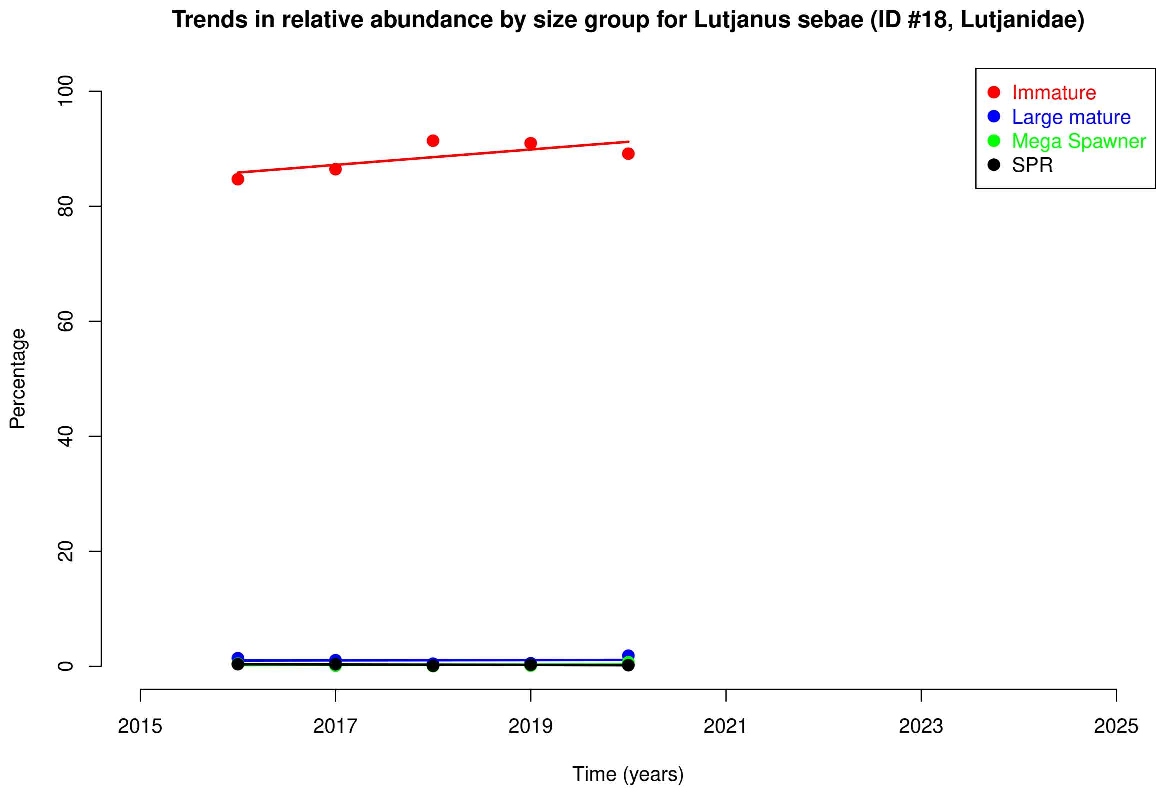
The majority of the catch consists of size classes around or above the optimum harvest size. This means that the impact of the fishery is minimized for this species. Potentially higher yields of this species could be achieved by catching them at somewhat smaller size, although capture of smaller specimen 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 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: 0.072
% Large Mature falling over recent years, situation deteriorating. P: 0.600
% Mega Spawner falling over recent years, situation deteriorating. P: 0.490
% SPR falling over recent years, situation deteriorating. P: 0.111


Catch length frequency for Lutjanus sebae (ID #18, Lutjanidae)
Most Recent 365 Days. N (Catch) = 169,960, n (Sample) = 3,973.
89 %
10 %
1 %
Trade Limit 31 cm
L−maturity 51 cm
L−optimum 68 cm
L−infinity 86 cm
L−max 96 cm
L−median 33 cm
Lx−codrs 96 cm
SPR 0 %
Trade Limit
L−maturity
L−optimum
L−max
L−median
L−infinity
Frequency
0
2000
4000
6000
8000
20
40
60
80
100
120
Total Length (cm)


Trends in relative abundance by size group for Lutjanus sebae (ID #18, 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 sebae (ID #18, Lutjanidae) in most recent 365 days.
N (Catch) =169,960, n (Sample) = 3,973
Immature (< 51cm): 89%
Small mature (>= 51cm, < 68cm): 10%
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.

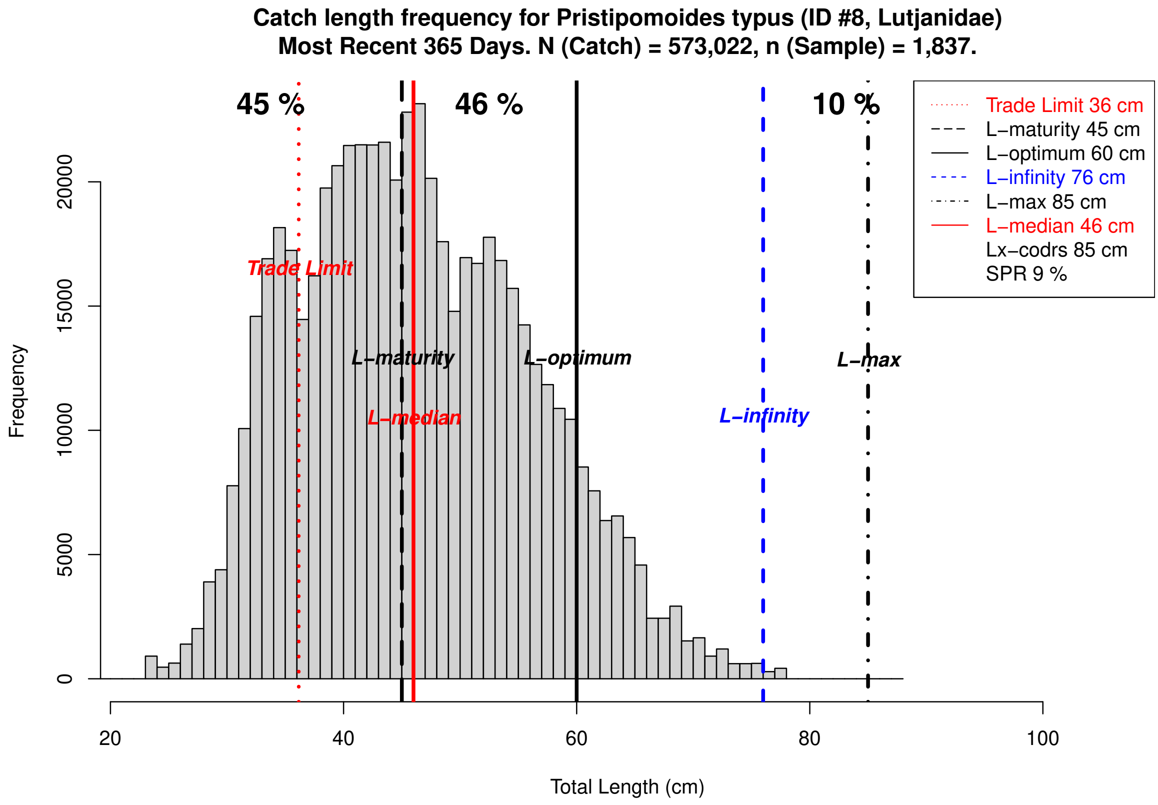
The majority of the fish in the catch have not had a chance to reproduce before capture. This fishery is most likely overfished already if fishing mortality is high for all size classes in the population. An immediate shift away from targeting juvenile fish and a reduction in overall fishing pressure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

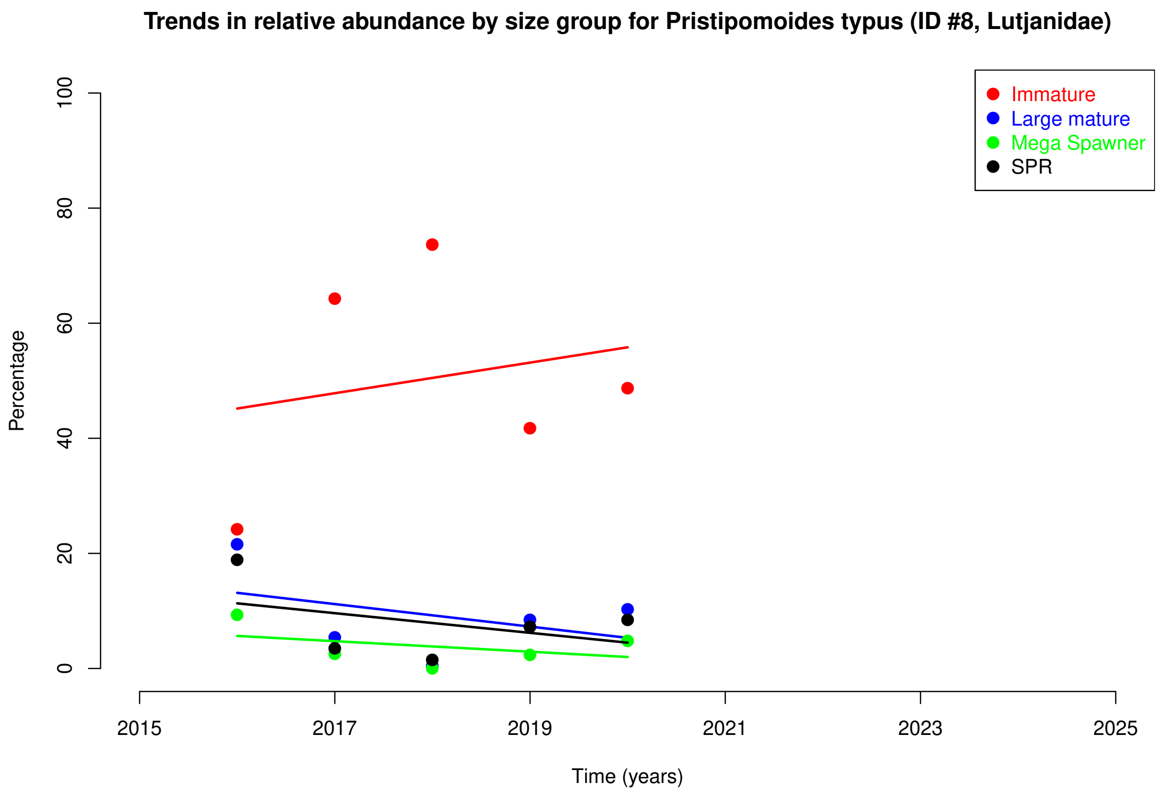
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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: 0.161
% Large Mature no trend over recent years, situation stable. P: 0.914
% Mega Spawner no trend over recent years, situation stable. P: 0.727
% SPR no trend over recent years, situation stable. P: 0.317


Catch length frequency for Pristipomoides typus (ID #8, Lutjanidae)
Most Recent 365 Days. N (Catch) = 573,022, n (Sample) = 1,837.
45 %
46 %
10 %
Trade Limit 36 cm
L−maturity 45 cm
L−optimum 60 cm
L−infinity 76 cm
L−max 85 cm
L−median 46 cm
Lx−codrs 85 cm
SPR 9 %
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) =573,022, n (Sample) = 1,837
Immature (< 45cm): 45%
Small mature (>= 45cm, < 60cm): 46%
Large mature (>= 60cm): 10%
Mega spawner (>= 66cm): 4% (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.

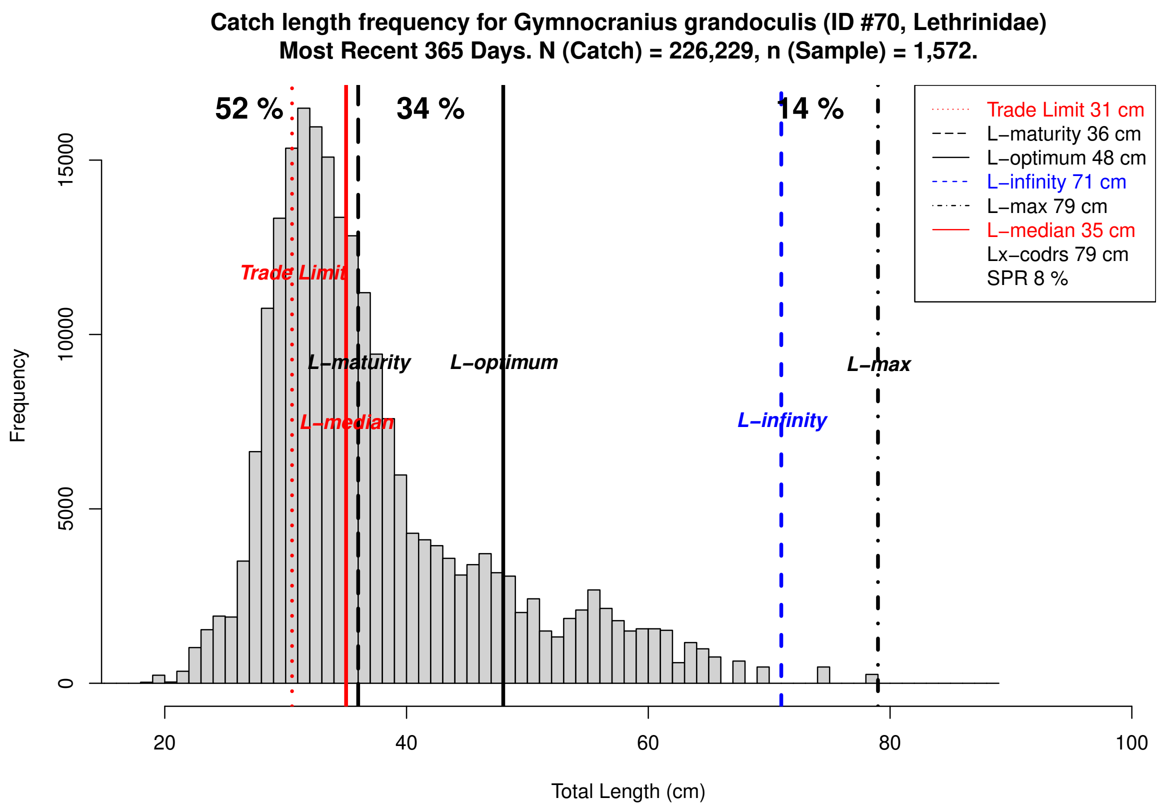
Between 30% and 50% of the fish in the catch are immature and have not had a chance to reproduce before capture. The fishery is in immediate danger of overfishing through overharvesting of juveniles, if fishing pressure is high. Catching small and immature fish needs to be actively avoided and a limit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

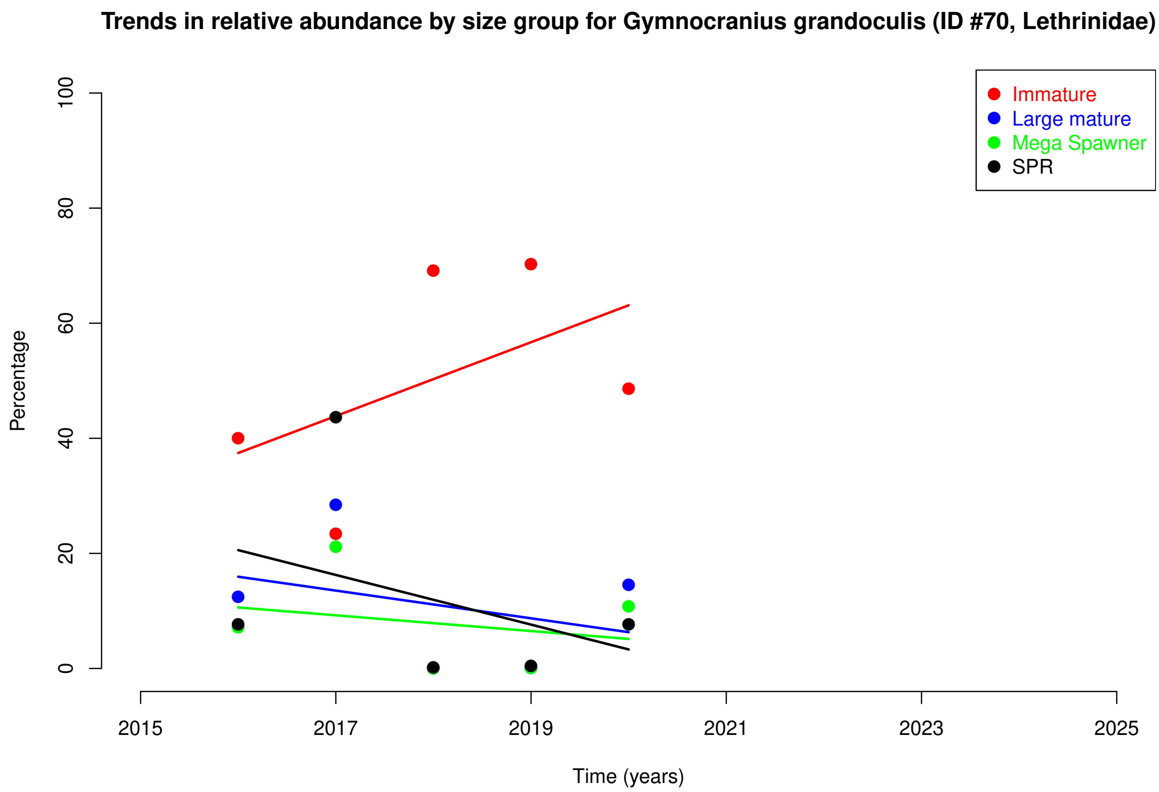
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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 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: 0.725
% Large Mature falling over recent years, situation deteriorating. P: 0.510
% Mega Spawner falling over recent years, situation deteriorating. P: 0.488
% SPR falling over recent years, situation deteriorating. P: 0.504


Catch length frequency for Gymnocranius grandoculis (ID #70, Lethrinidae)
Most Recent 365 Days. N (Catch) = 226,229, n (Sample) = 1,572.
52 %
34 %
14 %
Trade Limit 31 cm
L–maturity 36 cm
L–optimum 48 cm
L–infinity 71 cm
L–max 79 cm
L–median 35 cm
Lx–codrs 79 cm
SPR 8 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
Frequency
0
5000
10000
15000
20
40
60
80
100
Total Length (cm)


Trends in relative abundance by size group for Gymnocranius grandoculis (ID #70, 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 Gymnocranius grandoculis (ID #70, Lethrinidae) in most recent 365 days.
N (Catch) =226,229, n (Sample) = 1,572
Immature (< 36cm): 52%
Small mature (>= 36cm, < 48cm): 34%
Large mature (>= 48cm): 14%
Mega spawner (>= 52.8cm): 10% (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.

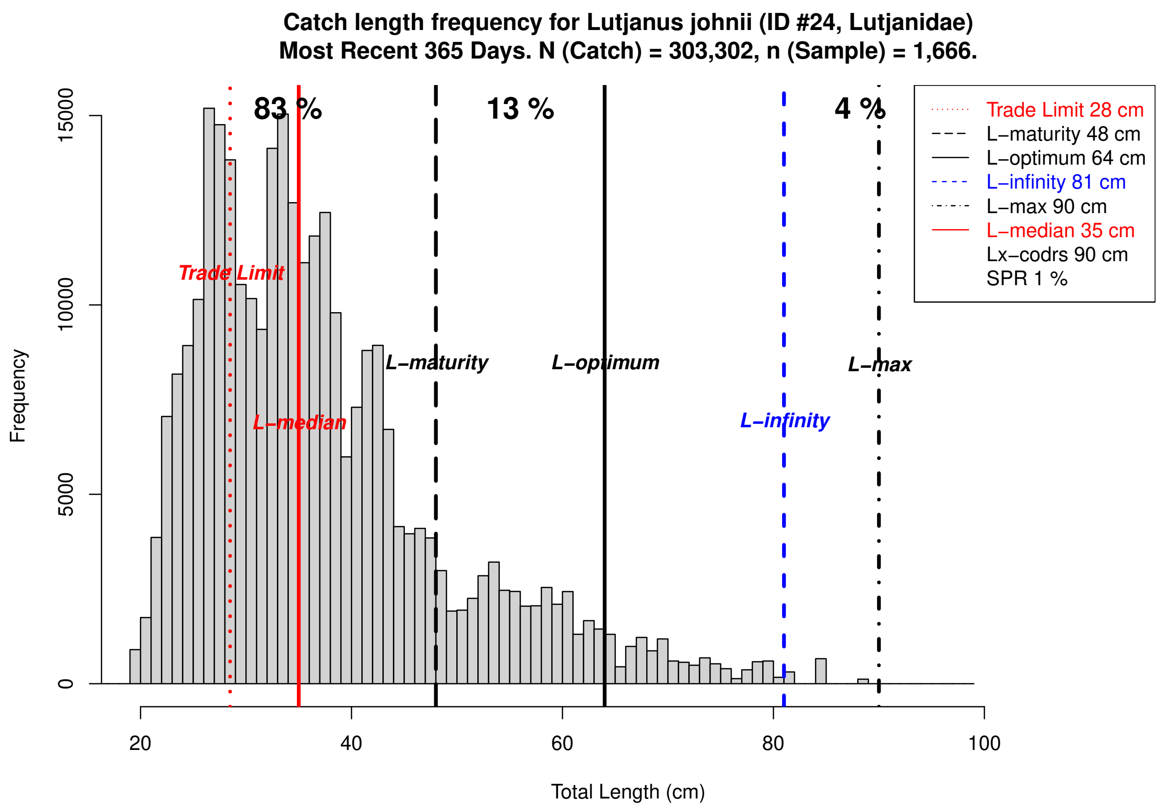
The majority of the fish in the catch have not had a chance to reproduce before capture. This fishery is most likely overfished already if fishing mortality is high for all size classes in the population. An immediate shift away from targeting juvenile fish and a reduction in overall fishing pressure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

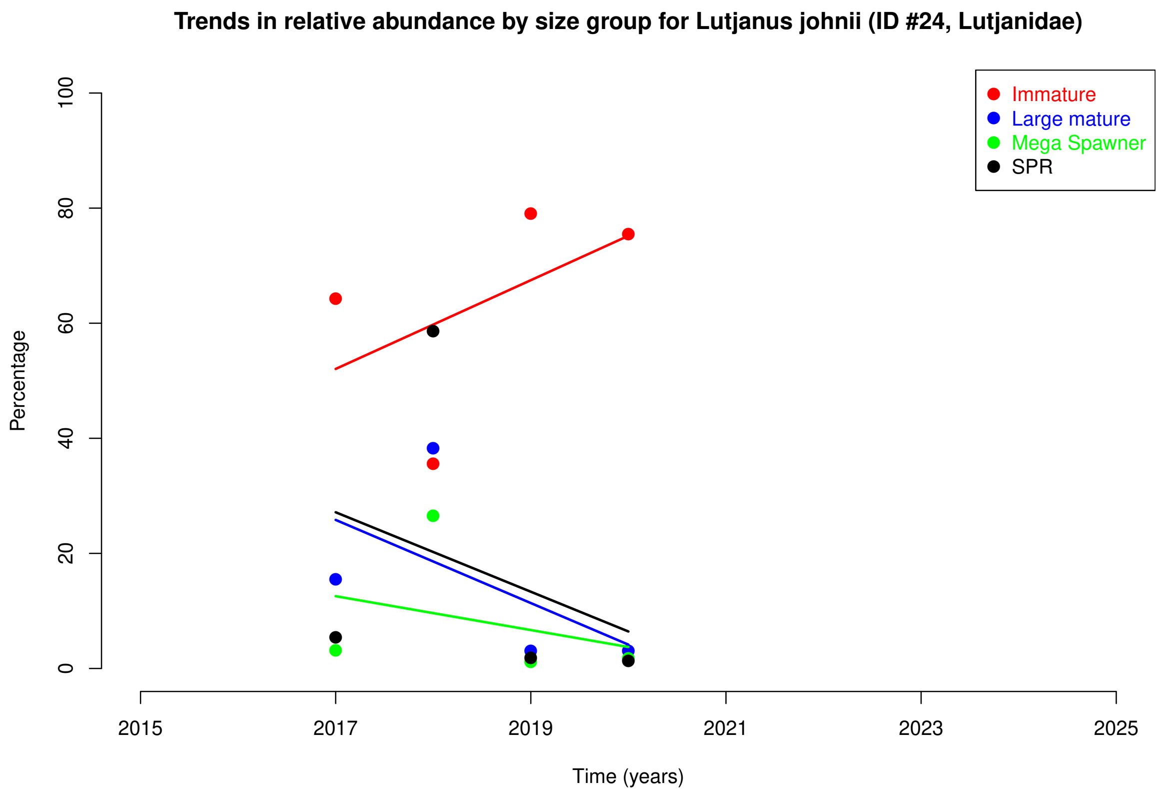
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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 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 rising over recent years, situation deteriorating. P: 0.381
% Large Mature falling over recent years, situation deteriorating. P: 0.596
% Mega Spawner falling over recent years, situation deteriorating. P: 0.689
% SPR falling over recent years, situation deteriorating. P: 0.532


Catch length frequency for Lutjanus johnii (ID #24, Lutjanidae)
Most Recent 365 Days. N (Catch) = 303,302, n (Sample) = 1,666.
83 %
13 %
4 %
Trade Limit 28 cm
L−maturity 48 cm
L−optimum 64 cm
L−infinity 81 cm
L−max 90 cm
L−median 35 cm
Lx−codrs 90 cm
SPR 1 %
Trade Limit
L−maturity
L−optimum
L−max
L−median
L−infinity
Frequency
0
5000
10000
15000
20
40
60
80
100
Total Length (cm)


Trends in relative abundance by size group for Lutjanus johnii (ID #24, 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 johnii (ID #24, Lutjanidae) in most recent 365 days.
N (Catch) =303,302, n (Sample) = 1,666
Immature (< 48cm): 83%
Small mature (>= 48cm, < 64cm): 13%
Large mature (>= 64cm): 4%
Mega spawner (>= 70.4cm): 2% (subset of large mature fish)
Spawning Potential Ratio: 1 %

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.

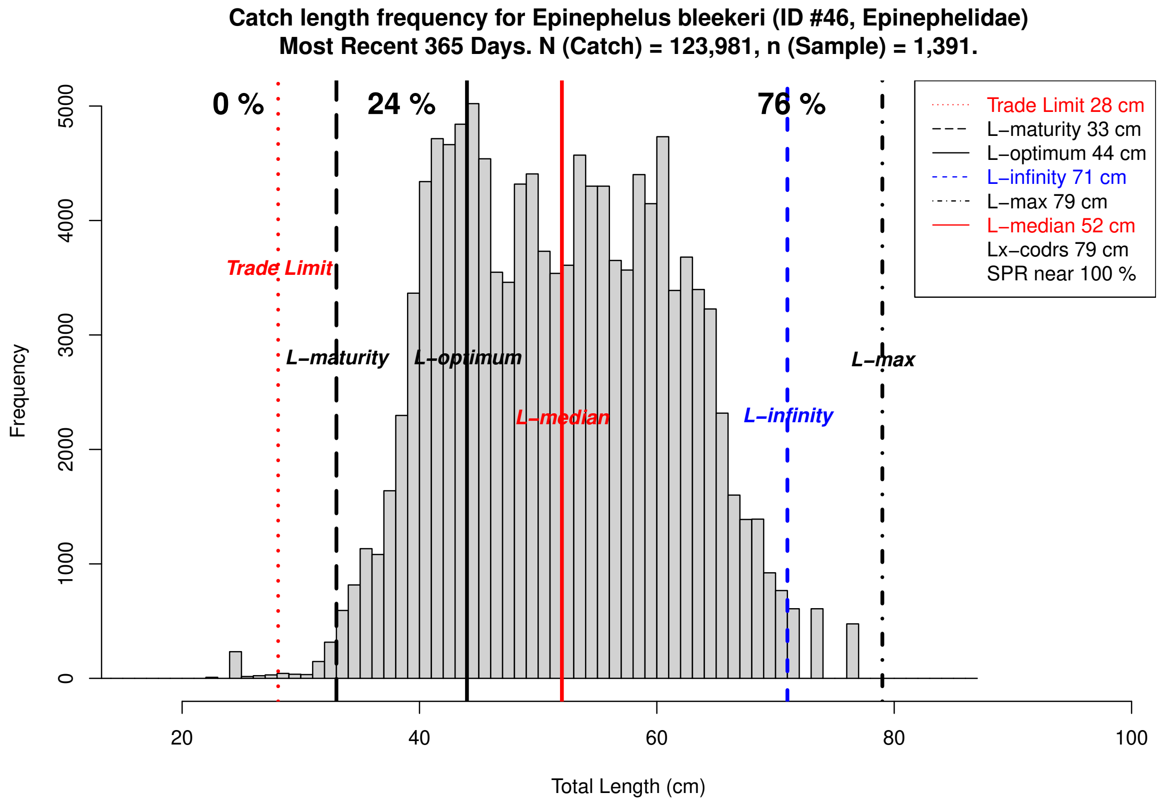
The majority of the fish in the catch have not had a chance to reproduce before capture. This fishery is most likely overfished already if fishing mortality is high for all size classes in the population. An immediate shift away from targeting juvenile fish and a reduction in overall fishing pressure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

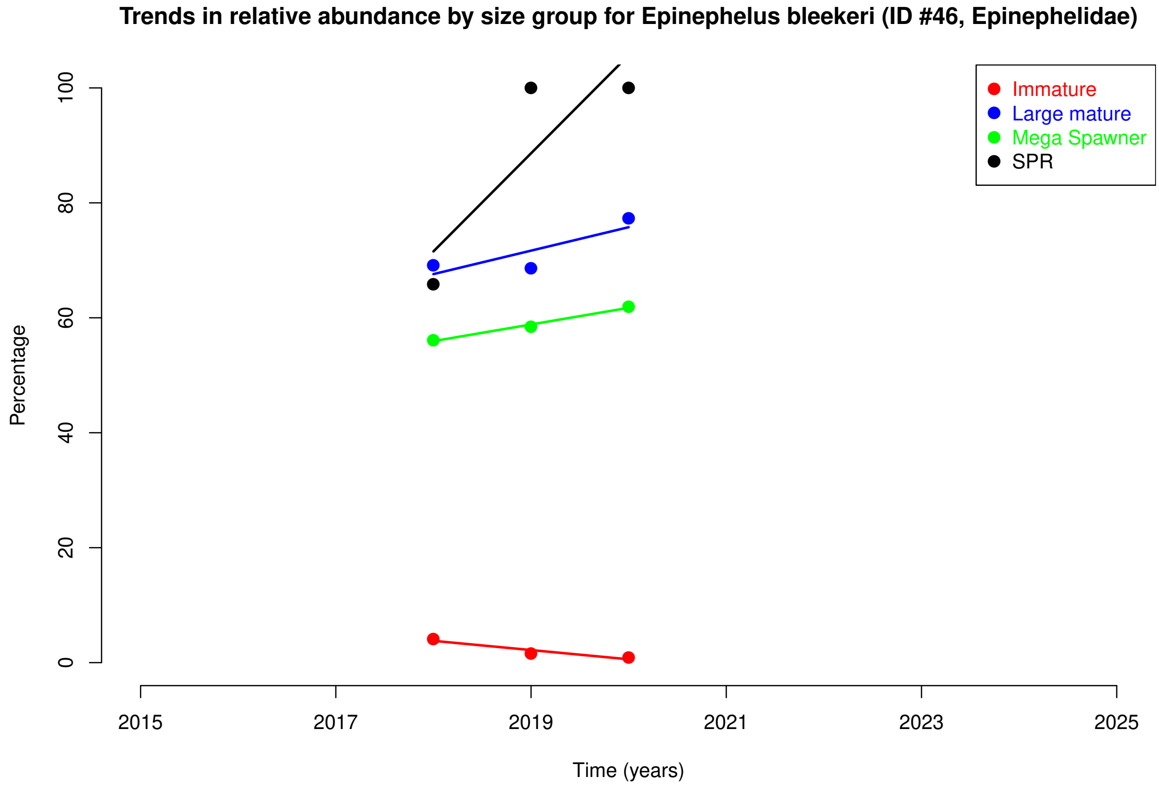
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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 johnii (ID #24, 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: 0.495
% Large Mature falling over recent years, situation deteriorating. P: 0.437
% Mega Spawner falling over recent years, situation deteriorating. P: 0.691
% SPR falling over recent years, situation deteriorating. P: 0.681


Catch length frequency for Epinephelus bleekeri (ID #46, Epinephelidae)
Most Recent 365 Days. N (Catch) = 123,981, n (Sample) = 1,391.
0 %
24 %
76 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
Trade Limit 28 cm
L–maturity 33 cm
L–optimum 44 cm
L–infinity 71 cm
L–max 79 cm
L–median 52 cm
Lx–codrs 79 cm
SPR near 100 %
Frequency
0
1000
2000
3000
4000
5000
20
40
60
80
100
Total Length (cm)


Trends in relative abundance by size group for Epinephelus bleekeri (ID #46, 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 Epinephelus bleekeri (ID #46, Epinephelidae) in most recent 365 days.
N (Catch) =123,981, n (Sample) = 1,391
Immature (< 33cm): 0%
Small mature (>= 33cm, < 44cm): 24%
Large mature (>= 44cm): 76%
Mega spawner (>= 48.4cm): 62% (subset of large mature fish)
Spawning Potential Ratio: near 100 %

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.

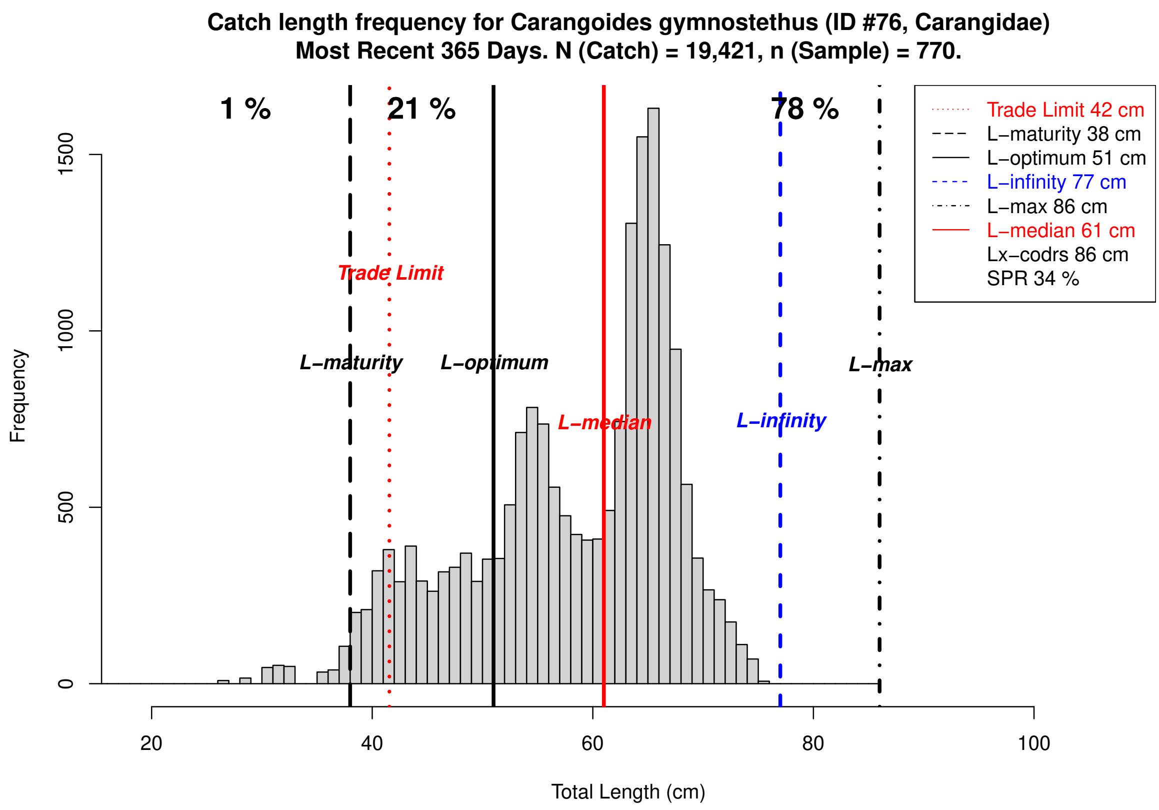
At least 90% of the fish in the catch are mature specimens that have spawned at least once before they were caught. The fishery does not depend on immature size classes for this species and is considered safe for this indicator. This fishery will not be causing overfishing through over harvesting of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

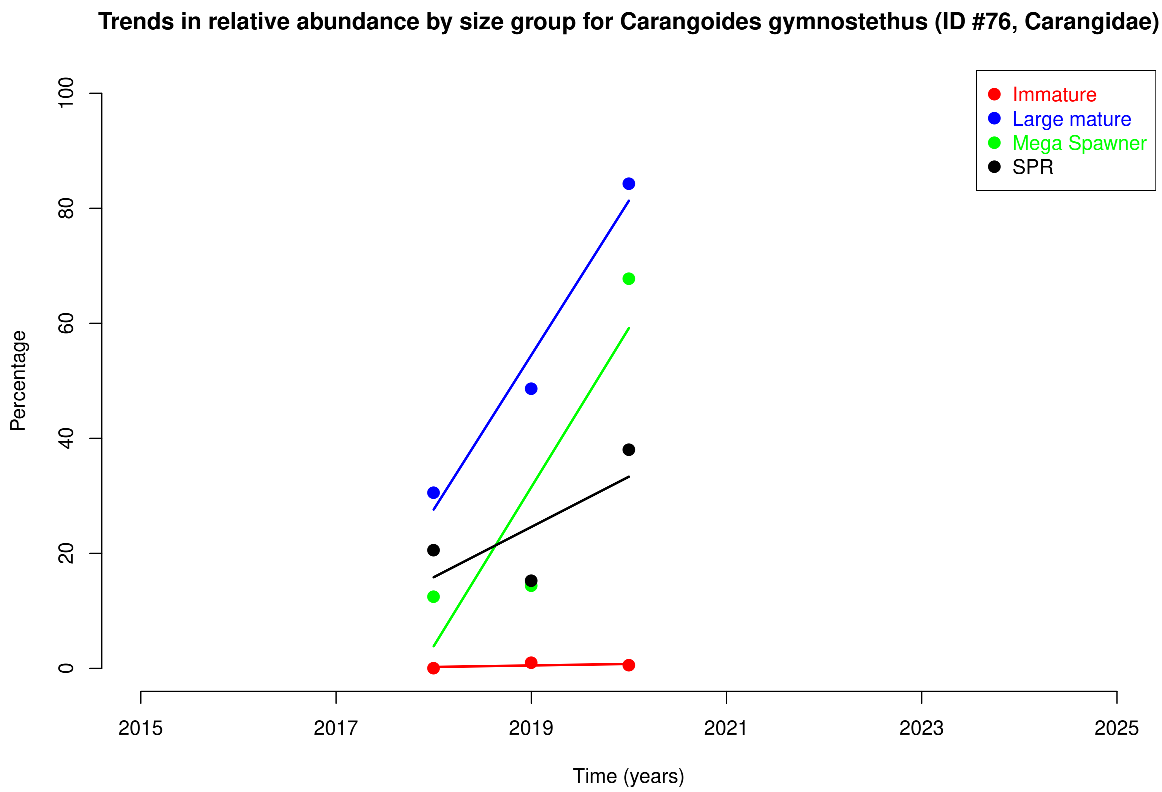
The majority of the catch consists of size classes around or above the optimum harvest size. This means that the impact of the fishery is minimized for this species. Potentially higher yields of this species could be achieved by catching them at somewhat smaller size, although capture of smaller specimen 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 Epinephelus bleekeri (ID #46, 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: 0.211
% Large Mature rising over recent years, situation improving. P: 0.365
% Mega Spawner rising over recent years, situation improving. P: 0.076
% SPR rising over recent years, situation improving. P: 0.333


Catch length frequency for Carangoides gymnostethus (ID #76, Carangidae)
Most Recent 365 Days. N (Catch) = 19,421, n (Sample) = 770.
1 %
21 %
78 %
Trade Limit 42 cm
L–maturity 38 cm
L–optimum 51 cm
L–infinity 77 cm
L–max 86 cm
L–median 61 cm
Lx–codrs 86 cm
SPR 34 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
Frequency
0
500
1000
1500
20
40
60
80
100
Total Length (cm)


Trends in relative abundance by size group for Carangoides gymnostethus (ID #76, 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 Carangoides gymnostethus (ID #76, Carangidae) in most recent 365 days.
N (Catch) =19,421, n (Sample) = 770
Immature (< 38cm): 1%
Small mature (>= 38cm, < 51cm): 21%
Large mature (>= 51cm): 78%
Mega spawner (>= 56.1cm): 62% (subset of large mature fish)
Spawning Potential Ratio: 34 %

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.

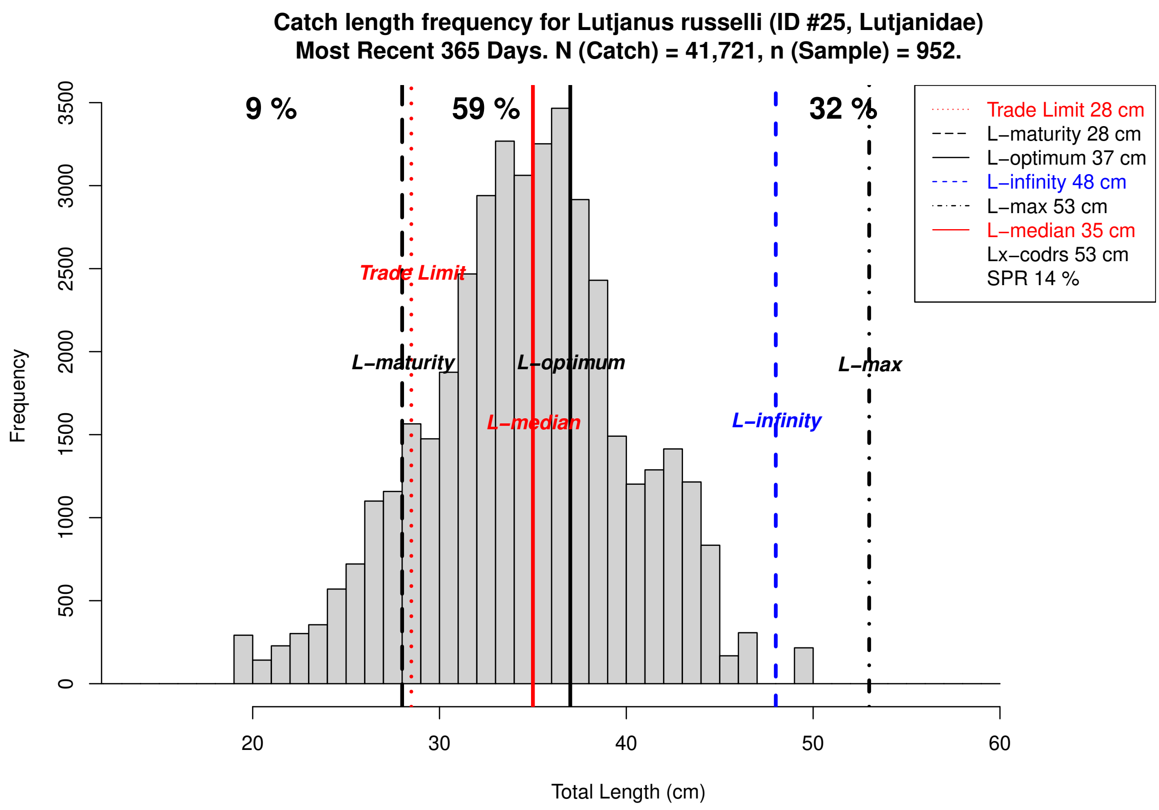
At least 90% of the fish in the catch are mature specimens that have spawned at least once before they were caught. The fishery does not depend on immature size classes for this species and is considered safe for this indicator. This fishery will not be causing overfishing through over harvesting of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

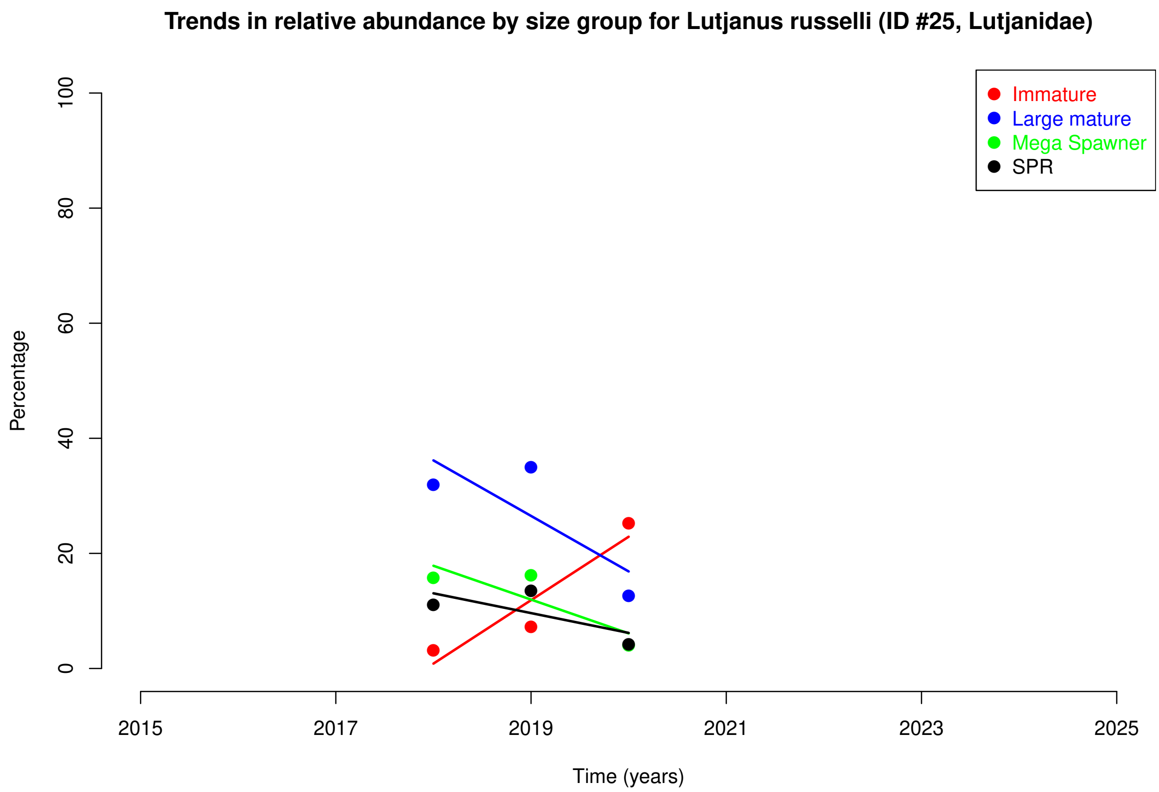
The majority of the catch consists of size classes around or above the optimum harvest size. This means that the impact of the fishery is minimized for this species. Potentially higher yields of this species could be achieved by catching them at somewhat smaller size, although capture of smaller specimen 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 Carangoides gymnostethus (ID #76, 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: 0.634
% Large Mature rising over recent years, situation improving. P: 0.118
% Mega Spawner rising over recent years, situation improving. P: 0.314
% SPR rising over recent years, situation improving. P: 0.476


Catch length frequency for Lutjanus russelli (ID #25, Lutjanidae)
Most Recent 365 Days. N (Catch) = 41,721, n (Sample) = 952.
9 %
59 %
32 %
Trade Limit 28 cm
L−maturity 28 cm
L−optimum 37 cm
L−infinity 48 cm
L−max 53 cm
L−median 35 cm
Lx−codrs 53 cm
SPR 14 %
Trade Limit
L−maturity
L−optimum
L−median
L−infinity
L−max
Frequency
0
500
1000
1500
2000
2500
3000
3500
20
30
40
50
60
Total Length (cm)


Trends in relative abundance by size group for Lutjanus russelli (ID #25, 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 russelli (ID #25, Lutjanidae) in most recent 365 days.
N (Catch) =41,721, n (Sample) = 952
Immature (< 28cm): 9%
Small mature (>= 28cm, < 37cm): 59%
Large mature (>= 37cm): 32%
Mega spawner (>= 40.7cm): 16% (subset of large mature fish)
Spawning Potential Ratio: 14 %

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.

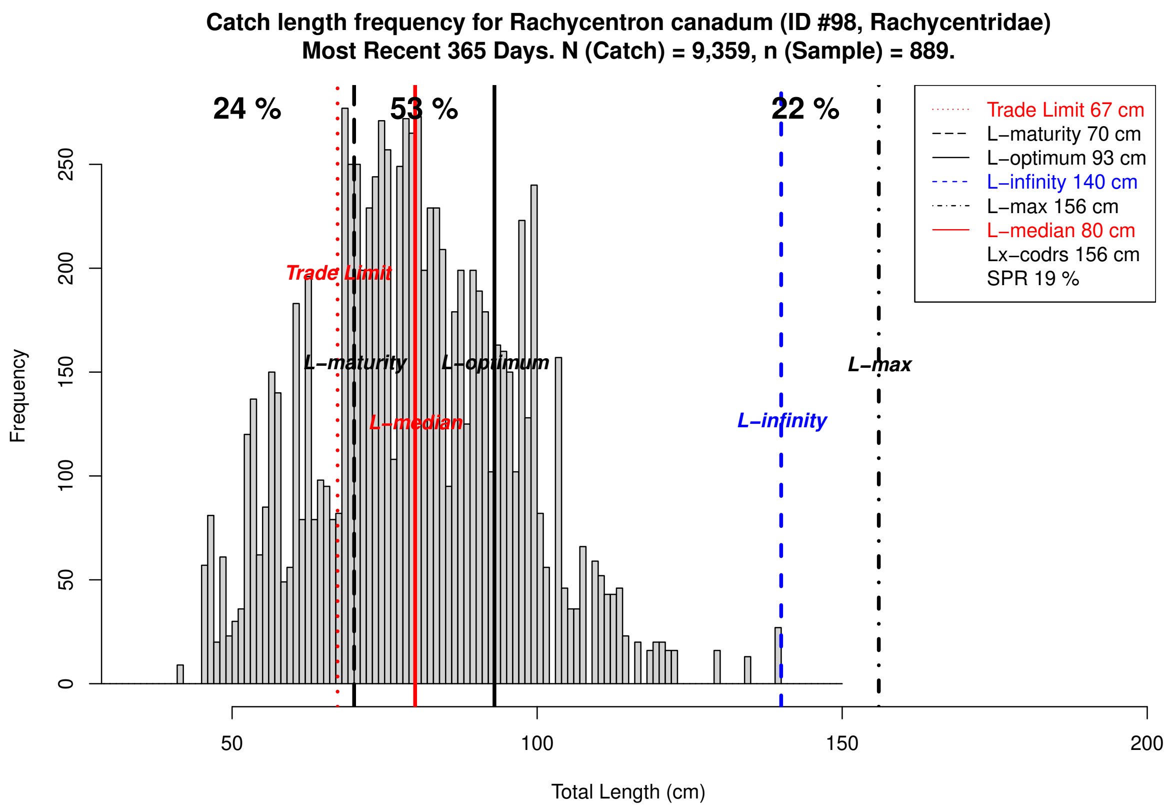
At least 90% of the fish in the catch are mature specimens that have spawned at least once before they were caught. The fishery does not depend on immature size classes for this species and is considered safe for this indicator. This fishery will not be causing overfishing through over harvesting of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

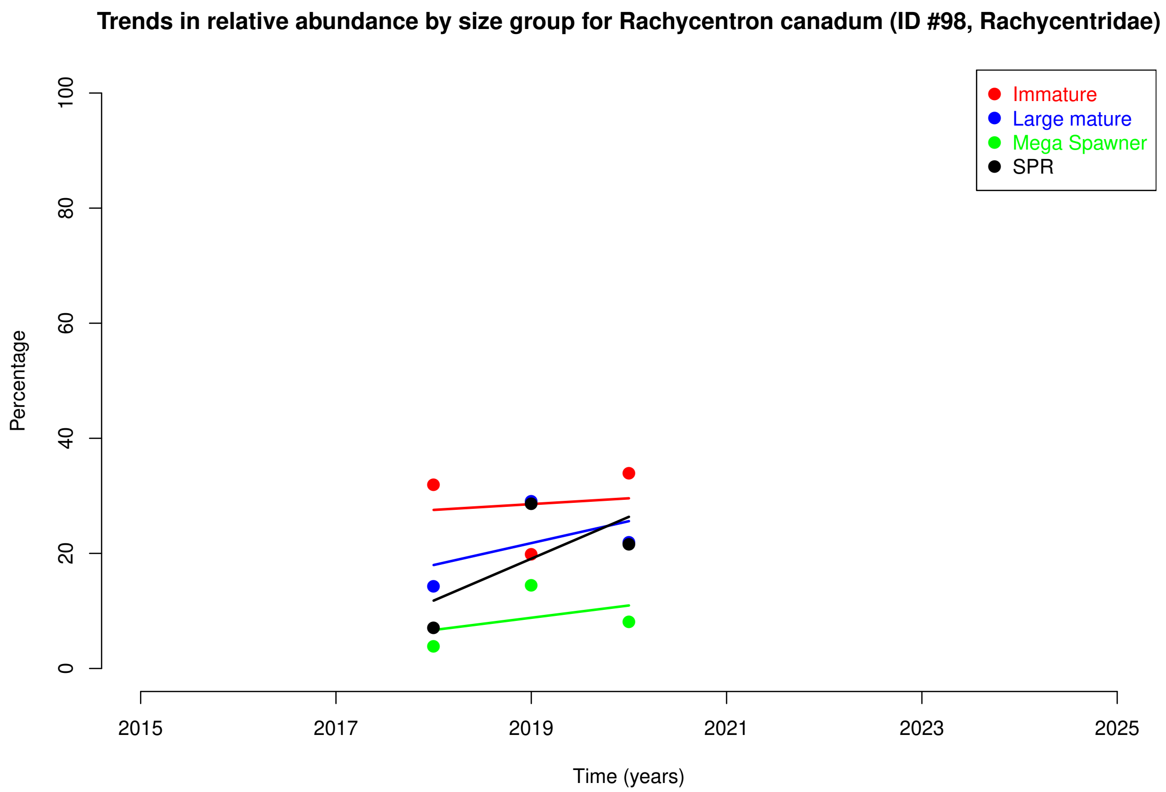
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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 russelli (ID #25, 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: 0.223
% Large Mature falling over recent years, situation deteriorating. P: 0.415
% Mega Spawner falling over recent years, situation deteriorating. P: 0.353
% SPR falling over recent years, situation deteriorating. P: 0.495


Catch length frequency for Rachycentron canadum (ID #98, Rachycentridae)
Most Recent 365 Days. N (Catch) = 9,359, n (Sample) = 889.
24 %
53 %
22 %
Trade Limit 67 cm
L−maturity 70 cm
L−optimum 93 cm
L−infinity 140 cm
L−max 156 cm
L−median 80 cm
Lx−codrs 156 cm
SPR 19 %
Trade Limit
L−maturity
L−optimum
L−median
L−infinity
L−max
Frequency
Total Length (cm)


Trends in relative abundance by size group for Rachycentron canadum (ID #98, Rachycentridae)
Immature
Large mature
Mega Spawner
SPR
Percentage
Time (years)

The percentages of Rachycentron canadum (ID #98, Rachycentridae) in most recent 365 days.
N (Catch) =9,359, n (Sample) = 889
Immature (< 70cm): 24%
Small mature (>= 70cm, < 93cm): 53%
Large mature (>= 93cm): 22%
Mega spawner (>= 102.3cm): 8% (subset of large mature fish)
Spawning Potential Ratio: 19 %

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.

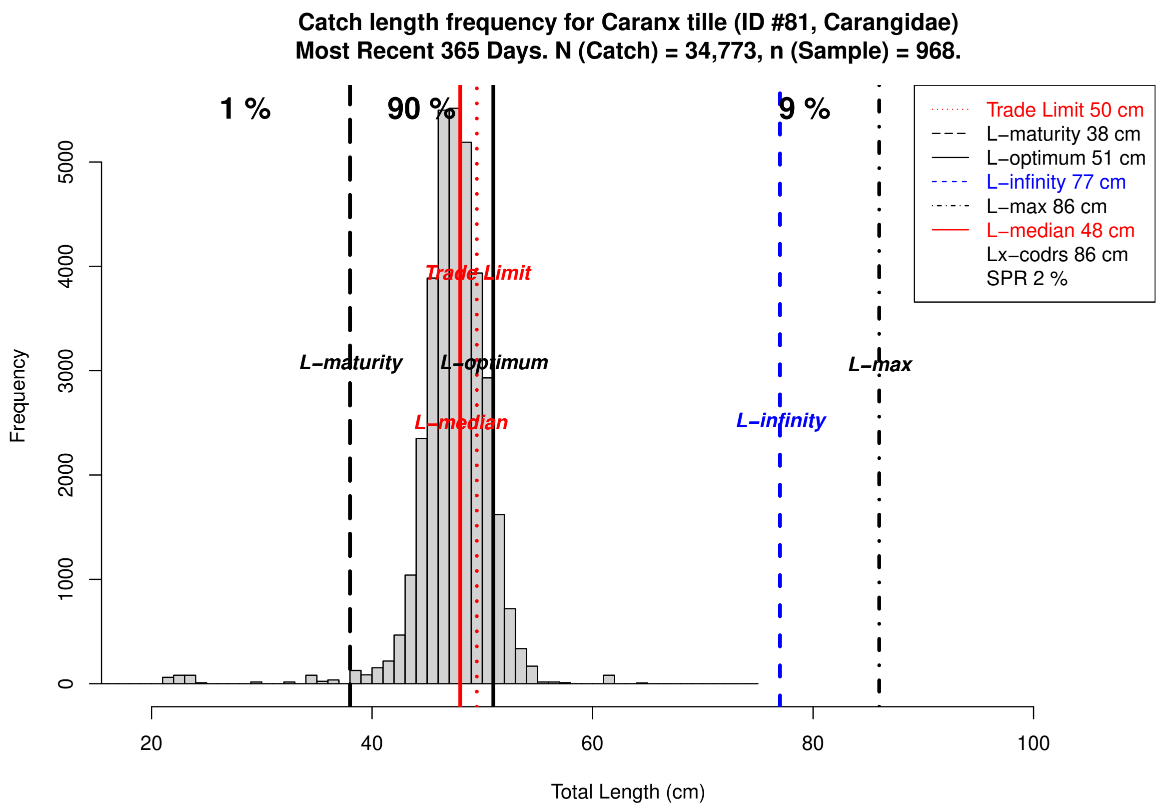
Between 20% and 30% of the fish in the catch are specimens that have not yet reproduced. This is reason for concern in terms of potential overfishing through overharvesting of juveniles, if fishing pressure is high and percentages immature fish would further rise. Targeting larger fish and avoiding small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

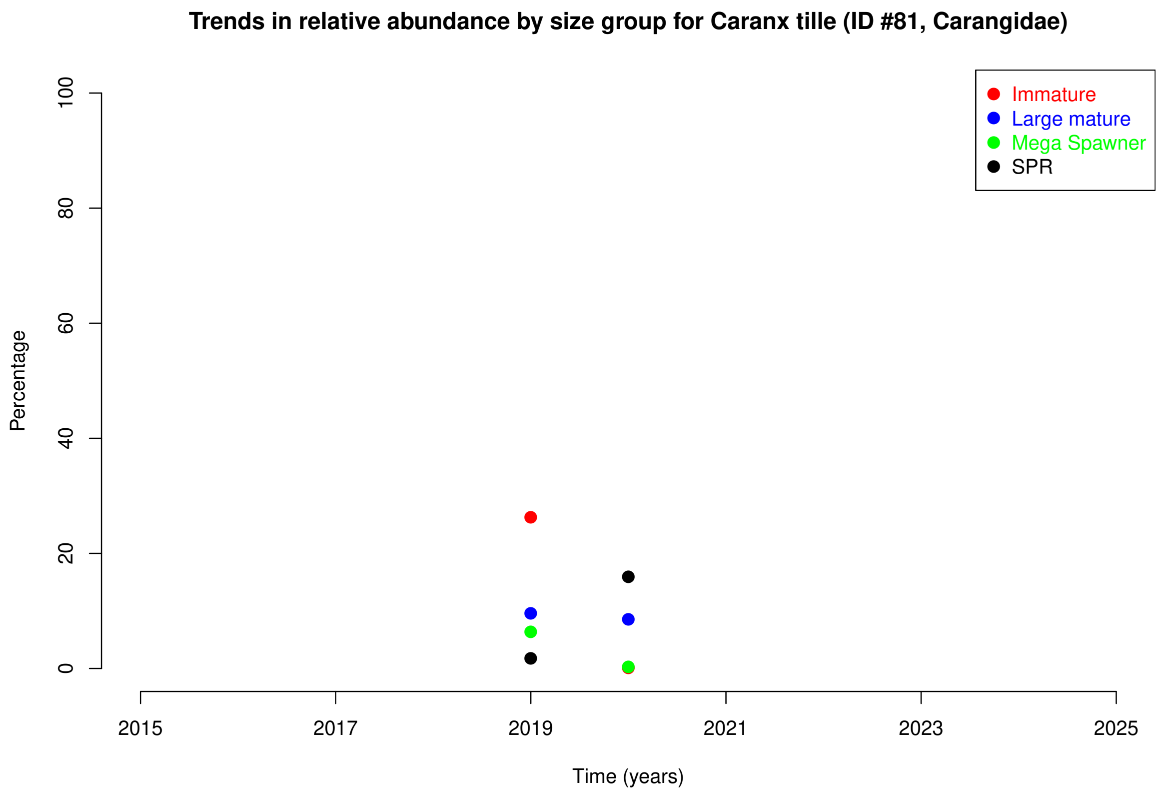
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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 Rachycentron canadum (ID #98, Rachycentridae), 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: 0.916
% Large Mature rising over recent years, situation improving. P: 0.655
% Mega Spawner rising over recent years, situation improving. P: 0.737
% SPR rising over recent years, situation improving. P: 0.540


Catch length frequency for Caranx tille (ID #81, Carangidae)
Most Recent 365 Days. N (Catch) = 34,773, n (Sample) = 968.
1 %
90 %
9 %
Trade Limit 50 cm
L–maturity 38 cm
L–optimum 51 cm
L–infinity 77 cm
L–max 86 cm
L–median 48 cm
Lx–codrs 86 cm
SPR 2 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
Frequency
0
1000
2000
3000
4000
5000
20
40
60
80
100
Total Length (cm)


Trends in relative abundance by size group for Caranx tille (ID #81, 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 tille (ID #81, Carangidae) in most recent 365 days.
N (Catch) =34,773, n (Sample) = 968
Immature (< 38cm): 1%
Small mature (>= 38cm, < 51cm): 90%
Large mature (>= 51cm): 9%
Mega spawner (>= 56.1cm): 0% (subset of large mature fish)
Spawning Potential Ratio: 2 %

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 Caranx tille (ID #81, Carangidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature trend not available.
% Large Mature trend not available.
% Mega Spawner trend not available.
% SPR trend not available.

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 712.

Rank	#ID	Species	Trade Limit Prop. Lmat	Immature %	Exploitation %	Mega Spawn %	SPR %
1	17	Lutjanus malabaricus	0.66	71	93	3	4
2	45	Epinephelus areolatus	1.31	2	40	42	26
3	21	Lutjanus erythropterus	0.86	49	90	5	7
4	7	Pristipomoides multidens	0.73	55	86	6	14
5	27	Lutjanus vitta	1.20	21	85	6	4
6	23	Pinjalo pinjalo	0.76	65	89	7	6
7	90	Diagramma pictum	1.02	60	87	8	14
8	60	Plectropomus maculatus	0.91	10	38	52	near 100
9	75	Carangoides chrysophrys	1.17	20	66	20	25
10	50	Epinephelus coioides	0.96	21	66	23	36
11	63	Lethrinus lentjan	1.05	2	41	37	34
12	18	Lutjanus sebae	0.61	89	99	0	0
13	8	Pristipomoides typus	0.80	45	90	4	9
14	70	Gymnocranius grandoculis	0.85	52	86	10	8
15	24	Lutjanus johnii	0.59	83	96	2	1
16	46	Epinephelus bleekeri	0.85	0	24	62	near 100
17	76	Carangoides gymnostethus	1.09	1	22	62	34
18	25	Lutjanus russelli	1.02	9	68	16	14
19	98	Rachycentron canadum	0.96	24	78	8	19
20	81	Caranx tille	1.30	1	91	0	2
21	72	Carangoides coeruleopinnatus	1.29	81	98	1	0
22	39	Cephalopholis sonnerati	1.03	0	33	49	49
23	80	Caranx sexfasciatus	1.24	11	55	32	49
24	19	Lutjanus timorensis		unknown	unknown	unknown	unknown
25	95	Sphyraena putnamae		unknown	unknown	unknown	unknown
27	71	Gymnocranius griseus		unknown	unknown	unknown	unknown
28	61	Plectropomus leopardus		unknown	unknown	unknown	unknown
29	66	Lethrinus olivaceus		unknown	unknown	unknown	unknown
36	9	Pristipomoides filamentosus		unknown	unknown	unknown	unknown
40	2	Aprion virescens		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 712.

Rank	#ID	Species	Trade Limit	Immature	Exploitation	Mega Spawn	SPR
1	17	Lutjanus malabaricus	high	high	high	high	high
2	45	Epinephelus areolatus	low	low	low	low	medium
3	21	Lutjanus erythropterus	high	high	high	high	high
4	7	Pristipomoides multidens	high	high	high	high	high
5	27	Lutjanus vitta	low	medium	high	high	high
6	23	Pinjalo pinjalo	high	high	high	high	high
7	90	Diagramma pictum	medium	high	high	high	high
8	60	Plectropomus maculatus	medium	low	low	low	low
9	75	Carangoides chrysophrys	low	medium	high	high	medium
10	50	Epinephelus coioides	medium	medium	high	medium	medium
11	63	Lethrinus lentjan	medium	low	low	low	medium
12	18	Lutjanus sebae	high	high	high	high	high
13	8	Pristipomoides typus	high	high	high	high	high
14	70	Gymnocranius grandoculis	high	high	high	high	high
15	24	Lutjanus johnii	high	high	high	high	high
16	46	Epinephelus bleekeri	high	low	low	low	low
17	76	Carangoides gymnostethus	medium	low	low	low	medium
18	25	Lutjanus russelli	medium	low	high	high	high
19	98	Rachycentron canadum	medium	medium	high	high	high
20	81	Caranx tille	low	low	high	high	high
21	72	Carangoides coeruleopinnatus	low	high	high	high	high
22	39	Cephalopholis sonnerati	medium	low	low	low	low
23	80	Caranx sexfasciatus	low	medium	medium	low	low
24	19	Lutjanus timorensis	unknown	unknown	unknown	unknown	unknown
25	95	Sphyraena putnamae	unknown	unknown	unknown	unknown	unknown
27	71	Gymnocranius griseus	unknown	unknown	unknown	unknown	unknown
28	61	Plectropomus leopardus	unknown	unknown	unknown	unknown	unknown
29	66	Lethrinus olivaceus	unknown	unknown	unknown	unknown	unknown
36	9	Pristipomoides filamentosus	unknown	unknown	unknown	unknown	unknown
40	2	Aprion virescens	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 712.

Rank	#ID	Species	% Immature	% Large Mature	% Mega Spawner	% SPR
1	17	Lutjanus malabaricus	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
2	45	Epinephelus areolatus	**stable**	**improving**	**improving**	**improving**
3	21	Lutjanus erythropterus	**improving**	**improving**	**improving**	**improving**
4	7	Pristipomoides multidens	**deteriorating**	**deteriorating**	**deteriorating**	**stable**
5	27	Lutjanus vitta	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
6	23	Pinjalo pinjalo	**deteriorating**	**deteriorating**	**deteriorating**	**improving**
7	90	Diagramma pictum	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
8	60	Plectropomus maculatus	**deteriorating**	**deteriorating**	**deteriorating**	**stable**
9	75	Carangoides chrysophrys	**improving**	**deteriorating**	**deteriorating**	**deteriorating**
10	50	Epinephelus coioides	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
11	63	Lethrinus lentjan	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
12	18	Lutjanus sebae	**deteriorating**	**stable**	**stable**	**stable**
13	8	Pristipomoides typus	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
14	70	Gymnocranius grandoculis	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
15	24	Lutjanus johnii	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
16	46	Epinephelus bleekeri	**improving**	**improving**	**improving**	**improving**
17	76	Carangoides gymnostethus	**deteriorating**	**improving**	**improving**	**improving**
18	25	Lutjanus russelli	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
19	98	Rachycentron canadum	**deteriorating**	**improving**	**improving**	**improving**
20	81	Caranx tille	**unknown**	**unknown**	**unknown**	**unknown**
21	72	Carangoides coeruleopinnatus	**improving**	**improving**	**improving**	**improving**
22	39	Cephalopholis sonnerati	**improving**	**improving**	**improving**	**improving**
23	80	Caranx sexfasciatus	**unknown**	**unknown**	**unknown**	**unknown**
24	19	Lutjanus timorensis	**unknown**	**unknown**	**unknown**	**unknown**
25	95	Sphyraena putnamae	**unknown**	**unknown**	**unknown**	**unknown**
27	71	Gymnocranius griseus	**unknown**	**unknown**	**unknown**	**unknown**
28	61	Plectropomus leopardus	**unknown**	**unknown**	**unknown**	**unknown**
29	66	Lethrinus olivaceus	**unknown**	**unknown**	**unknown**	**unknown**
36	9	Pristipomoides filamentosus	**unknown**	**unknown**	**unknown**	**unknown**
40	2	Aprion virescens	**unknown**	**unknown**	**unknown**	**unknown**

5 Discussion and conclusions

Bottom long line fishing for snappers, groupers, emperors and grunts in WPP 712 occurs on the shelf areas and tops of slopes, throughout the Java Sea and on the slope where the Java Sea meets the Makassar Strait. 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, mainly at depths between 50 and 250 meters. Drop line fishers in general operate also at greater depths, but WPP 712 does not include much really deep fishing ground. Snappers, groupers, emperors and grunts in WPP 712 are also targeted with traps and deep set bottom gillnets, as well as in "mixed gear" fisheries, which operate multiple gear types simultaneously. Hook and line, trap and gillnet fishing grounds in WPP 712 overlap 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 here.

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 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 is high for all the larger snappers which are commonly targeted in WPP 712 (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) for 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 712 and the situation is currently not improving. Time trends for the top 10 snapper species (ranked by abundance) show continued decline of the stocks, 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 712 than in some of the Eastern fisheries management areas, which may be part of the reason that long line vessels from Western Indonesian fish all the way in the East.

Overall we are currently looking mainly at a high risk of overfishing for all major snapper species in WPP 712, 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 demersal 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 deep water 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.

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 712.

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 712, 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	Lutjanus malabaricus	9	0	1	3	2	NA	NA	NA	NA
2	Epinephelus areolatus	21	20	23	25	29	NA	NA	NA	NA
3	Lutjanus erythropterus	NA	0	2	5	5	NA	NA	NA	NA
4	Pristipomoides multidens	19	9	8	13	17	NA	NA	NA	NA
5	Lutjanus vitta	11	10	6	3	9	NA	NA	NA	NA
6	Pinjalo pinjalo	NA	NA	1	4	1	NA	NA	NA	NA
7	Diagramma pictum	NA	58	51	32	25	NA	NA	NA	NA
8	Plectropomus maculatus	NA	NA	100	100	100	NA	NA	NA	NA
9	Carangoides chrysophrys	NA	100	14	15	16	NA	NA	NA	NA
10	Epinephelus coioides	NA	NA	71	37	46	NA	NA	NA	NA
11	Lethrinus lentjan	NA	46	25	28	17	NA	NA	NA	NA
12	Lutjanus sebae	0	0	0	0	0	NA	NA	NA	NA
13	Pristipomoides typus	19	3	1	7	8	NA	NA	NA	NA
14	Gymnocranius grandoculis	8	44	0	0	8	NA	NA	NA	NA
15	Lutjanus johnii	NA	5	59	2	1	NA	NA	NA	NA
16	Epinephelus bleekeri	NA	NA	66	100	100	NA	NA	NA	NA
17	Carangoides gymnostethus	NA	NA	21	15	38	NA	NA	NA	NA
18	Lutjanus russelli	NA	NA	11	14	4	NA	NA	NA	NA
19	Rachycentron canadum	NA	NA	7	29	22	NA	NA	NA	NA
20	Caranx tille	NA	NA	NA	2	16	NA	NA	NA	NA

Table 5.2: CpUE (kg/GT/day) trends by fleet segment for Lutjanus malabaricus in WPP 712

CpUE	2016	2017	2018	2019	2020	2021	2022	2023	2024
Nano Dropline	0.3	3.1	4.3	3.8	4.9	NA	NA	NA	NA
Nano Longline	0.3	3.1	4.3	0.2	0.1	NA	NA	NA	NA
Small Dropline	0.3	6.4	5.3	5.1	4.3	NA	NA	NA	NA
Small Longline	0.3	3.1	4.3	0.2	0.2	NA	NA	NA	NA
Medium Dropline	0.3	4.1	2.9	2.2	2.8	NA	NA	NA	NA
Medium Longline	0.6	0.5	4.3	3.8	4.0	NA	NA	NA	NA
Large Dropline	NA	NA	NA	NA	NA	NA	NA	NA	NA
Large Longline	0.2	0.3	4.3	3.8	4.0	NA	NA	NA	NA

Table 5.3: CpUE (kg/GT/day) trends by fleet segment for Pristipomoides multidens in WPP 712

CpUE	2016	2017	2018	2019	2020	2021	2022	2023	2024
Nano Dropline	1.6	0.8	0.9	1.5	0.4	NA	NA	NA	NA
Nano Longline	1.6	0.8	0.9	3.5	2.2	NA	NA	NA	NA
Small Dropline	1.6	1.1	1.4	4.2	4.6	NA	NA	NA	NA
Small Longline	1.6	0.8	0.9	6.7	4.6	NA	NA	NA	NA
Medium Dropline	1.6	0.3	0.4	0.1	0.1	NA	NA	NA	NA
Medium Longline	2.3	1.3	0.9	2.8	2.8	NA	NA	NA	NA
Large Dropline	NA	NA	NA	NA	NA	NA	NA	NA	NA
Large Longline	1.2	0.6	0.9	2.8	2.8	NA	NA	NA	NA

Table 5.4: CpUE (kg/GT/day) trends by fleet segment for Epinephelus coioides in WPP 712

CpUE	2016	2017	2018	2019	2020	2021	2022	2023	2024
Nano Dropline	NA	0.1	0.2	NA	NA	NA	NA	NA	NA
Nano Longline	NA	0.1	0.2	NA	NA	NA	NA	NA	NA
Small Dropline	NA	0.0	0.0	0.2	0.1	NA	NA	NA	NA
Small Longline	NA	0.1	0.2	NA	0.3	NA	NA	NA	NA
Medium Dropline	NA	0.0	0.1	0.2	0.2	NA	NA	NA	NA
Medium Longline	NA	0.0	0.2	0.5	0.9	NA	NA	NA	NA
Large Dropline	NA	NA	NA	NA	NA	NA	NA	NA	NA
Large Longline	NA	NA	0.2	0.5	0.9	NA	NA	NA	NA

Table 5.5: CpUE (kg/GT/day) trends by fleet segment for Lutjanus erythropterus in WPP 712

CpUE	2016	2017	2018	2019	2020	2021	2022	2023	2024
Nano Dropline	0.0	0.2	0.6	0.4	NA	NA	NA	NA	NA
Nano Longline	0.0	0.2	0.6	NA	NA	NA	NA	NA	NA
Small Dropline	0.0	0.2	0.7	0.6	0.5	NA	NA	NA	NA
Small Longline	0.0	0.2	0.6	NA	0.0	NA	NA	NA	NA
Medium Dropline	0.0	1.5	0.4	0.5	0.7	NA	NA	NA	NA
Medium Longline	0.0	0.0	0.6	0.5	0.4	NA	NA	NA	NA
Large Dropline	NA	NA	NA	NA	NA	NA	NA	NA	NA
Large Longline	0.0	0.0	0.6	0.5	0.4	NA	NA	NA	NA

Table 5.6: CpUE (kg/GT/day) trends by fleet segment for all species in WPP 712

CpUE	2016	2017	2018	2019	2020	2021	2022	2023	2024
Nano Dropline	2.6	6.0	8.2	9.1	9.1	NA	NA	NA	NA
Nano Longline	2.6	6.0	8.2	8.1	4.8	NA	NA	NA	NA
Small Dropline	2.6	10.1	9.5	12.7	11.8	NA	NA	NA	NA
Small Longline	2.6	6.0	8.2	12.5	10.0	NA	NA	NA	NA
Medium Dropline	2.6	7.9	5.1	4.8	5.2	NA	NA	NA	NA
Medium Longline	3.8	3.2	8.2	10.4	10.5	NA	NA	NA	NA
Large Dropline	NA	NA	NA	NA	NA	NA	NA	NA	NA
Large Longline	2.1	1.5	8.2	10.4	10.5	NA	NA	NA	NA

Table 5.7: Sample sizes over the period 2016 to 2024 for the others species in WPP 712 Dropline

Family Name	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total	%Catch
Acanthuridae	0	0	33	250	46	0	0	0	0	329	0.060
Ariidae	0	1	25	46	55	0	0	0	0	127	0.023
Balistidae	0	1	103	579	150	0	0	0	0	833	0.152
Caesionidae	0	0	32	350	138	0	0	0	0	520	0.095
Carangidae	0	704	4382	10930	5489	0	0	0	0	21505	3.920
Chaetodontidae	0	0	0	14	1	0	0	0	0	15	0.003
Coryphaenidae	0	0	61	99	3	0	0	0	0	163	0.030
Ephippidae	0	0	31	149	157	0	0	0	0	337	0.061
Epinephelidae	0	2	29	56	34	0	0	0	0	121	0.022
Haemulidae	0	0	0	0	0	0	0	0	0	0	0.000
Holocentridae	0	0	1	4	2	0	0	0	0	7	0.001
Labridae	0	0	24	169	162	0	0	0	0	355	0.065
Lethrinidae	0	7	3	83	31	0	0	0	0	124	0.023
Lutjanidae	0	30	89	263	134	0	0	0	0	516	0.094
Malacanthidae	0	0	0	1	2	0	0	0	0	3	0.001
Monacanthidae	0	0	20	155	24	0	0	0	0	199	0.036
Mullidae	0	0	2	11	1	0	0	0	0	14	0.003
Muraenesocidae	0	0	0	0	1	0	0	0	0	1	0.000
Nemipteridae	0	0	3	73	55	0	0	0	0	131	0.024
Other	0	143	147	79	42	0	0	0	0	411	0.075
Pomacanthidae	0	0	0	58	0	0	0	0	0	58	0.011
Priacanthidae	0	0	2	9	0	0	0	0	0	11	0.002
Rays	0	2	17	79	52	0	0	0	0	150	0.027
Scaridae	0	0	1	26	43	0	0	0	0	70	0.013
Sciaenidae	0	0	0	0	0	0	0	0	0	0	0.000
Scombridae	0	71	116	173	185	0	0	0	0	545	0.099
Serranidae	0	0	0	1	1	0	0	0	0	2	0.000
Sharks	0	1	30	58	38	0	0	0	0	127	0.023
Siganidae	0	0	45	57	260	0	0	0	0	362	0.066
Sphyraenidae	0	0	10	12	10	0	0	0	0	32	0.006
Tetraodontidae	0	0	0	0	1	0	0	0	0	1	0.000
Trichiuridae	0	0	6	2	1	0	0	0	0	9	0.002
Total	0	962	5212	13786	7118	0	0	0	0	27078	4.936

Table 5.8: Sample sizes over the period 2016 to 2024 for the others species in WPP 712 Longline

Family Name	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total	%Catch
Acanthuridae	0	0	0	0	0	0	0	0	0	0	0.000
Ariidae	2	22	0	0	2	0	0	0	0	26	0.005
Balistidae	0	0	0	1	9	0	0	0	0	10	0.002
Caesionidae	0	0	0	0	0	0	0	0	0	0	0.000
Carangidae	8	40	0	0	10	0	0	0	0	58	0.011
Chaetodontidae	0	0	0	0	0	0	0	0	0	0	0.000
Coryphaenidae	0	0	0	0	0	0	0	0	0	0	0.000
Ephippidae	0	0	0	0	0	0	0	0	0	0	0.000
Epinephelidae	5	2	0	0	6	0	0	0	0	13	0.002
Haemulidae	0	0	0	0	1	0	0	0	0	1	0.000
Holocentridae	0	1	0	0	0	0	0	0	0	1	0.000
Labridae	0	0	0	0	1	0	0	0	0	1	0.000
Lethrinidae	10	11	0	0	9	0	0	0	0	30	0.005
Lutjanidae	3	7	0	0	9	0	0	0	0	19	0.003
Malacanthidae	11	14	0	0	13	0	0	0	0	38	0.007
Monacanthidae	0	0	0	0	0	0	0	0	0	0	0.000
Mullidae	0	0	0	0	0	0	0	0	0	0	0.000
Muraenesocidae	0	0	0	0	0	0	0	0	0	0	0.000
Nemipteridae	10	0	0	2	3	0	0	0	0	15	0.003
Other	10	13	0	0	1	0	0	0	0	24	0.004
Pomacanthidae	0	0	0	0	0	0	0	0	0	0	0.000
Priacanthidae	2	0	0	0	0	0	0	0	0	2	0.000
Rays	0	0	0	0	0	0	0	0	0	0	0.000
Scaridae	0	0	0	0	0	0	0	0	0	0	0.000
Sciaenidae	0	0	0	0	0	0	0	0	0	0	0.000
Scombridae	8	13	0	1	11	0	0	0	0	33	0.006
Serranidae	0	0	0	0	0	0	0	0	0	0	0.000
Sharks	0	0	0	4	1	0	0	0	0	5	0.001
Siganidae	0	0	0	0	0	0	0	0	0	0	0.000
Sphyraenidae	0	0	0	0	0	0	0	0	0	0	0.000
Tetraodontidae	0	0	0	0	0	0	0	0	0	0	0.000
Trichiuridae	0	0	0	0	0	0	0	0	0	0	0.000
Total	69	123	0	8	76	0	0	0	0	276	0.050

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