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Length-Based Stock Assessment Of A Species Complex In Deepwater Demersal Fisheries Targeting Snappers In Indonesia Fishery Management Area WPP 714

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1 Introduction

This report presents a length-based assessment of the multi-species deep slope fisheries targeting snappers, groupers, emperors and grunts at depths ranging from 50 to 500 meters, in fisheries management area (WPP) 714 in eastern Indonesia. WPP 714 covers mostly the Banda Sea, while it borders on the Maluku and Seram Seas in the North, the Arafura Sea in the East and the Timor and Flores Seas in the South (Figure 1.1). At the boundaries of these seas, WPP 714 borders on WPP 715 in the North, WPP 718 in the East, WPP 573 in the South and WPP 713 in the West. There is also an International boundary with East Timorese waters in the South, in between WPP 573 and WPP 718. Most of the WPP 714 boundaries cut right through various fishing grounds with continuous habitat and with fishing fleets freely moving across those boundaries, except for the International boundary with East Timor in the South.

Drop line and mini long line vessels fish on both sides of WPP 714 boundaries sometimes even within a single fishing trip, but more often shifting between fishing grounds with the varying seasons and wind directions. Small scale fishing fleets based in the Banggai Islands in the North, for example, fish in WPP 715 on the North side of the Banggai and Sula Islands during the South Easterly monsoon winds from May through October, while fishing on the South side of these Islands during the North West monsoon from December through March, and fishing on both sides during the inter-monsoon months of April and November. In terms of habitat and ecology of the target species, WPP 714 and surrounding fisheries management areas, at least for the fishing grounds directly across the boundaries, are very similar and completely connected. Fishing grounds for snappers, groupers, emperors and other target species in this region include mostly deep slopes along the many islands as well as seamounts, atolls and other deep slopes and structures which are characteristic for this area. The typical habitat in WPP 714 is mostly suitable for deep drop line fishing along these structures.

Several fleets from various home ports in Indonesia contributed catch data to the current assessment of WPP 714 deep slope fisheries. This includes among others a medium scale drop line fishery operating out of Kema in North Sulawesi (inside WPP 715), a small scale mini long line fishery based in the Banggai and Sula Islands on the boundary of the Maluku and Banda Seas and small to medium scale drop line fisheries operating out of Tual in the Kei Islands and Saumlaki in the Tanimbar group. In addition, data were used from fleets originating from outside the region (e.g. Bali, Probolinggo, Kupang, Aru) whenever they were operating inside WPP 714. The drop line fishery is an active vertical hook and line fishery operating at depths from 50 to 500 meters, whereas long lines are set horizontally along the bottom at depths ranging from 50 to 150 meters.

Fishing grounds for the small scale mini long line and drop line fleets are mostly concentrated near the home islands of these fleets, whereas medium scale vessels routinely make trips to locations up to 1,000 kilometres or more from their home port, to all corners of this region. Typical medium scale drop line vessels originating from Kema in North Sulawesi operate at great distances from their home port throughout WPP 714 and all surrounding fisheries management areas. Kema-based vessels make up to about 10 trips a year, landing around 4 tons of mixed snapper, grouper and emperor for each trip or up to about 40 tons per vessel per year.

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 714, 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 714 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.

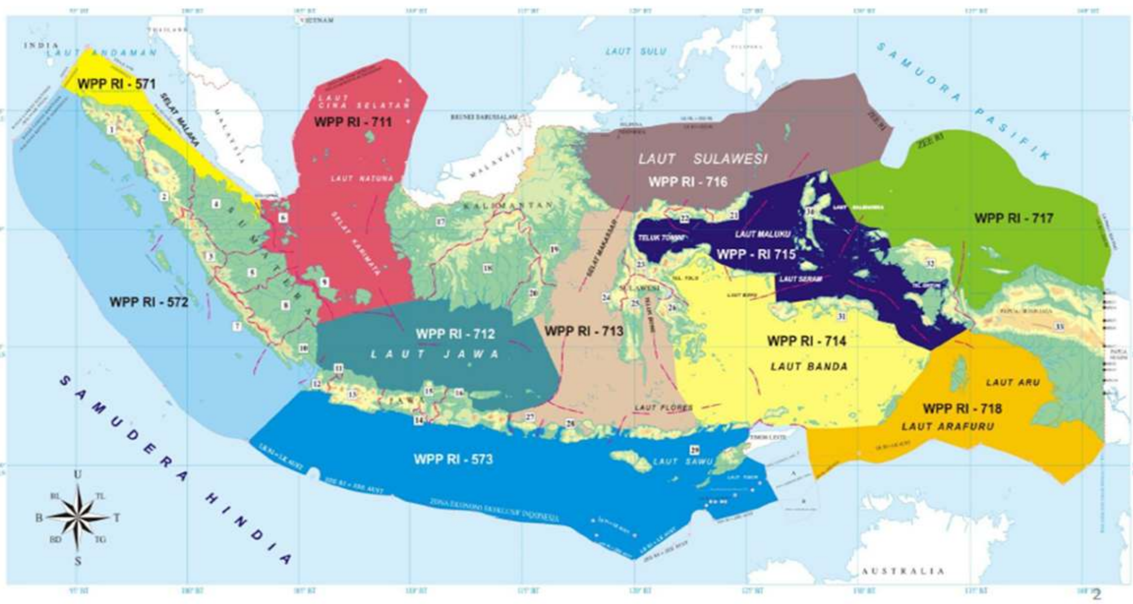


Figure 1.1: Fisheries Management Areas (*Wilayah Pengelolaan Perikanan* or WPP) in Indonesian marine waters.

[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 714

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	7	Pristipomoides multidens	500	0.020	2.944	FL	31.18	34.92	5328
2	4	Etelis sp.	500	0.022	2.950	FL	30.16	32.84	4006
3	1	Aphareus rutilans	1000	0.015	2.961	FL	42.20	49.61	3132
4	20	Lutjanus gibbus	500	0.015	3.091	FL	28.87	31.09	3011
5	70	Gymnocranius grandoculis	500	0.032	2.885	FL	28.43	30.53	2771
6	6	Etelis coruscans	500	0.041	2.758	FL	30.28	37.85	2697
7	2	Aprion virescens	1000	0.023	2.886	FL	40.49	45.90	2667
8	45	Epinephelus areolatus	300	0.011	3.048	FL	28.18	28.77	2629
9	66	Lethrinus olivaceus	300	0.029	2.851	FL	25.49	27.50	2464
10	9	Pristipomoides filamentosus	500	0.038	2.796	FL	29.70	33.27	1992
11	16	Lutjanus bohar	500	0.016	3.059	FL	29.70	31.31	1951
12	17	Lutjanus malabaricus	500	0.009	3.137	FL	33.11	33.11	1821
13	19	Lutjanus timorensis	500	0.009	3.137	FL	33.11	33.34	1659
14	85	Erythrocles schlegelii	1500	0.011	3.040	FL	48.55	53.60	1397
15	27	Lutjanus vitta	300	0.017	2.978	FL	26.72	27.64	1374
16	34	Paracaesio kusakarii	500	0.011	3.135	FL	30.96	34.80	1329
17	15	Lutjanus argentimaculatus	500	0.034	2.792	FL	31.22	31.78	1273
18	8	Pristipomoides typus	500	0.014	2.916	TL	36.16	36.16	1261
19	80	Caranx sexfasciatus	2000	0.032	2.930	FL	43.43	49.51	1252
20	37	Cephalopholis miniata	300	0.026	2.864	TL	26.35	26.35	1201
21	39	Cephalopholis sonnerati	300	0.015	3.058	TL	25.78	25.78	1132
22	81	Caranx tille	2000	0.032	2.930	FL	43.43	49.51	1058
23	5	Etelis radiosus	1000	0.056	2.689	FL	38.05	43.15	1041
24	78	Caranx ignobilis	2000	0.027	2.913	FL	46.78	54.36	978
25	38	Cephalopholis sexmaculata	300	0.027	3.000	SL	22.37	28.24	977
26	28	Lutjanus boutton	300	0.034	3.000	FL	20.75	21.56	904
27	62	Variola albimarginata	300	0.012	3.079	FL	26.68	30.44	902
28	63	Lethrinus lentjan	300	0.020	2.986	FL	25.16	26.35	885
29	18	Lutjanus sebae	500	0.009	3.208	FL	29.97	31.26	874
30	58	Epinephelus amblycephalus	1500	0.012	3.057	TL	45.99	45.99	819
31	10	Pristipomoides sieboldii	300	0.022	2.942	FL	25.52	29.21	817
32	90	Diagramma pictum	500	0.014	2.988	FL	33.08	36.71	813
33	31	Symphorus nematophorus	1000	0.015	3.046	FL	38.63	40.18	716
34	50	Epinephelus coioides	1500	0.011	3.084	TL	46.94	46.94	691
35	69	Wattsia mossambica	500	0.040	2.824	FL	28.21	29.34	676
36	67	Lethrinus amboinensis	300	0.029	2.851	FL	25.49	28.06	659
37	35	Paracaesio stonei	500	0.024	2.960	FL	28.78	32.35	647
38	61	Plectropomus leopardus	500	0.012	3.060	FL	32.56	33.38	578
39	48	Epinephelus bilobatus	300	0.014	2.990	TL	27.82	27.82	562
40	94	Sphyraena forsteri	500	0.005	3.034	FL	43.51	49.16	514
41	22	Pinjalo lewisi	300	0.014	2.970	FL	28.42	29.64	492
42	33	Paracaesio xanthura	300	0.023	3.000	SL	23.64	27.39	471
43	65	Lethrinus nebulosus	500	0.019	2.996	FL	30.03	32.14	450
44	93	Sphyraena barracuda	1500	0.006	3.011	FL	61.48	69.47	423
45	79	Caranx lugubris	2000	0.020	3.001	FL	46.51	55.35	393
46	57	Epinephelus undulosus	1500	0.015	2.940	FL	50.31	50.31	390
47	84	Seriola rivoliana	2000	0.006	3.170	FL	54.23	60.03	389
48	60	Plectropomus maculatus	500	0.016	3.000	FL	31.76	31.76	372
49	46	Epinephelus bleekeri	300	0.009	3.126	TL	28.09	28.09	345
50	43	Epinephelus morrhua	300	0.061	2.624	FL	25.59	25.59	338

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 714

Rank	Species	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
1	Pristipomoides multidens	939	985	645	1315	1444	0	0	0	0	5328
2	Etelis sp.	62	171	207	940	2626	0	0	0	0	4006
3	Aphareus rutilans	118	156	314	1548	996	0	0	0	0	3132
4	Lutjanus gibbus	101	75	155	2105	575	0	0	0	0	3011
5	Gymnocranius grandoculis	989	965	315	365	137	0	0	0	0	2771
6	Etelis coruscans	12	33	307	448	1897	0	0	0	0	2697
7	Aprion virescens	843	693	315	569	247	0	0	0	0	2667
8	Epinephelus areolatus	534	434	269	815	577	0	0	0	0	2629
9	Lethrinus olivaceus	481	308	444	883	348	0	0	0	0	2464
10	Pristipomoides filamentosus	173	220	511	544	544	0	0	0	0	1992
11	Lutjanus bohar	110	322	228	940	351	0	0	0	0	1951
12	Lutjanus malabaricus	396	524	321	371	209	0	0	0	0	1821
13	Lutjanus timorensis	50	119	135	895	460	0	0	0	0	1659
14	Erythrocles schlegelii	5	16	41	83	1252	0	0	0	0	1397
15	Lutjanus vitta	190	72	121	690	301	0	0	0	0	1374
16	Paracaesio kusakarii	82	100	331	336	480	0	0	0	0	1329
17	Lutjanus argentimaculatus	234	211	240	454	134	0	0	0	0	1273
18	Pristipomoides typus	79	166	169	424	423	0	0	0	0	1261
19	Caranx sexfasciatus	85	68	58	945	96	0	0	0	0	1252
20	Cephalopholis miniata	4	7	7	746	437	0	0	0	0	1201
21	Cephalopholis sonnerati	417	265	77	245	128	0	0	0	0	1132
22	Caranx tille	34	14	38	776	196	0	0	0	0	1058
23	Etelis radiosus	31	56	84	202	668	0	0	0	0	1041
24	Caranx ignobilis	221	206	110	320	121	0	0	0	0	978
25	Cephalopholis sexmaculata	24	17	2	641	293	0	0	0	0	977
26	Lutjanus boutton	43	47	39	454	321	0	0	0	0	904
27	Variola albimarginata	142	72	50	456	182	0	0	0	0	902
28	Lethrinus lentjan	50	48	60	526	201	0	0	0	0	885
29	Lutjanus sebae	319	295	85	128	47	0	0	0	0	874
30	Epinephelus amblycephalus	331	348	63	63	14	0	0	0	0	819
31	Pristipomoides sieboldii	7	13	59	281	457	0	0	0	0	817
32	Diagramma pictum	293	253	89	132	46	0	0	0	0	813
33	Symphorus nematophorus	268	260	89	87	12	0	0	0	0	716
34	Epinephelus coioides	214	126	69	177	105	0	0	0	0	691
35	Wattsia mossambica	13	20	57	393	193	0	0	0	0	676
36	Lethrinus amboinensis	80	109	100	219	151	0	0	0	0	659
37	Paracaesio stonei	25	66	68	163	325	0	0	0	0	647
38	Plectropomus leopardus	48	6	36	244	244	0	0	0	0	578
39	Epinephelus bilobatus	177	124	59	144	58	0	0	0	0	562
40	Sphyraena forsteri	40	42	24	276	132	0	0	0	0	514
41	Pinjalo lewisi	1	10	65	204	212	0	0	0	0	492
42	Paracaesio xanthura	5	3	13	149	301	0	0	0	0	471
43	Lethrinus nebulosus	14	131	86	174	45	0	0	0	0	450
44	Sphyraena barracuda	157	99	42	94	31	0	0	0	0	423
45	Caranx lugubris	0	26	2	274	91	0	0	0	0	393
46	Epinephelus undulosus	214	86	42	44	4	0	0	0	0	390
47	Seriola rivoliana	53	30	31	113	162	0	0	0	0	389
48	Plectropomus maculatus	68	21	11	100	172	0	0	0	0	372
49	Epinephelus bleekeri	93	81	51	58	62	0	0	0	0	345
50	Epinephelus morrhua	50	34	54	129	71	0	0	0	0	338

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.

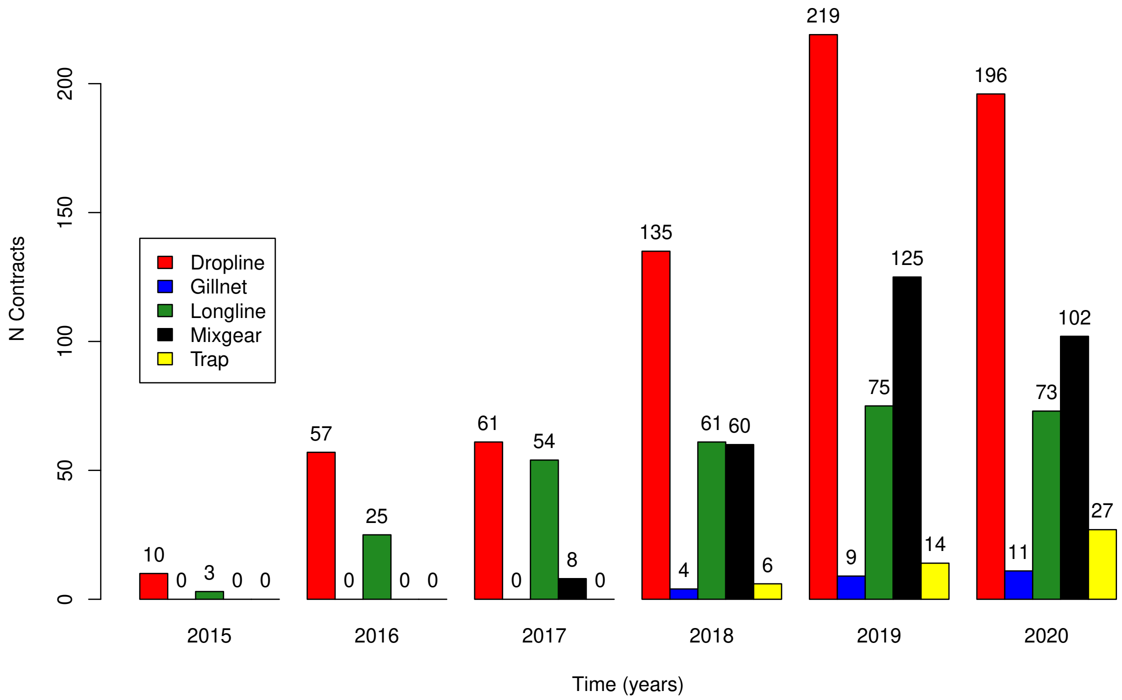


Figure 2.3: Number of CODRS contractors by gear type actively fishing in Indonesian waters.

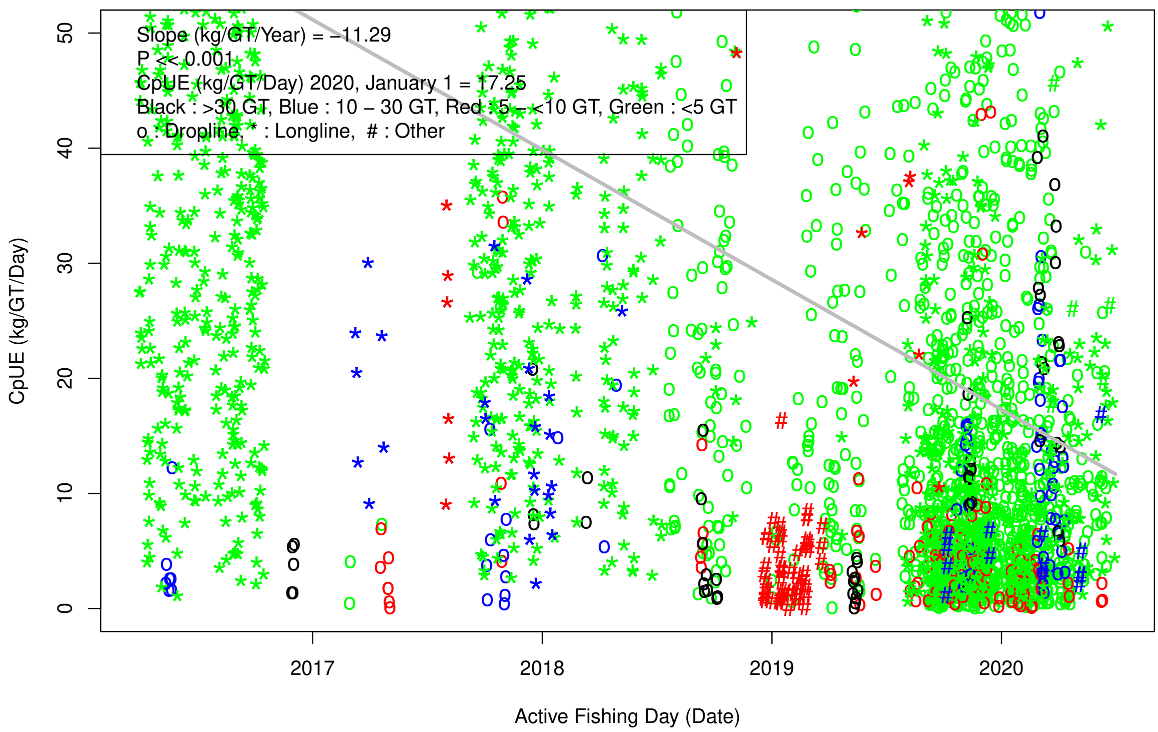


Figure 2.4: Catch per Unit of Effort in WPP 714.

Table 2.1: Number of CODRS deployed by gear type and boat size category in WPP 714

N	Dropline	Longline	Gillnet	Trap	Mix Gear	Total
Nano	23	9	NA	0	0	32
Small	3	2	NA	NA	3	8
Medium	0	0	NA	1	NA	1
Large	2	NA	NA	NA	NA	2
Total	28	11	0	1	3	43

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 714 for the most recent 365 days

kg/GT/Day	Dropline	Longline	Gillnet	Trap	Mix Gear
Nano	16.68	20.32	NA	24.67	18.00
Small	8.38	18.32	NA	NA	18.00
Medium	18.97	18.00	NA	5.17	NA
Large	26.45	NA	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 714 for the most recent 365 days

N	Dropline	Longline	Gillnet	Trap	Mix Gear
Nano	1020	313	NA	6	1505
Small	73	3	NA	NA	1505
Medium	51	1505	NA	14	NA
Large	25	NA	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 714

Number of Boat	Dropline	Longline	Gillnet	Trap	Mix Gear	Total
Nano Dedicated	225	74	0	2	5	306
Nano Seasonal	186	1	0	0	120	307
Small Dedicated	5	5	0	0	0	10
Small Seasonal	1	0	0	0	5	6
Medium Dedicated	2	4	0	1	0	7
Medium Seasonal	1	0	0	0	0	1
Large Dedicated	3	0	0	0	0	3
Large Seasonal	0	0	0	0	0	0
Total	423	84	0	3	130	640

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 714

Total GT	Dropline	Longline	Gillnet	Trap	Mix Gear	Total
Nano Dedicated	287	97	0	1	5	390
Nano Seasonal	234	4	0	0	145	383
Small Dedicated	31	31	0	0	0	62
Small Seasonal	6	0	0	0	32	38
Medium Dedicated	47	77	0	12	0	136
Medium Seasonal	13	0	0	0	0	13
Large Dedicated	101	0	0	0	0	101
Large Seasonal	0	0	0	0	0	0
Total	719	209	0	13	182	1123

Table 2.7: Total catch in metric tons per year by fishing gear and boat size category in WPP 714 for the most recent 365 days

Total Catch	Dropline	Longline	Gillnet	Trap	Mix Gear	Total
Nano Dedicated	964	463	0	5	24	1455
Nano Seasonal	390	11	0	0	347	748
Small Dedicated	55	147	0	0	0	201
Small Seasonal	5	0	0	0	70	75
Medium Dedicated	182	295	0	14	0	490
Medium Seasonal	25	0	0	0	0	25
Large Dedicated	443	0	0	0	0	443
Large Seasonal	0	0	0	0	0	0
Total	2064	915	0	18	441	3437

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 714 for the most recent 365 days.

Species	Weight MT	Weight %	Cumulative % Weight	Immature % Number	Immature % Weight	Risk Immature
Etelis sp.	384	11	11	40	21	High
Aphareus rutilans	346	10	21	55	28	High
Pristipomoides multidens	254	7	29	38	16	High
Lethrinus olivaceus	251	7	36	3	0	Low
Caranx ignobilis	173	5	41	18	9	Med
Etelis coruscans	161	5	46	59	38	High
Caranx sexfasciatus	158	5	50	5	1	Low
Aprion virescens	137	4	54	50	23	High
Lutjanus argentimaculatus	82	2	57	15	5	Med
Lutjanus sebae	77	2	59	13	4	Med
Lutjanus bohar	76	2	61	80	36	High
Erythrocles schlegelii	73	2	63	1	0	Low
Caranx tille	71	2	65	9	2	Low
Epinephelus coioides	70	2	67	5	1	Low
Lutjanus malabaricus	69	2	69	23	7	Med
Lutjanus gibbus	67	2	71	40	20	High
Etelis radiosus	56	2	73	66	39	High
Paracaesio kusakarii	49	1	74	18	8	Med
Pristipomoides filamentosus	47	1	76	84	54	High
Lutjanus timorensis	44	1	77	11	5	Med
Total Top 20 Species	2645	77	77	37	16	High
Total Top 100 Species	3437	100	100	24	14	Medium

Table 2.9: Top 20 species by volume in Dropline fisheries with % immature fish in the catch in WPP 714 for the most recent 365 days.

Species	Weight MT	Weight %	Cumulative % Weight	Immature % Number	Immature % Weight	Risk Immature
Etelis sp.	300	15	15	40	21	High
Aphareus rutilans	232	11	26	52	26	High
Lethrinus olivaceus	170	8	34	3	0	Low
Pristipomoides multidens	132	6	40	37	16	High
Etelis coruscans	126	6	46	59	38	High
Caranx sexfasciatus	107	5	52	5	1	Low
Caranx ignobilis	72	3	55	18	9	Med
Erythrocles schlegelii	57	3	58	1	0	Low
Aprion virescens	57	3	61	49	24	High
Caranx tille	56	3	63	9	2	Low
Lutjanus gibbus	46	2	66	40	20	High
Lutjanus bohar	45	2	68	80	36	High
Lutjanus argentimaculatus	44	2	70	19	6	Med
Etelis radiosus	43	2	72	66	39	High
Lutjanus malabaricus	38	2	74	16	4	Med
Paracaesio kusakarii	37	2	76	18	8	Med
Lutjanus timorensis	33	2	77	11	5	Med
Pristipomoides filamentosus	28	1	79	84	54	High
Epinephelus coioides	27	1	80	2	0	Low
Seriola rivoliana	27	1	81	28	7	Med
Total Top 20 Species	1677	81	81	37	17	High
Total Top 100 Species	2064	100	100	26	15	Medium

Table 2.10: Top 20 species by volume in Longline fisheries with % immature fish in the catch in WPP 714 for the most recent 365 days.

Species	Weight MT	Weight %	Cumulative % Weight	Immature % Number	Immature % Weight	Risk Immature
Pristipomoides multidens	90	10	10	43	17	High
Caranx ignobilis	79	9	18	NA	NA	
Aphareus rutilans	70	8	26	73	38	High
Aprion virescens	63	7	33	51	21	High
Lutjanus sebae	62	7	40	13	4	Med
Lethrinus olivaceus	48	5	45	0	0	Low
Etelis sp.	35	4	49	NA	NA	
Diagramma pictum	33	4	53	1	0	Low
Caranx sexfasciatus	31	3	56	NA	NA	
Epinephelus coioides	29	3	59	4	1	Low
Lutjanus argentimaculatus	28	3	62	6	2	Low
Elagatis bipinnulata	23	3	65	NA	NA	
Lutjanus bohar	22	2	67	NA	NA	
Lutjanus malabaricus	21	2	69	26	8	Med
Lethrinus lentjan	19	2	71	2	0	Low
Lethrinus nebulosus	16	2	73	NA	NA	
Etelis coruscans	14	2	75	NA	NA	
Epinephelus amblycephalus	14	2	76	2	0	Low
Gymnocranius grandoculis	13	1	78	NA	NA	
Pristipomoides filamentosus	13	1	79	NA	NA	
Total Top 20 Species	725	79	79	20	9	Medium
Total Top 100 Species	915	100	100	15	8	Medium

Table 2.11: Top 20 species by volume in Gillnet fisheries with % immature fish in the catch in WPP 714 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 714 for the most recent 365 days.

Species	Weight MT	Weight %	Cumulative % Weight	Immature % Number	Immature % Weight	Risk Immature
Plectropomus maculatus	9	48	48	1	0	Low
Epinephelus coioides	5	25	73	20	8	Med
Plectropomus leopardus	2	11	84	4	2	Low
Lutjanus malabaricus	1	8	92	90	76	High
Epinephelus bleekeri	0	2	93	NA	NA	
Lethrinus olivaceus	0	1	95	NA	NA	
Diagramma pictum	0	1	96	NA	NA	
Lutjanus vitta	0	1	97	NA	NA	
Cephalopholis sonnerati	0	1	97	NA	NA	
Lethrinus lentjan	0	1	98	NA	NA	
Lutjanus sebae	0	0	99	NA	NA	
Lutjanus russelli	0	0	99	NA	NA	
Lutjanus johnii	0	0	99	NA	NA	
Epinephelus malabaricus	0	0	99	NA	NA	
Caranx ignobilis	0	0	100	NA	NA	
Lutjanus argentimaculatus	0	0	100	NA	NA	
Epinephelus areolatus	0	0	100	NA	NA	
Lutjanus bohar	0	0	100	NA	NA	
Paracaesio xanthura	0	0	100	NA	NA	
NA	NA	NA	NA	NA	NA	NA
Total Top 20 Species	18	100	100	17	8	Medium
Total Top 100 Species	18	100	100	17	8	Medium

Table 2.13: Top 20 species by volume in Mixgears fisheries with % immature fish in the catch in WPP 714 for the most recent 365 days.

Species	Weight MT	Weight %	Cumulative % Weight	Immature % Number	Immature % Weight	Risk Immature
Etelis sp.	49	11	11	NA	NA	
Aphareus rutilans	44	10	21	NA	NA	
Pristipomoides multidens	33	7	29	NA	NA	
Lethrinus olivaceus	32	7	36	NA	NA	
Caranx ignobilis	22	5	41	NA	NA	
Etelis coruscans	21	5	46	NA	NA	
Caranx sexfasciatus	20	5	50	NA	NA	
Aprion virescens	18	4	54	NA	NA	
Lutjanus argentimaculatus	11	2	57	NA	NA	
Lutjanus sebae	10	2	59	NA	NA	
Lutjanus bohar	10	2	61	NA	NA	
Erythrocles schlegelii	9	2	63	NA	NA	
Caranx tille	9	2	65	NA	NA	
Epinephelus coioides	9	2	67	NA	NA	
Lutjanus malabaricus	9	2	69	NA	NA	
Lutjanus gibbus	9	2	71	NA	NA	
Etelis radiosus	7	2	73	NA	NA	
Paracaesio kusakarii	6	1	74	NA	NA	
Pristipomoides filamentosus	6	1	76	NA	NA	
Lutjanus timorensis	6	1	77	NA	NA	
Total Top 20 Species	339	77	77	NA	NA	NA
Total Top 100 Species	441	100	100	NA	NA	NA

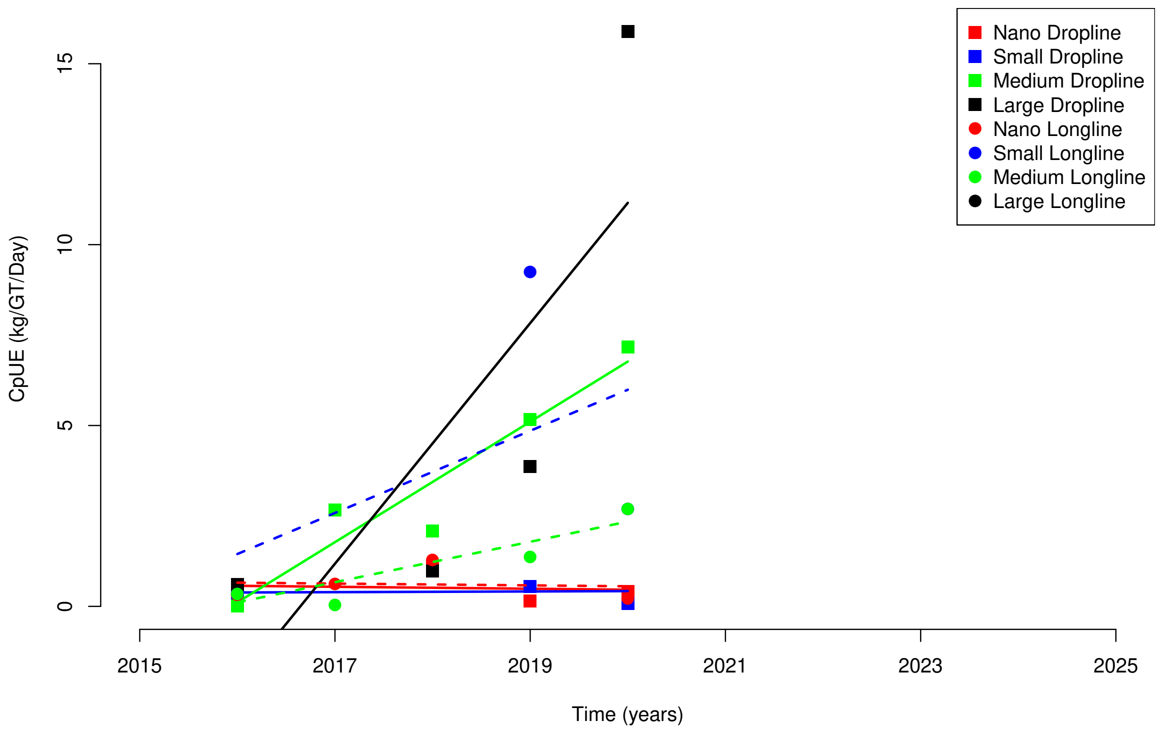


Figure 2.5: Catch per Unit of Effort per calendar year for Etelis sp. in WPP 714 for Dropline and Longline catches by fleet segment. Solid lines and dashed lines for trends in Dropline CpUE and Longline CpUE respectively.

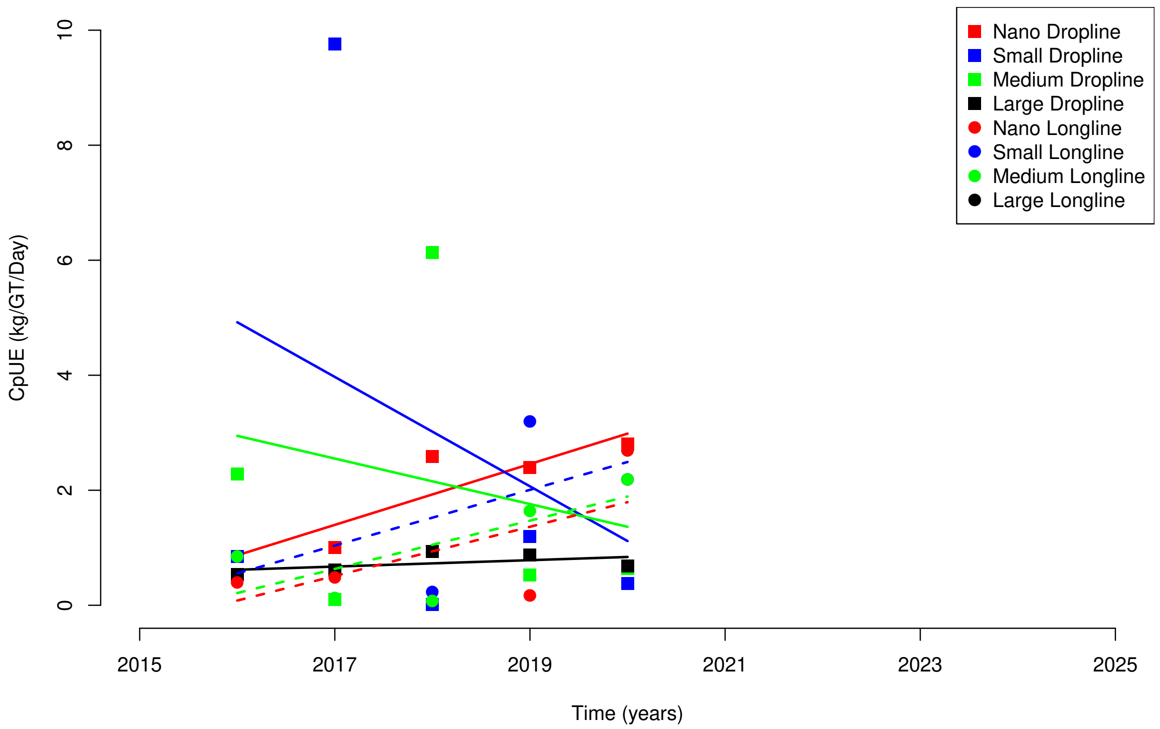


Figure 2.6: Catch per Unit of Effort per calendar year for Aphareus rutilans
in WPP 714 for Dropline and Longline catches by fleet segment.
Solid lines and dashed lines for trends in Dropline CpUE and Longline CpUE respectively.

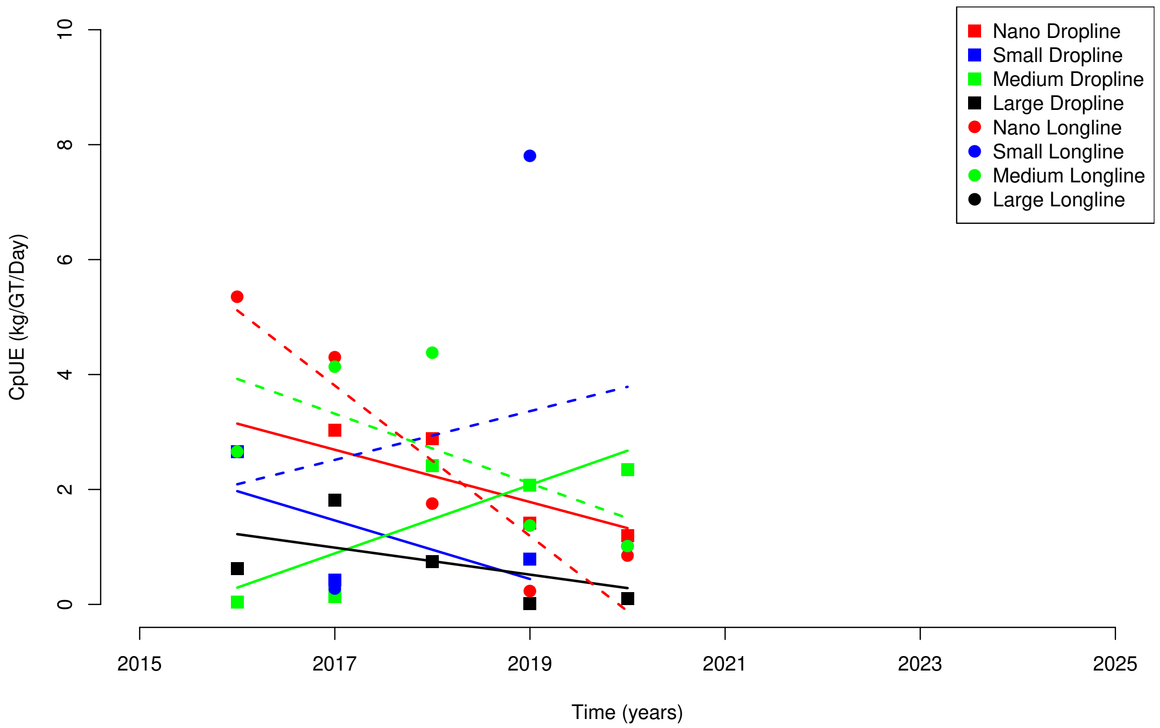


Figure 2.7: Catch per Unit of Effort per calendar year for Pristipomoides multidens
in WPP 714 for Dropline and Longline catches by fleet segment.
Solid lines and dashed lines for trends in Dropline CpUE and Longline CpUE respectively.

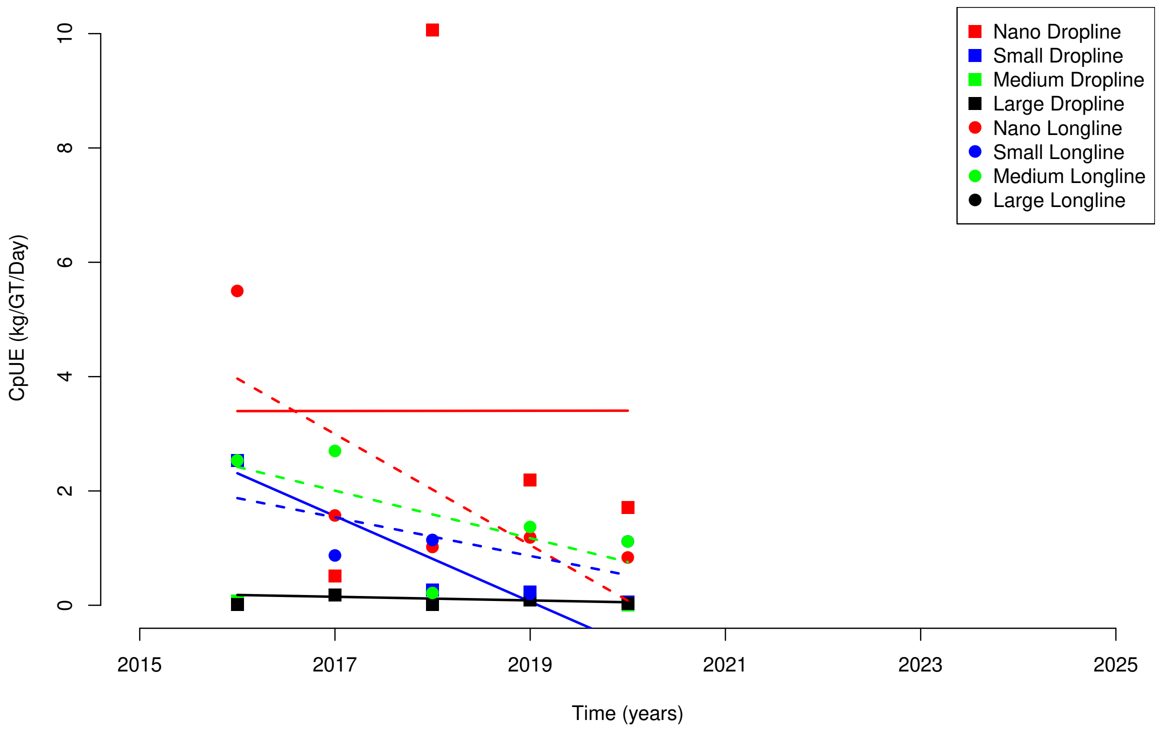


Figure 2.8: Catch per Unit of Effort per calendar year for Lethrinus olivaceus
in WPP 714 for Dropline and Longline catches by fleet segment.
Solid lines and dashed lines for trends in Dropline CpUE and Longline CpUE respectively.

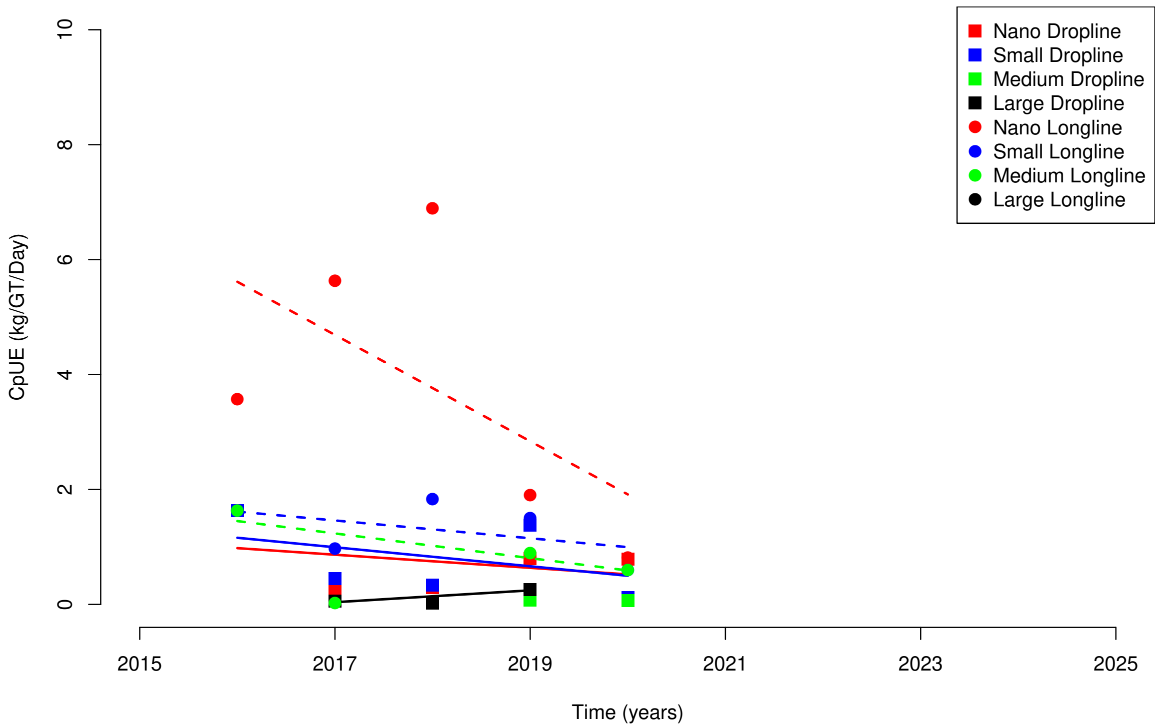


Figure 2.9: Catch per Unit of Effort per calendar year for Caranx ignobilis
in WPP 714 for Dropline and Longline catches by fleet segment.
Solid lines and dashed lines for trends in Dropline CpUE and Longline CpUE respectively.

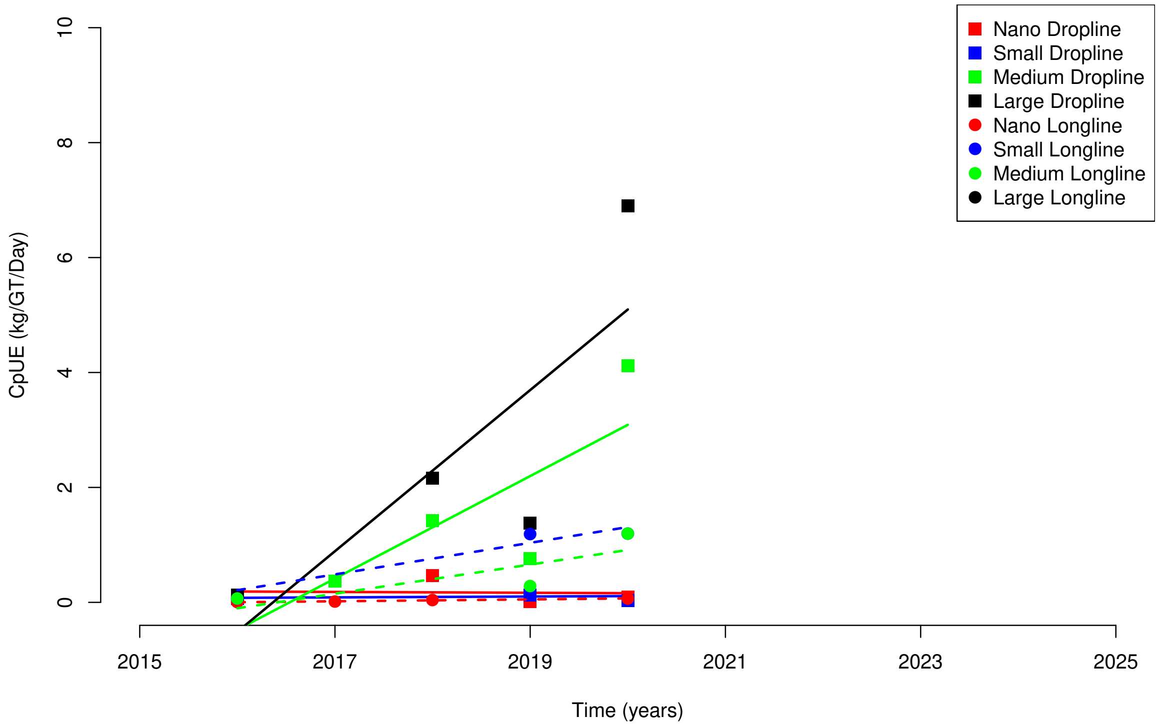


Figure 2.10: Catch per Unit of Effort per calendar year for Etelis coruscans in WPP 714 for Dropline and Longline catches by fleet segment. Solid lines and dashed lines for trends in Dropline CpUE and Longline CpUE respectively.

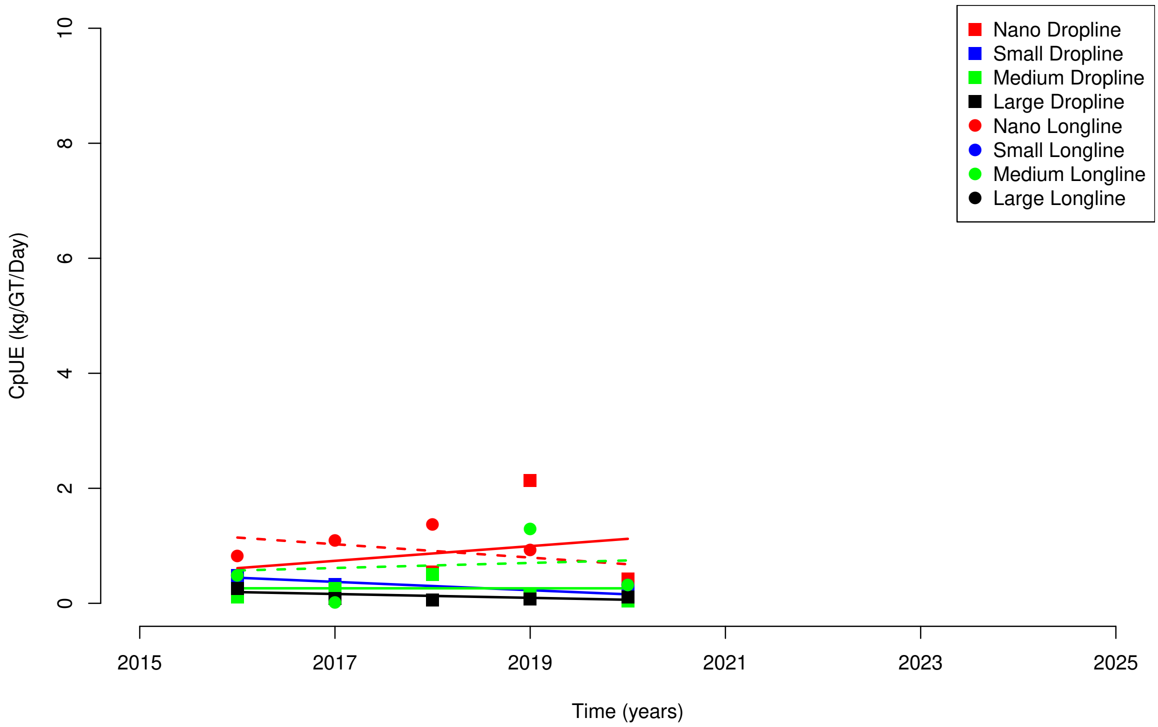


Figure 2.11: Catch per Unit of Effort per calendar year for Caranx sexfasciatus in WPP 714 for Dropline and Longline catches by fleet segment. Solid lines and dashed lines for trends in Dropline CpUE and Longline CpUE respectively.

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

Fishing grounds in WPP 714, mainly covering the Banda Sea, are closely connected to those in surrounding fisheries management areas. The fleets that operate on these connected fishing grounds typically cover multiple WPP, often within single fishing trips. Spot trace data show great geographic spread of the various fleets in and around WPP 714 (Figures 3.1 to 3.3), with highly mobile medium- and larger sized snapper fishing boats making trips to fishing grounds that are up to 1,000 kilometres away from home ports.

Much of the fishing activity recorded inside WPP 714 boundaries is by fishing vessels originating from outside this area. For the purpose of this report, all fish catches recorded by SPOT and CODRS data as catches from actual fishing activity within WPP 714 boundaries were included in the stock assessments for this WPP, regardless of origin of the fishing vessel.

Decision making by boat owners on various movements can be based on fisheries technical issues such as catch rates or weather, but also on administrative issues like licensing or enforcement of rules against under-marking in Gross Tonnage. And not only are medium scale fishing operations highly mobile in terms of their trips from home port, they are also flexible in changing their base of operations from one port to another, changing from landing at home port to offloading at processing plants or on transport vessels in remote ports or offloading for air cargo at yet other places.

Fishing vessels from many home ports around the Banda Sea (Figures 3.4 to 3.6) operate in WPP 714 as well as in neighbouring WPP. Small scale fleets from the Banggai and Sula Islands as well as from mainland Sulawesi, the Kei Islands and other locations, feed into the same supply lines as the medium scale fishing vessels. Small scale fisheries often supply fish via a network of small local traders and upstream aggregators which prepare larger volumes for sale to processing companies. For example a snapper processor based in Luwuk, Central Sulawsi, receives part of its raw product from the supply network around the local islands while additional supply comes from medium scale operations in North Sulawesi and elsewhere. This company has been receiving transports for example from from Kema in North Sulawesi, which is the base of a medium scale deep water snapper drop line fishery. That fishery currently lands most of its catches in Kema but operates throughout and beyond the waters of WPP 715, WPP 714 and WPP 718.

In recent years we have observed movement of staging ports but also of processing capacity to remote areas in the east such as Tual in the Kei Islands and the island of Penambulai, East of the Aru Islands in WPP 718. Fish processing capacity in the area of WPP 714 is currently present in Kendari on the coast of South East Sulawesi, Luwuk in Central Sulawesi, Ambon in the Northern Maluku islands and Tual in the Kei Islands. All these places are used for processing fish from far and wide beyond WPP 714.

Potential IUU issues related to snapper fisheries in and around WPP 714 include the under marking of medium scale vessels to below 30GT, the licensing of the various fleets for specific WPP and the operation of deep slope snapper fishers from remote ports at deep water sites inside Marine Protected Areas throughout this region. Especially the fisheries activity in MPAs needs to be discussed with fishing boat captains and boat owners to prevent issues of supply line “pollution” with IUU fish from thee protected areas.

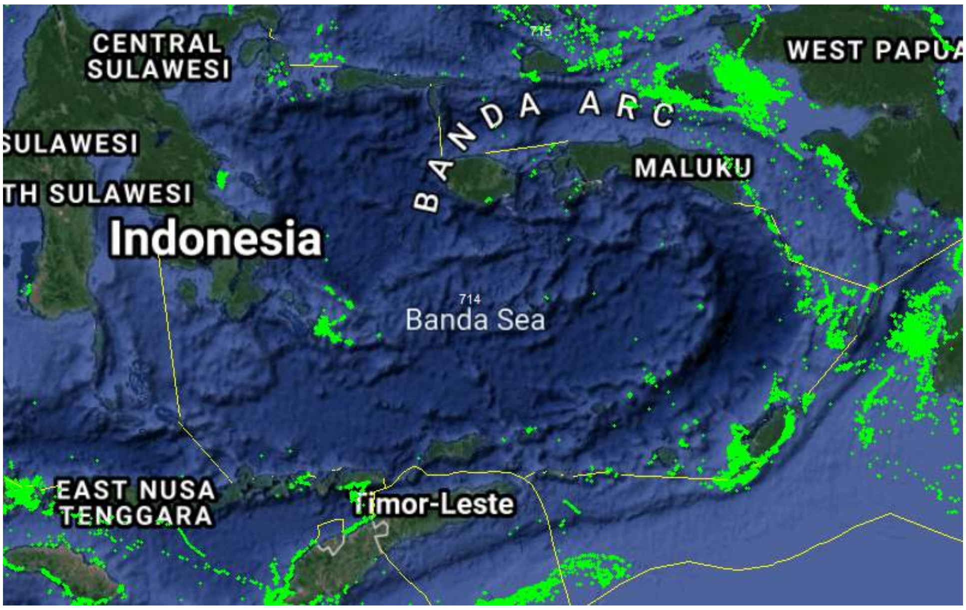


Figure 3.1: Fishing positions of dropliners participating in the CODRS program over the years 2014 - 2019 in WPP 714, as reported by Spot Trace. Reported positions during steaming, anchoring, or docking are excluded from this map.

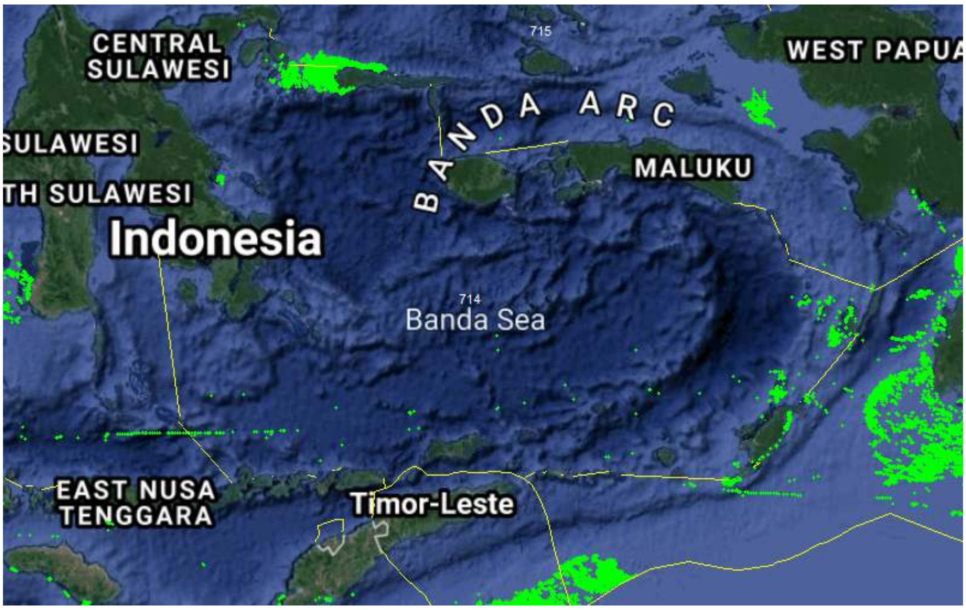


Figure 3.2: Fishing positions of longliners participating in the CODRS program over the years 2014 - 2019 in WPP 714, as reported by Spot Trace. Reported positions during steaming, anchoring, or docking are excluded from this map.

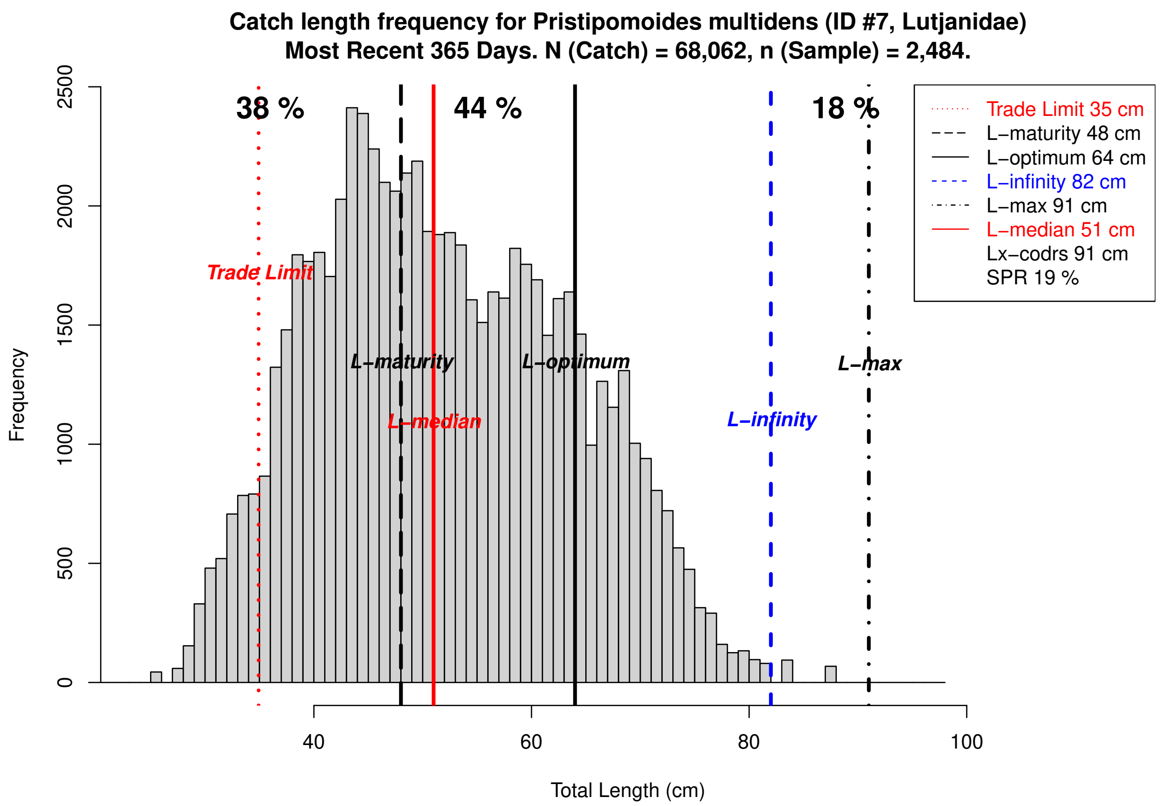
Figure 3.3: Fishing positions of vessels applying more than one gear, participating in the CODRS program over the years 2014 - 2019 in WPP 714, as reported by Spot Trace. Gears used by the vessels in this group are a combination of droplines, longlines, traps, and gillnets. Reported positions during steaming, anchoring, or docking are excluded from this map.

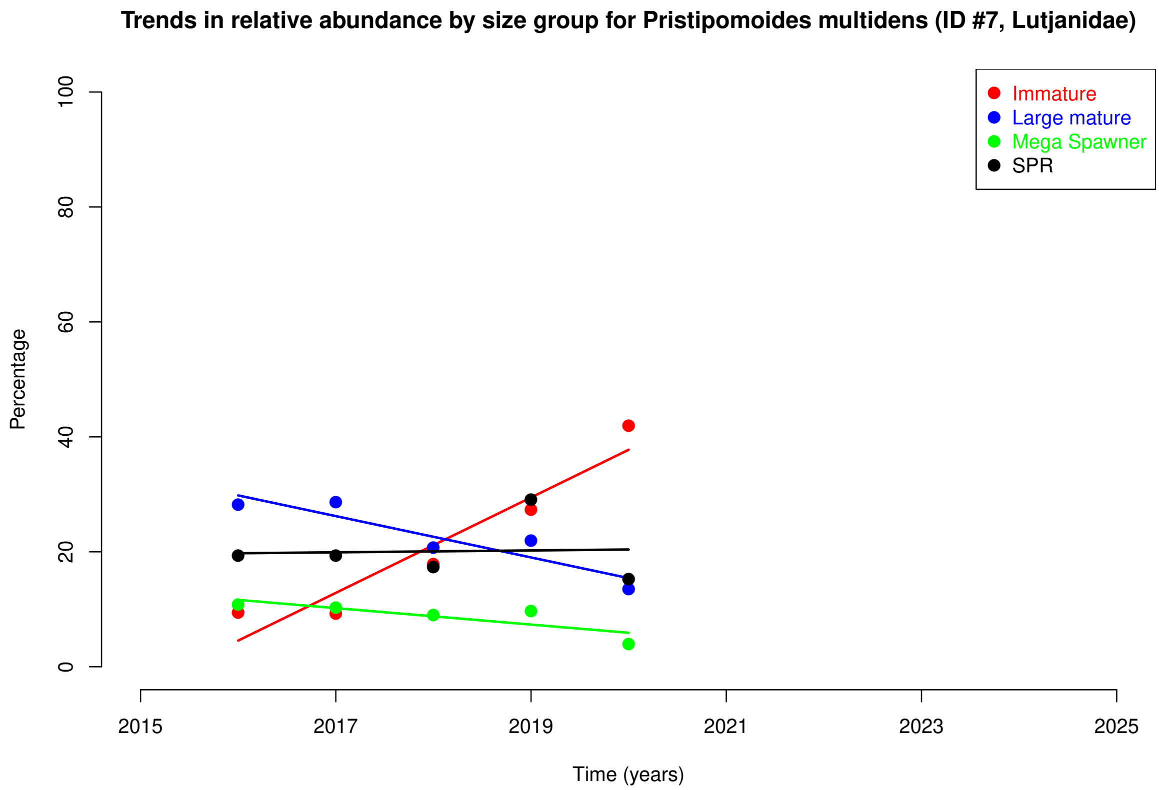
Figure 3.4: A typical small scale snapper fishing fleets from Kasuari, Banggai Laut, Sulawesi Tengah, operating in the Banda Sea (WPP 714) and on nearby fishing grounds.

Figure 3.5: A typical small scale snapper fishing fleets from Tual, Maluku, operating in the Banda Sea (WPP 714) and on nearby fishing grounds.

Figure 3.6: A typical snapper fishing boat from Kema, Minahasa Utara, Sulawesi Utara, operating in the Banda Sea (WPP 714) and on nearby fishing grounds.

4 Length-based assessments of Top 20 most abundant species in CODRS samples including all years in WPP 714





The percentages of Pristipomoides multidens (ID #7, Lutjanidae) in most recent 365 days.
N (Catch) =68,062, n (Sample) = 2,484
Immature (< 48cm): 38%
Small mature (>= 48cm, < 64cm): 44%
Large mature (>= 64cm): 18%
Mega spawner (>= 70.4cm): 7% (subset of large mature fish)
Spawning Potential Ratio: 19 %

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

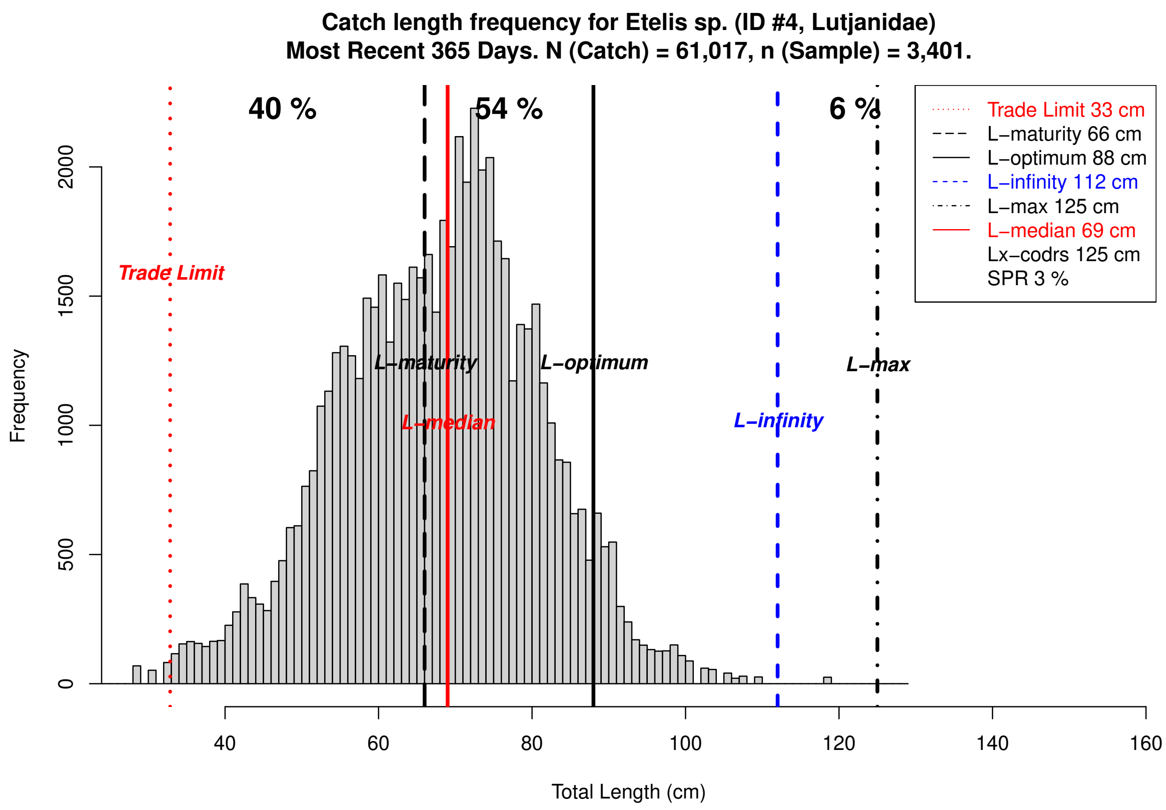
Between 30% and 50% of the fish in the catch are immature and have not had a chance to reproduce before capture. The fishery is in immediate danger of overfishing through overharvesting of juveniles, if fishing pressure is high. Catching small and immature fish needs to be actively avoided and a limit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

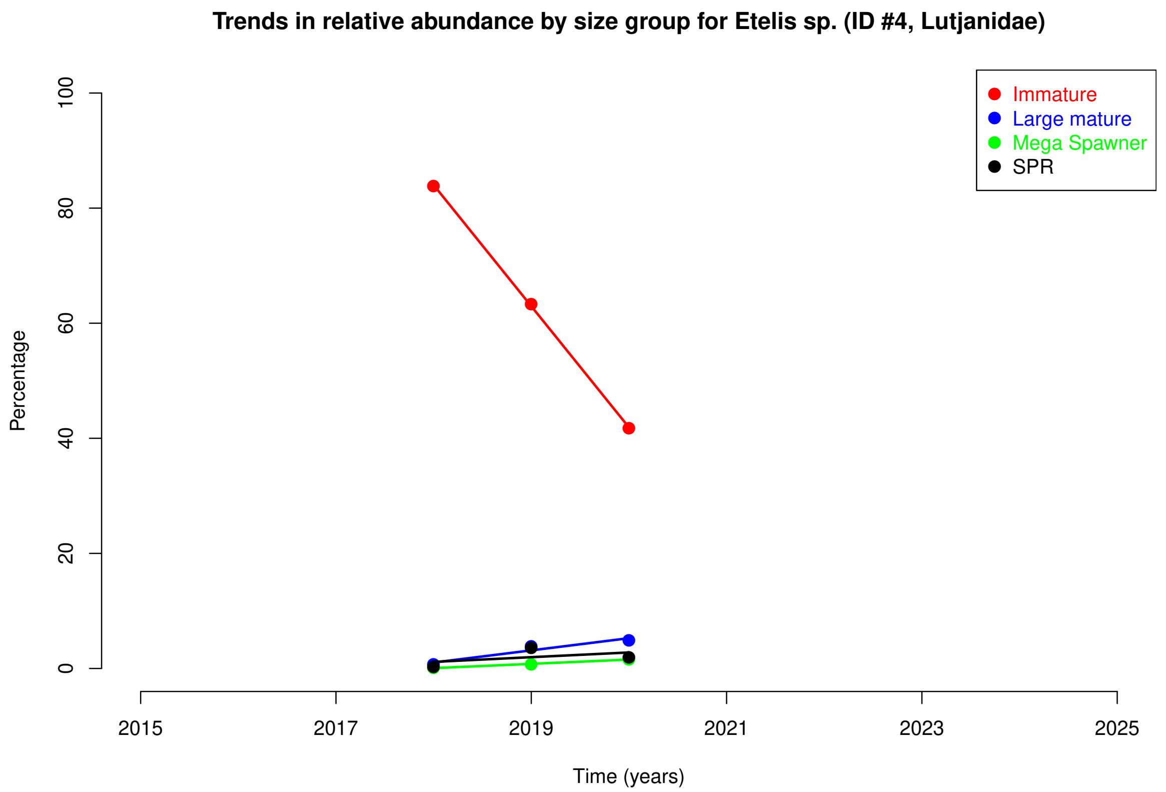
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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

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

Trends in relative abundance by size group for Pristipomoides multidens (ID #7, Lutjanidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature rising over recent years, situation deteriorating. P: 0.012
% Large Mature falling over recent years, situation deteriorating. P: 0.029
% Mega Spawner falling over recent years, situation deteriorating. P: 0.090
% SPR rising over recent years, situation improving. P: 0.939


Catch length frequency for Etelis sp. (ID #4, Lutjanidae)
Most Recent 365 Days. N (Catch) = 61,017, n (Sample) = 3,401.
40 %
54 %
6 %
Trade Limit 33 cm
L−maturity 66 cm
L−optimum 88 cm
L−infinity 112 cm
L−max 125 cm
L−median 69 cm
Lx−codrs 125 cm
SPR 3 %
Trade Limit
L−maturity
L−optimum
L−median
L−infinity
L−max
Frequency
0
500
1000
1500
2000
40
60
80
100
120
140
160
Total Length (cm)


Trends in relative abundance by size group for Etelis sp. (ID #4, 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 Etelis sp. (ID #4, Lutjanidae) in most recent 365 days.
N (Catch) =61,017, n (Sample) = 3,401
Immature (< 66cm): 40%
Small mature (>= 66cm, < 88cm): 54%
Large mature (>= 88cm): 6%
Mega spawner (>= 96.8cm): 1% (subset of large mature fish)
Spawning Potential Ratio: 3 %

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.

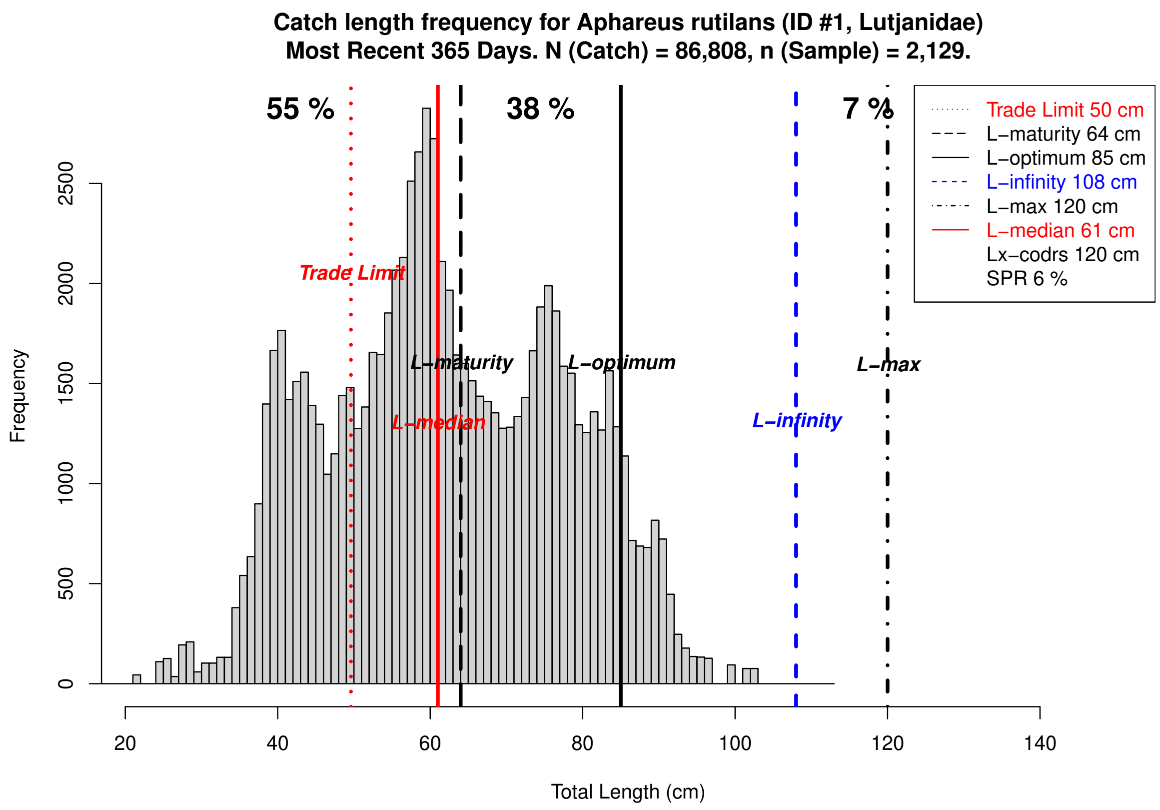
Between 30% and 50% of the fish in the catch are immature and have not had a chance to reproduce before capture. The fishery is in immediate danger of overfishing through overharvesting of juveniles, if fishing pressure is high. Catching small and immature fish needs to be actively avoided and a limit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

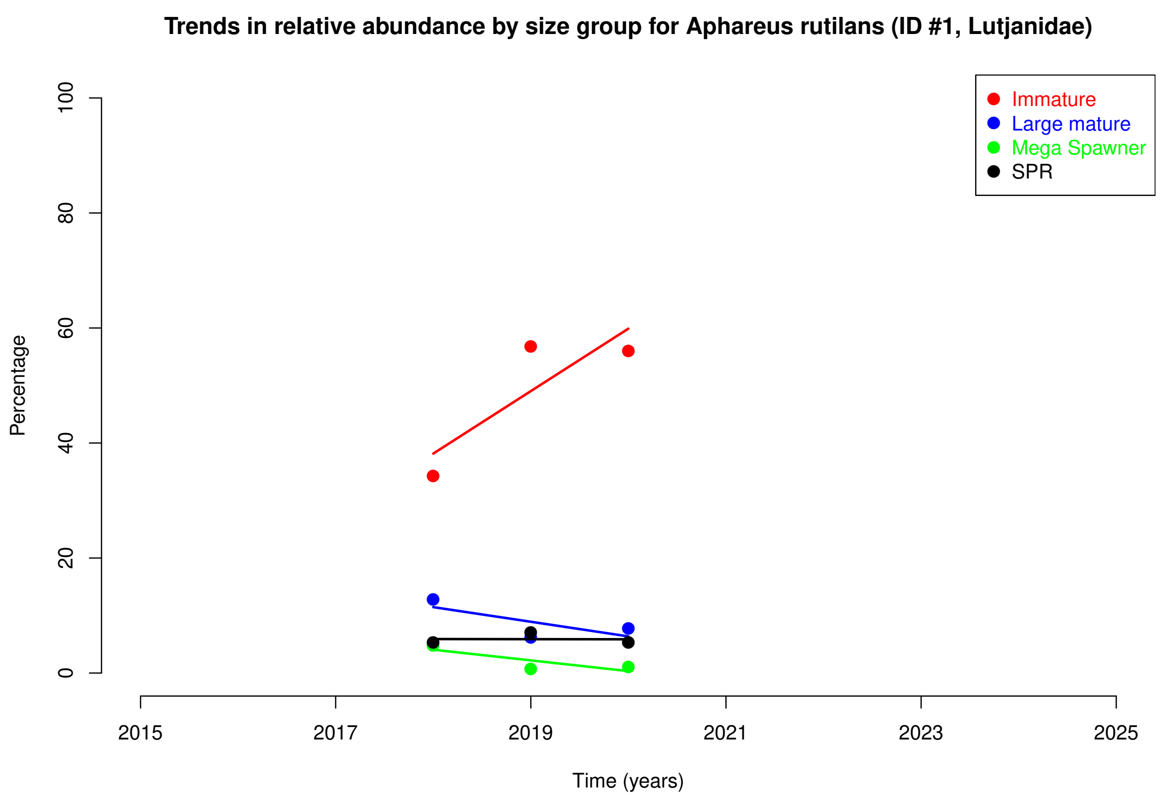
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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 Etelis sp. (ID #4, 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: 0.010
% Large Mature rising over recent years, situation improving. P: 0.171
% Mega Spawner rising over recent years, situation improving. P: 0.083
% SPR rising over recent years, situation improving. P: 0.669


Catch length frequency for Aphareus rutilans (ID #1, Lutjanidae)
Most Recent 365 Days. N (Catch) = 86,808, n (Sample) = 2,129.
55 %
38 %
7 %
Trade Limit 50 cm
L–maturity 64 cm
L–optimum 85 cm
L–infinity 108 cm
L–max 120 cm
L–median 61 cm
Lx–codrs 120 cm
SPR 6 %
Trade Limit
L–maturity
L–optimum
L–infinity
L–max
L–median
Frequency
Total Length (cm)


Trends in relative abundance by size group for Aphareus rutilans (ID #1, Lutjanidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
Time (years)

The percentages of Aphareus rutilans (ID #1, Lutjanidae) in most recent 365 days.
N (Catch) =86,808, n (Sample) = 2,129
Immature (< 64cm): 55%
Small mature (>= 64cm, < 85cm): 38%
Large mature (>= 85cm): 7%
Mega spawner (>= 93.5cm): 1% (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.

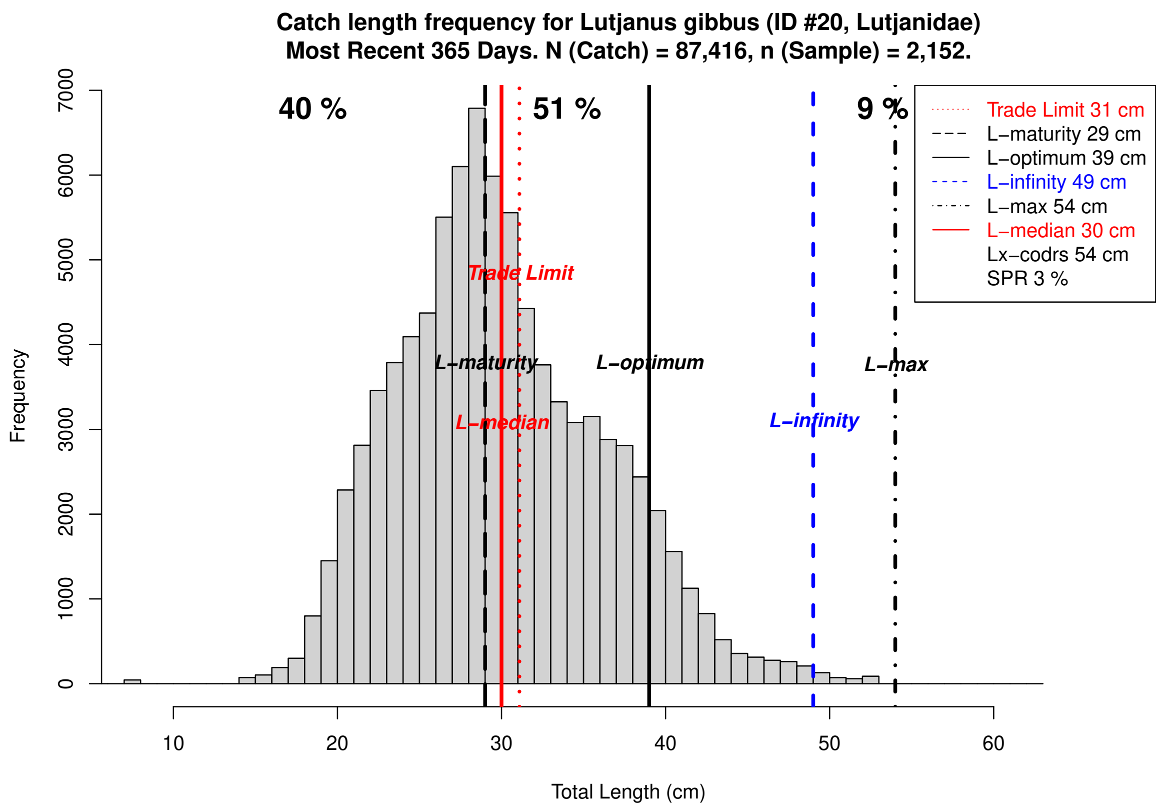
The majority of the fish in the catch have not had a chance to reproduce before capture. This fishery is most likely overfished already if fishing mortality is high for all size classes in the population. An immediate shift away from targeting juvenile fish and a reduction in overall fishing pressure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

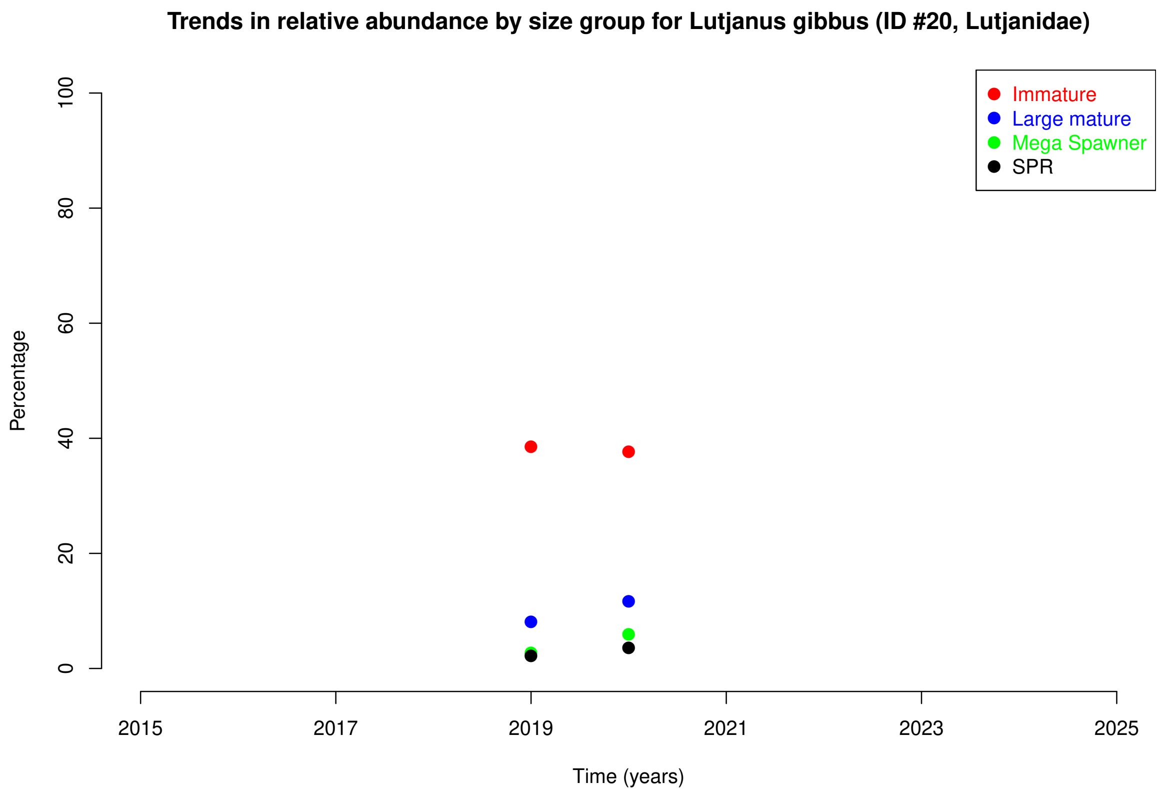
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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 Aphareus rutilans (ID #1, Lutjanidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature rising over recent years, situation deteriorating. P: 0.353
% Large Mature falling over recent years, situation deteriorating. P: 0.473
% Mega Spawner falling over recent years, situation deteriorating. P: 0.390
% SPR no trend over recent years, situation stable. P: 0.987


Catch length frequency for Lutjanus gibbus (ID #20, Lutjanidae)
Most Recent 365 Days. N (Catch) = 87,416, n (Sample) = 2,152.
40 %
51 %
9 %
Trade Limit 31 cm
L−maturity 29 cm
L−optimum 39 cm
L−infinity 49 cm
L−max 54 cm
L−median 30 cm
Lx−codrs 54 cm
SPR 3 %
Trade Limit
L−maturity
L−optimum
L−max
L−median
L−infinity
Frequency
0
1000
2000
3000
4000
5000
6000
7000
10
20
30
40
50
60
Total Length (cm)


Trends in relative abundance by size group for Lutjanus gibbus (ID #20, 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 gibbus (ID #20, Lutjanidae) in most recent 365 days.
N (Catch) =87,416, n (Sample) = 2,152
Immature (< 29cm): 40%
Small mature (>= 29cm, < 39cm): 51%
Large mature (>= 39cm): 9%
Mega spawner (>= 42.9cm): 4% (subset of large mature fish)
Spawning Potential Ratio: 3 %

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

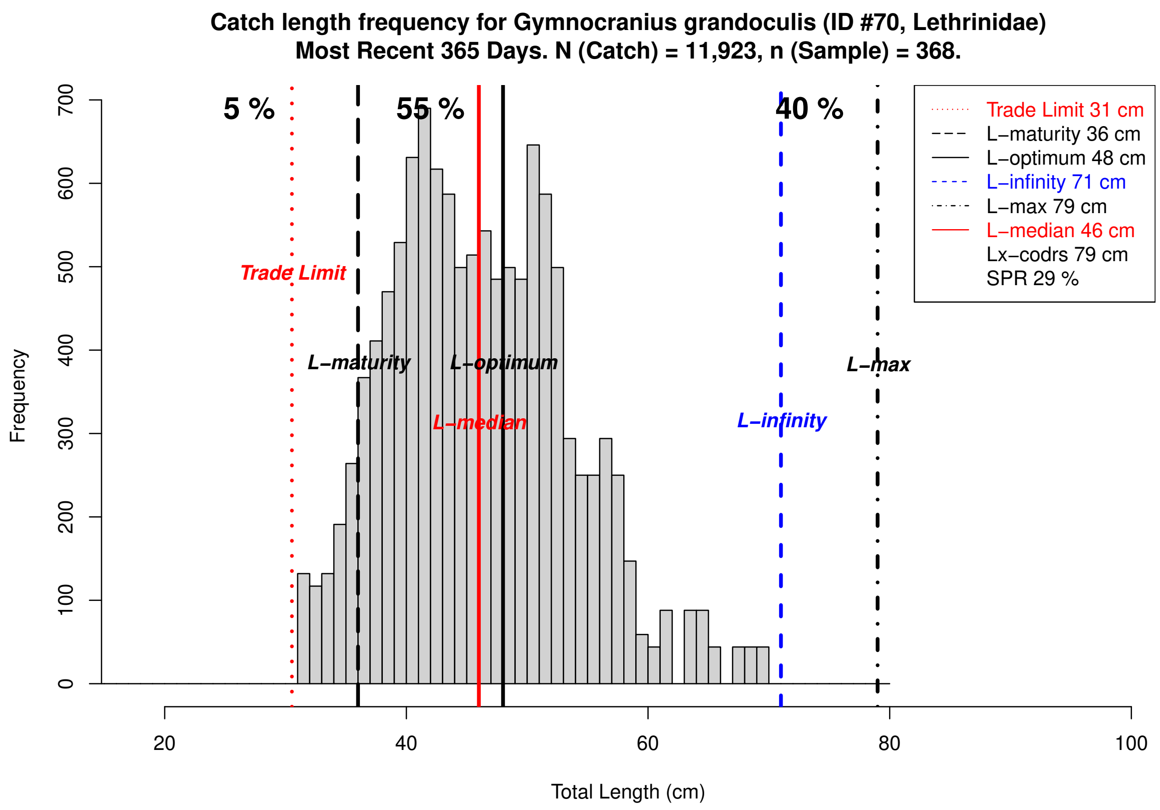
Between 30% and 50% of the fish in the catch are immature and have not had a chance to reproduce before capture. The fishery is in immediate danger of overfishing through overharvesting of juveniles, if fishing pressure is high. Catching small and immature fish needs to be actively avoided and a limit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

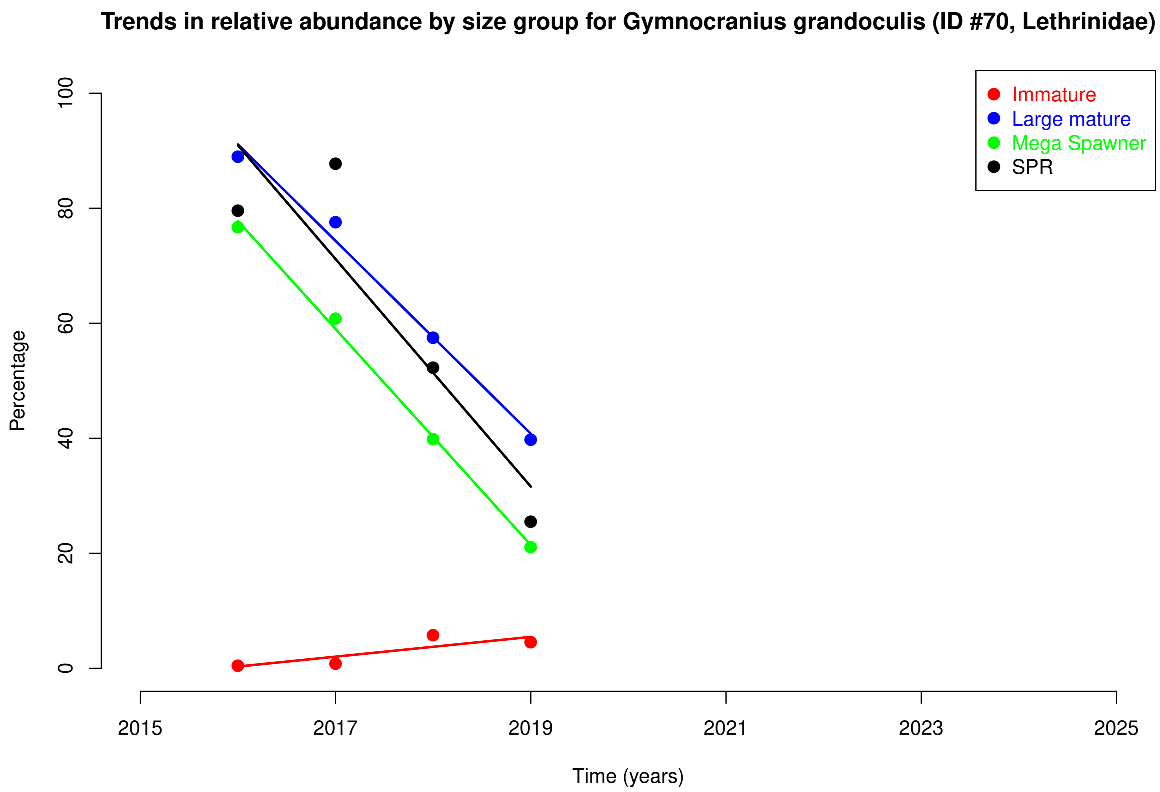
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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

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

Trends in relative abundance by size group for Lutjanus gibbus (ID #20, Lutjanidae), 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.


Catch length frequency for Gymnocranius grandoculis (ID #70, Lethrinidae)
Most Recent 365 Days. N (Catch) = 11,923, n (Sample) = 368.
5 %
55 %
40 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
Trade Limit 31 cm
L–maturity 36 cm
L–optimum 48 cm
L–infinity 71 cm
L–max 79 cm
L–median 46 cm
Lx–codrs 79 cm
SPR 29 %
Frequency
Total Length (cm)


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

The percentages of Gymnocranius grandoculis (ID #70, Lethrinidae) in most recent 365 days.
N (Catch) =11,923, n (Sample) = 368
Immature (< 36cm): 5%
Small mature (>= 36cm, < 48cm): 55%
Large mature (>= 48cm): 40%
Mega spawner (>= 52.8cm): 21% (subset of large mature fish)
Spawning Potential Ratio: 29 %

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.

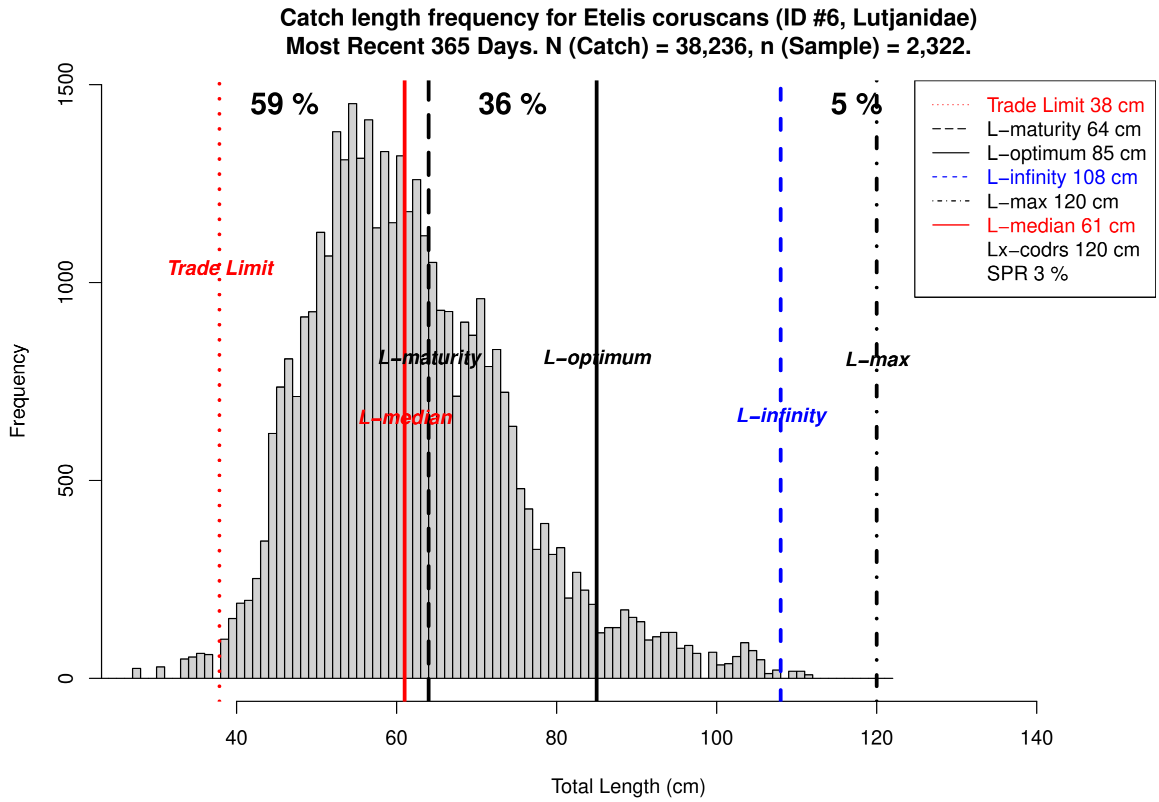
At least 90% of the fish in the catch are mature specimens that have spawned at least once before they were caught. The fishery does not depend on immature size classes for this species and is considered safe for this indicator. This fishery will not be causing overfishing through over harvesting of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

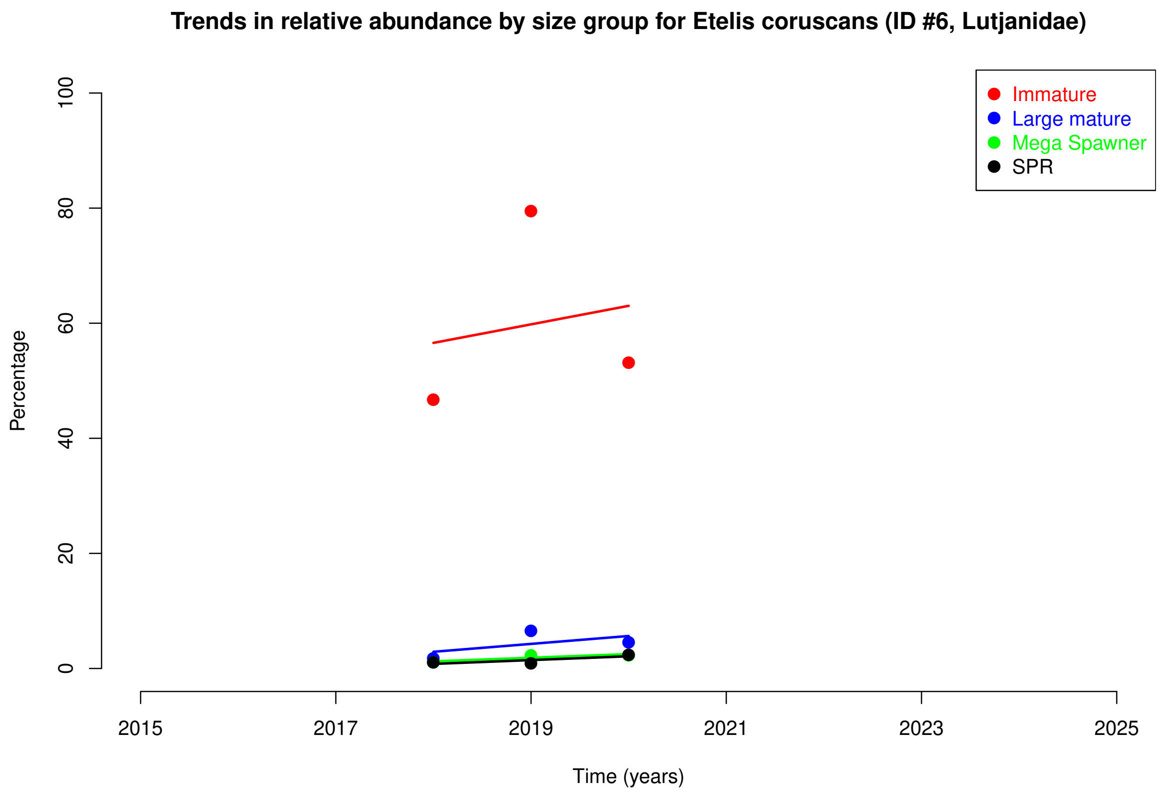
The bulk of the catch includes age groups that have just matured and are about to achieve their full growth potential. This indicates that the fishery is probably at least being fully exploited. Risk level is medium.

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

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

Trends in relative abundance by size group for Gymnocranius grandoculis (ID #70, Lethrinidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature rising over recent years, situation deteriorating. P: 0.166
% Large Mature falling over recent years, situation deteriorating. P: 0.006
% Mega Spawner falling over recent years, situation deteriorating. P: 0.001
% SPR falling over recent years, situation deteriorating. P: 0.097


Catch length frequency for Etelis coruscans (ID #6, Lutjanidae)
Most Recent 365 Days. N (Catch) = 38,236, n (Sample) = 2,322.
59 %
36 %
5 %
Trade Limit 38 cm
L–maturity 64 cm
L–optimum 85 cm
L–infinity 108 cm
L–max 120 cm
L–median 61 cm
Lx–codrs 120 cm
SPR 3 %
Trade Limit
L–maturity
L–optimum
L–max
L–median
L–infinity
Frequency
0
500
1000
1500
40
60
80
100
120
140
Total Length (cm)


Trends in relative abundance by size group for Etelis coruscans (ID #6, 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 Etelis coruscans (ID #6, Lutjanidae) in most recent 365 days.
N (Catch) =38,236, n (Sample) = 2,322
Immature (< 64cm): 59%
Small mature (>= 64cm, < 85cm): 36%
Large mature (>= 85cm): 5%
Mega spawner (>= 93.5cm): 2% (subset of large mature fish)
Spawning Potential Ratio: 3 %

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.

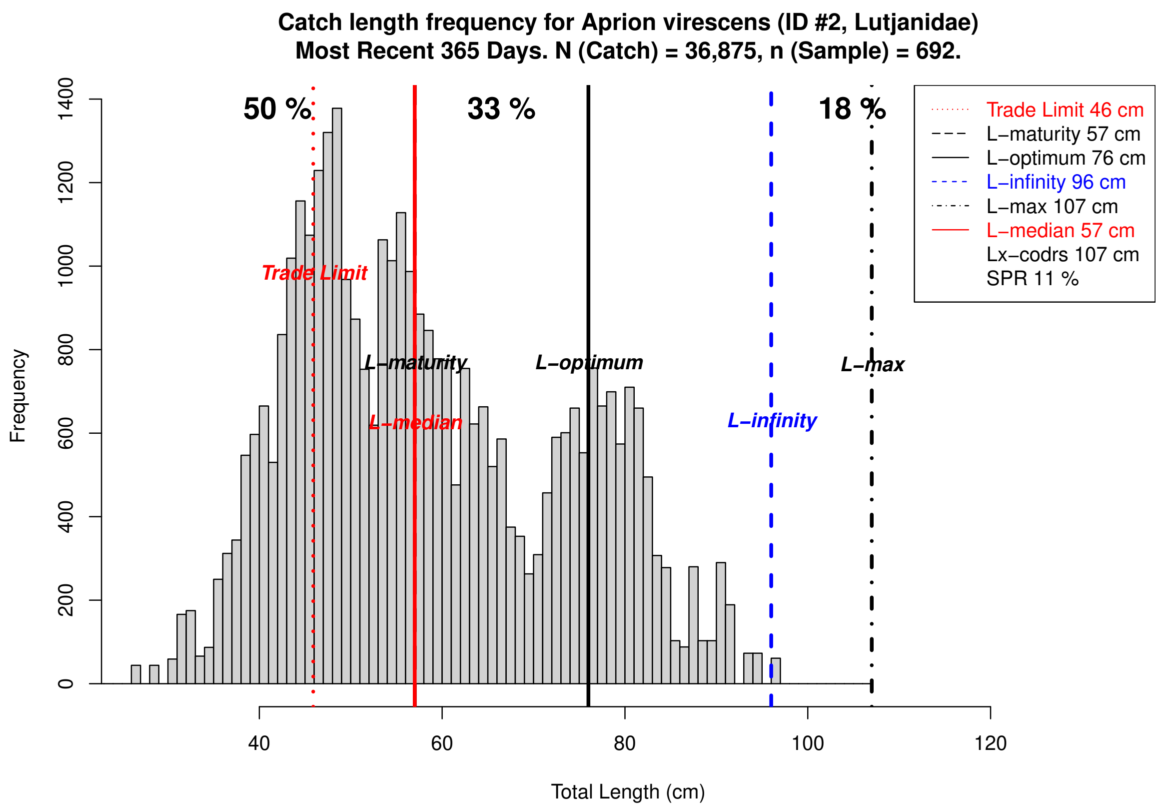
The majority of the fish in the catch have not had a chance to reproduce before capture. This fishery is most likely overfished already if fishing mortality is high for all size classes in the population. An immediate shift away from targeting juvenile fish and a reduction in overall fishing pressure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

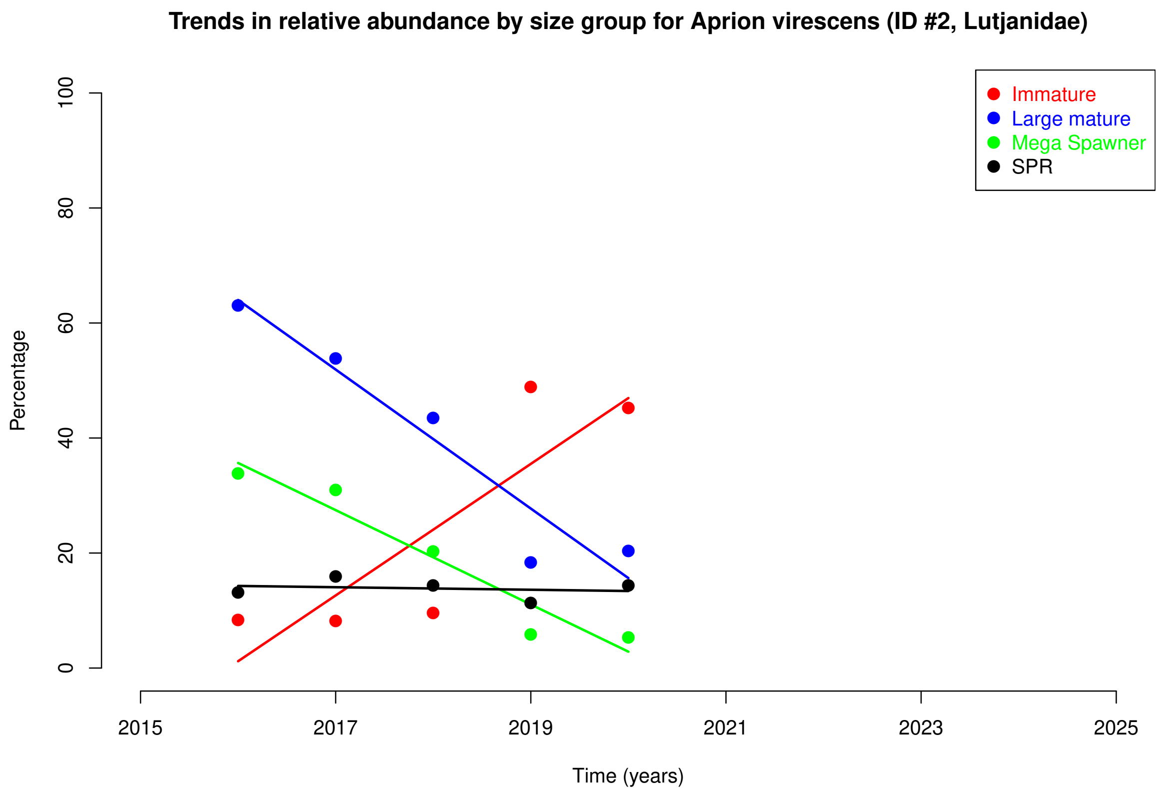
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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 Etelis coruscans (ID #6, 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: 0.881
% Large Mature rising over recent years, situation improving. P: 0.607
% Mega Spawner rising over recent years, situation improving. P: 0.305
% SPR rising over recent years, situation improving. P: 0.391


Catch length frequency for Aprion virescens (ID #2, Lutjanidae)
Most Recent 365 Days. N (Catch) = 36,875, n (Sample) = 692.
50 %
33 %
18 %
Trade Limit 46 cm
L–maturity 57 cm
L–optimum 76 cm
L–infinity 96 cm
L–max 107 cm
L–median 57 cm
Lx–codrs 107 cm
SPR 11 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
Frequency
Total Length (cm)


Trends in relative abundance by size group for Aprion virescens (ID #2, Lutjanidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
Time (years)

The percentages of Aprion virescens (ID #2, Lutjanidae) in most recent 365 days.
N (Catch) =36,875, n (Sample) = 692
Immature (< 57cm): 50%
Small mature (>= 57cm, < 76cm): 33%
Large mature (>= 76cm): 18%
Mega spawner (>= 83.6cm): 5% (subset of large mature fish)
Spawning Potential Ratio: 11 %

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.

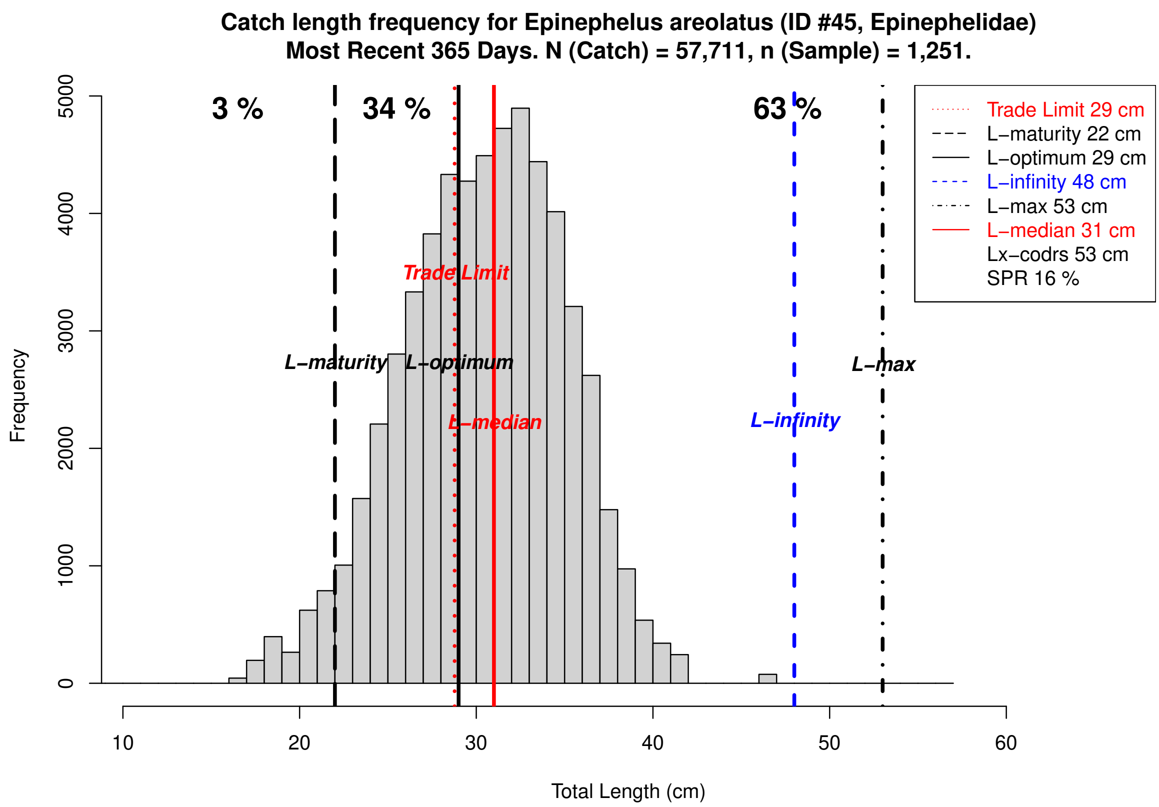
Between 30% and 50% of the fish in the catch are immature and have not had a chance to reproduce before capture. The fishery is in immediate danger of overfishing through overharvesting of juveniles, if fishing pressure is high. Catching small and immature fish needs to be actively avoided and a limit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

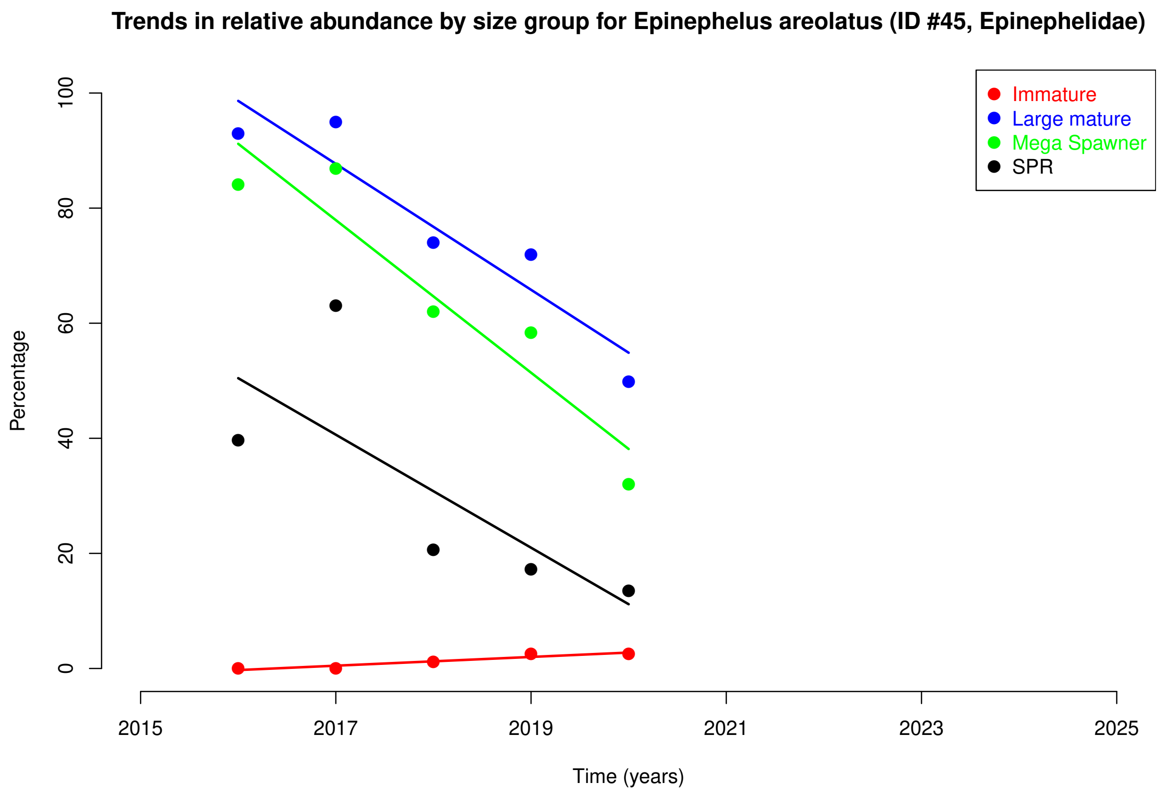
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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 Aprion virescens (ID #2, 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: 0.062
% Large Mature falling over recent years, situation deteriorating. P: 0.010
% Mega Spawner falling over recent years, situation deteriorating. P: 0.008
% SPR falling over recent years, situation deteriorating. P: 0.743


Catch length frequency for Epinephelus areolatus (ID #45, Epinephelidae)
Most Recent 365 Days. N (Catch) = 57,711, n (Sample) = 1,251.
3 %
34 %
63 %
Trade Limit
L−maturity
L−optimum
L−median
L−infinity
L−max
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 16 %
Frequency
0
1000
2000
3000
4000
5000
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) =57,711, n (Sample) = 1,251
Immature (< 22cm): 3%
Small mature (>= 22cm, < 29cm): 34%
Large mature (>= 29cm): 63%
Mega spawner (>= 31.9cm): 48% (subset of large mature fish)
Spawning Potential Ratio: 16 %

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.

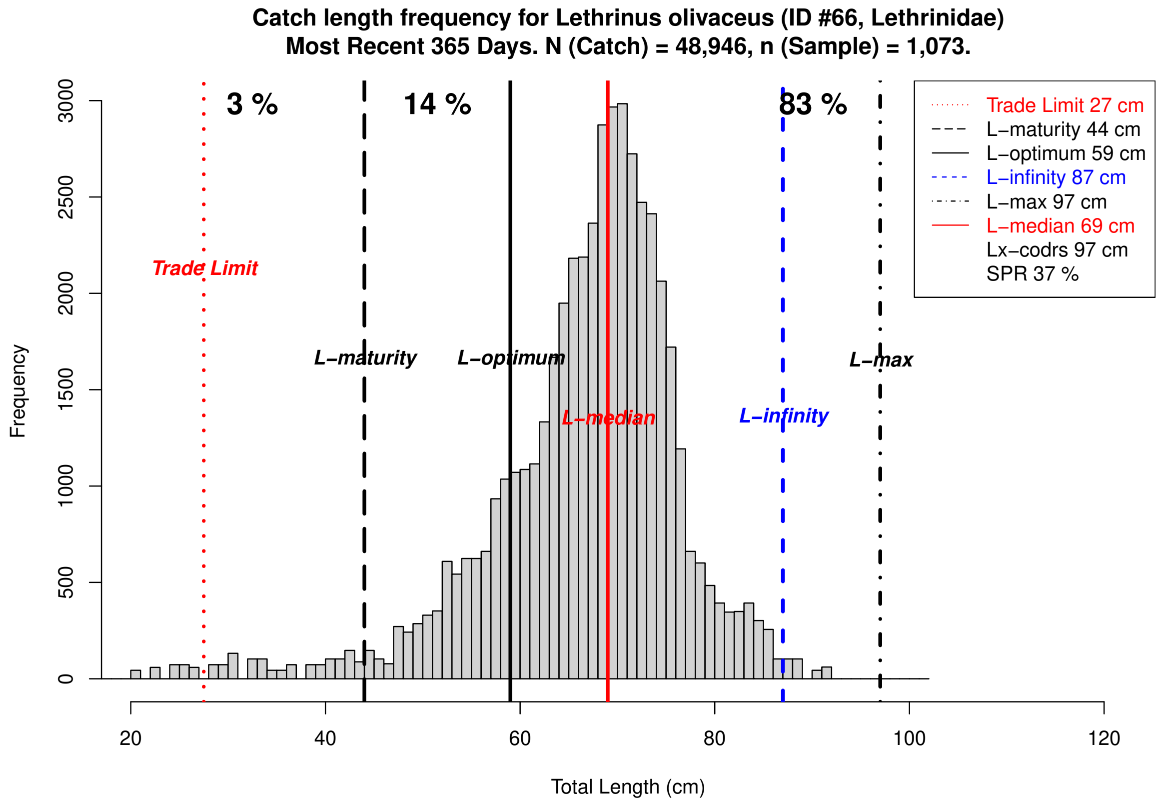
At least 90% of the fish in the catch are mature specimens that have spawned at least once before they were caught. The fishery does not depend on immature size classes for this species and is considered safe for this indicator. This fishery will not be causing overfishing through over harvesting of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

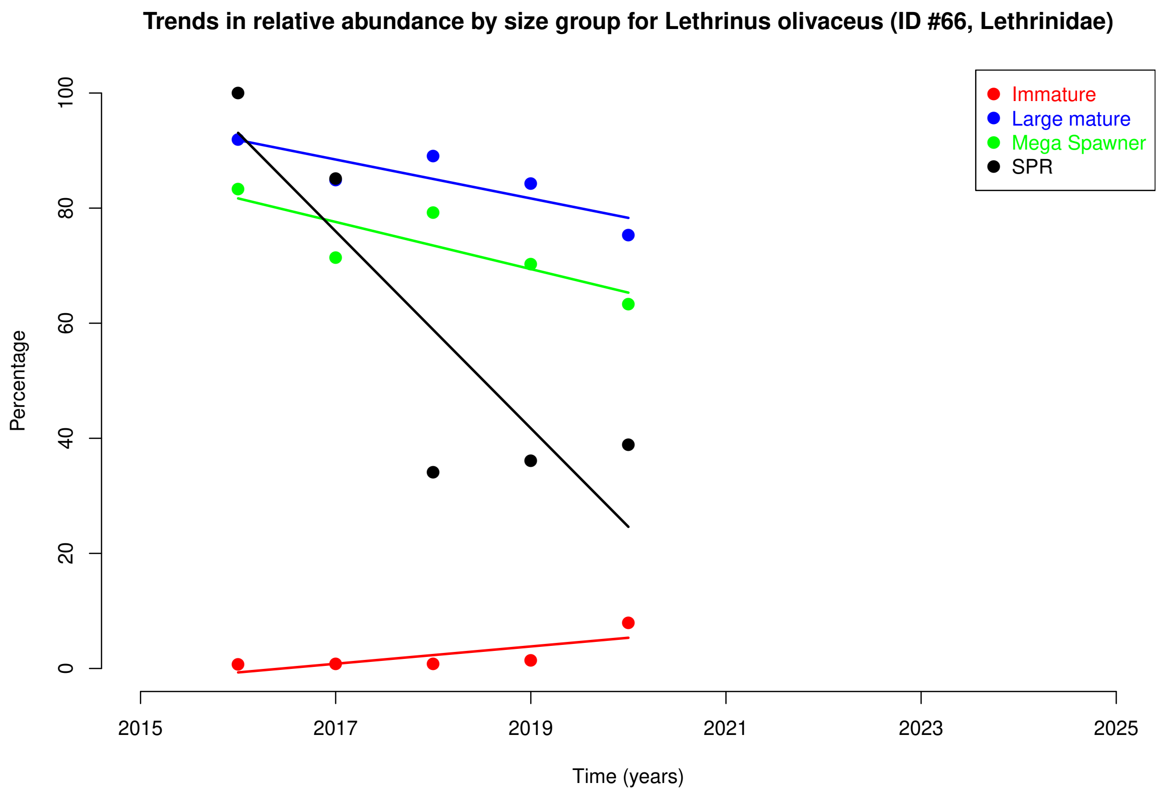
The majority of the catch consists of size classes around or above the optimum harvest size. This means that the impact of the fishery is minimized for this species. Potentially higher yields of this species could be achieved by catching them at somewhat smaller size, although capture of smaller specimen 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 less than 25%. The fishery probably over-exploits the stock, and there is a substantial risk that the fishery will cause severe decline of the stock if fishing effort is not reduced. Risk level is high.

Trends in relative abundance by size group for Epinephelus areolatus (ID #45, Epinephelidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature rising over recent years, situation deteriorating. P: 0.014
% Large Mature falling over recent years, situation deteriorating. P: 0.017
% Mega Spawner falling over recent years, situation deteriorating. P: 0.017
% SPR falling over recent years, situation deteriorating. P: 0.143


Catch length frequency for Lethrinus olivaceus (ID #66, Lethrinidae)
Most Recent 365 Days. N (Catch) = 48,946, n (Sample) = 1,073.
3 %
14 %
83 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
Trade Limit 27 cm
L–maturity 44 cm
L–optimum 59 cm
L–infinity 87 cm
L–max 97 cm
L–median 69 cm
Lx–codrs 97 cm
SPR 37 %
Frequency
Total Length (cm)


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

The percentages of Lethrinus olivaceus (ID #66, Lethrinidae) in most recent 365 days.
N (Catch) =48,946, n (Sample) = 1,073
Immature (< 44cm): 3%
Small mature (>= 44cm, < 59cm): 14%
Large mature (>= 59cm): 83%
Mega spawner (>= 64.9cm): 70% (subset of large mature fish)
Spawning Potential Ratio: 37 %

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.

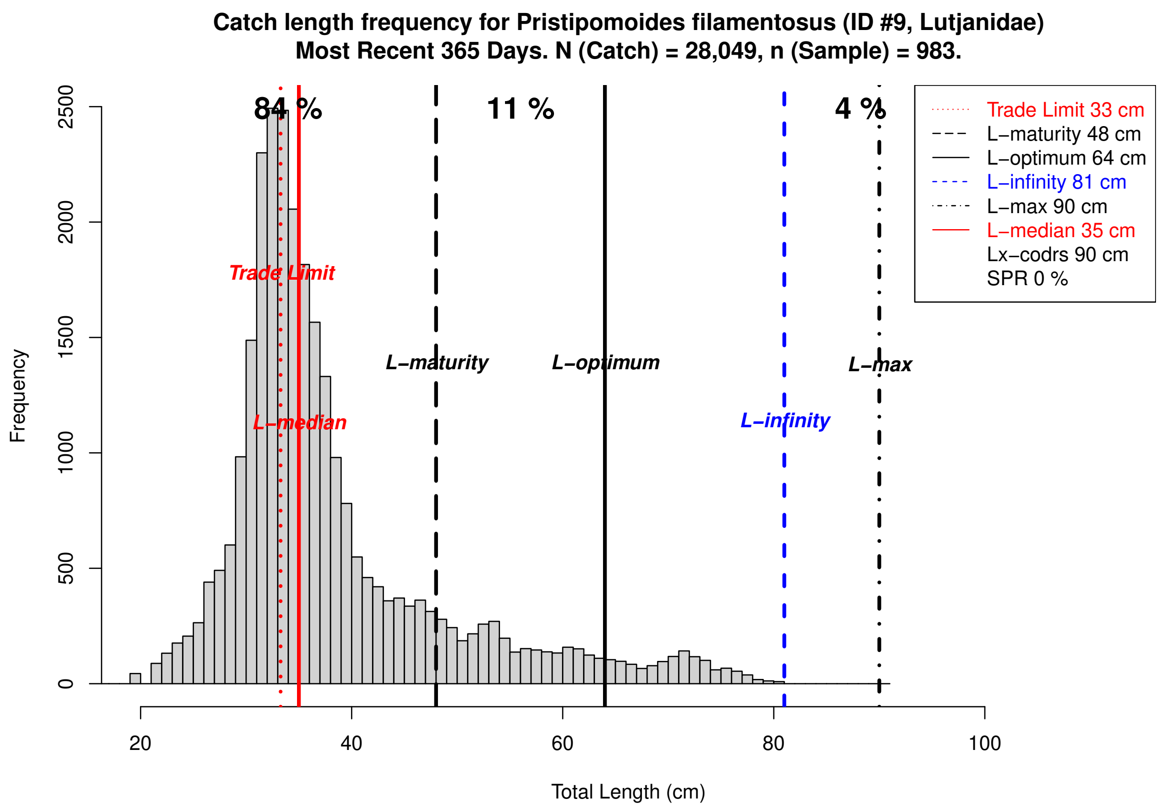
At least 90% of the fish in the catch are mature specimens that have spawned at least once before they were caught. The fishery does not depend on immature size classes for this species and is considered safe for this indicator. This fishery will not be causing overfishing through over harvesting of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

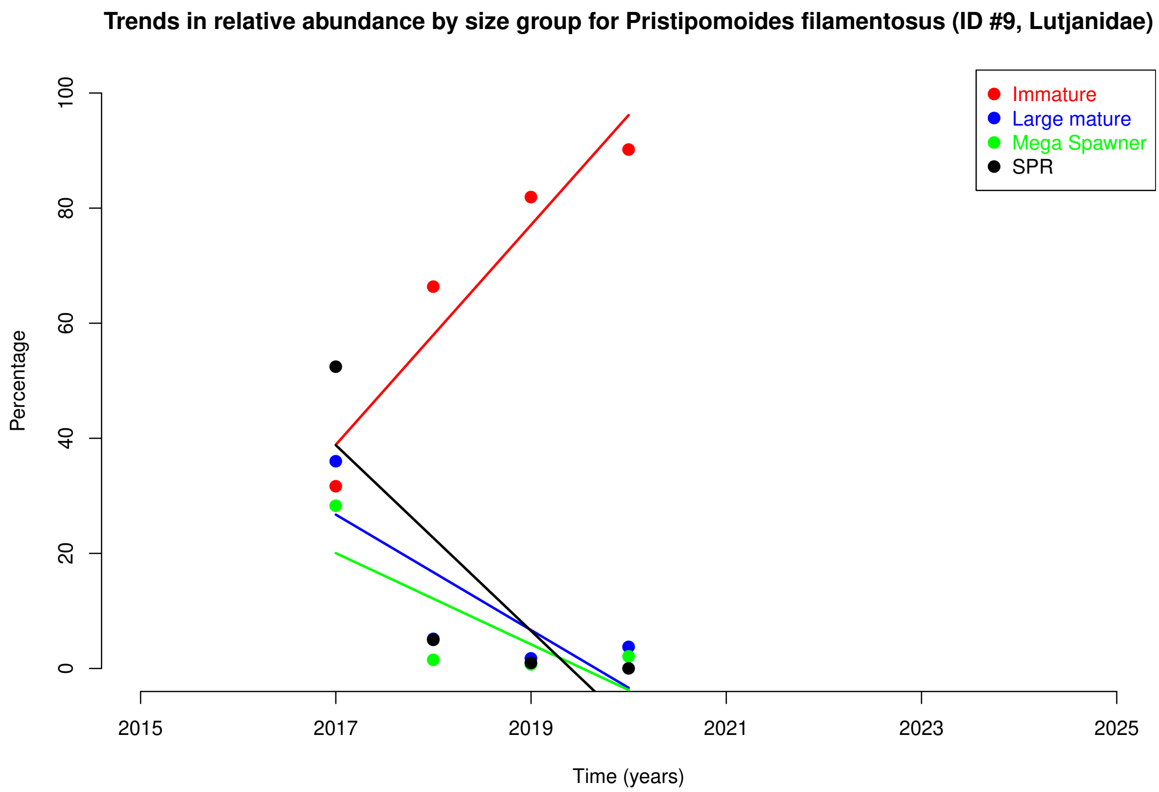
The majority of the catch consists of size classes around or above the optimum harvest size. This means that the impact of the fishery is minimized for this species. Potentially higher yields of this species could be achieved by catching them at somewhat smaller size, although capture of smaller specimen 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 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 olivaceus (ID #66, Lethrinidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature rising over recent years, situation deteriorating. P: 0.135
% Large Mature falling over recent years, situation deteriorating. P: 0.069
% Mega Spawner falling over recent years, situation deteriorating. P: 0.085
% SPR falling over recent years, situation deteriorating. P: 0.058


Catch length frequency for Pristipomoides filamentosus (ID #9, Lutjanidae)
Most Recent 365 Days. N (Catch) = 28,049, n (Sample) = 983.
84 %
11 %
4 %
Trade Limit 33 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 0 %
Trade Limit
L−maturity
L−optimum
L−max
L−median
L−infinity
Frequency
0
500
1000
1500
2000
2500
20
40
60
80
100
Total Length (cm)


Trends in relative abundance by size group for Pristipomoides filamentosus (ID #9, 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 filamentosus (ID #9, Lutjanidae) in most recent 365 days.
N (Catch) =28,049, n (Sample) = 983
Immature (< 48cm): 84%
Small mature (>= 48cm, < 64cm): 11%
Large mature (>= 64cm): 4%
Mega spawner (>= 70.4cm): 3% (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.

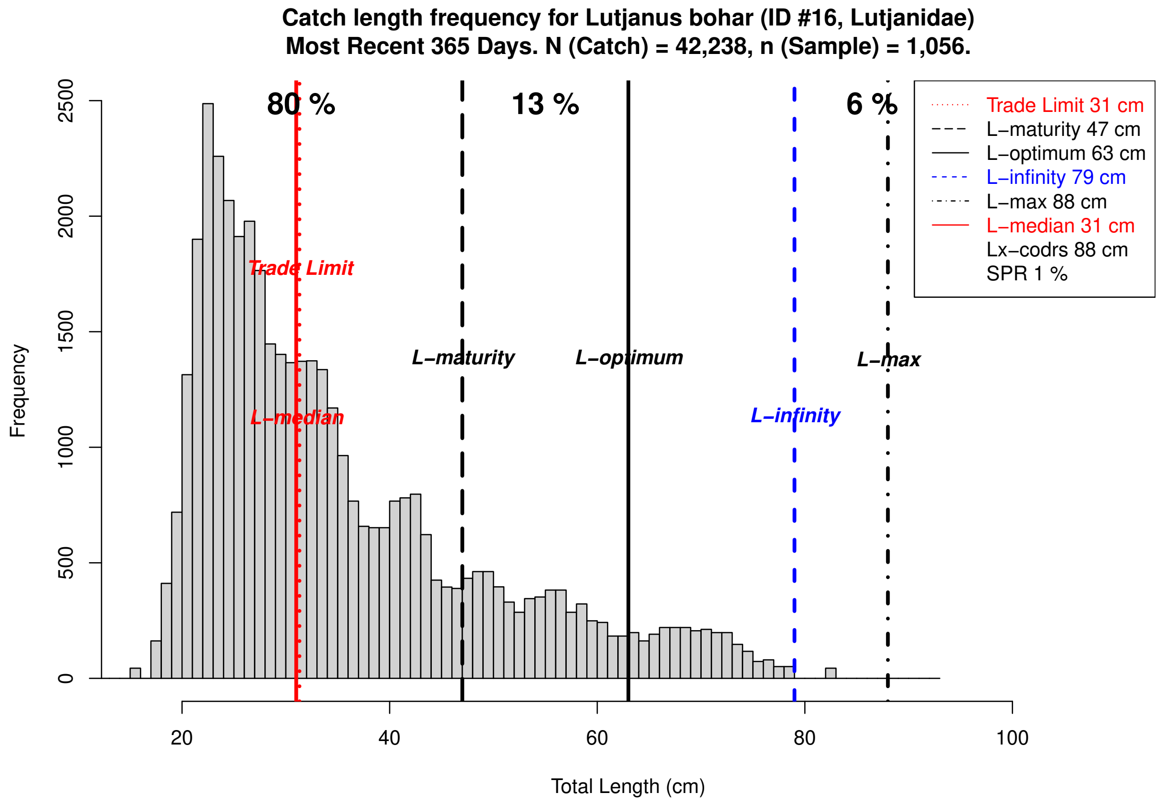
The majority of the fish in the catch have not had a chance to reproduce before capture. This fishery is most likely overfished already if fishing mortality is high for all size classes in the population. An immediate shift away from targeting juvenile fish and a reduction in overall fishing pressure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

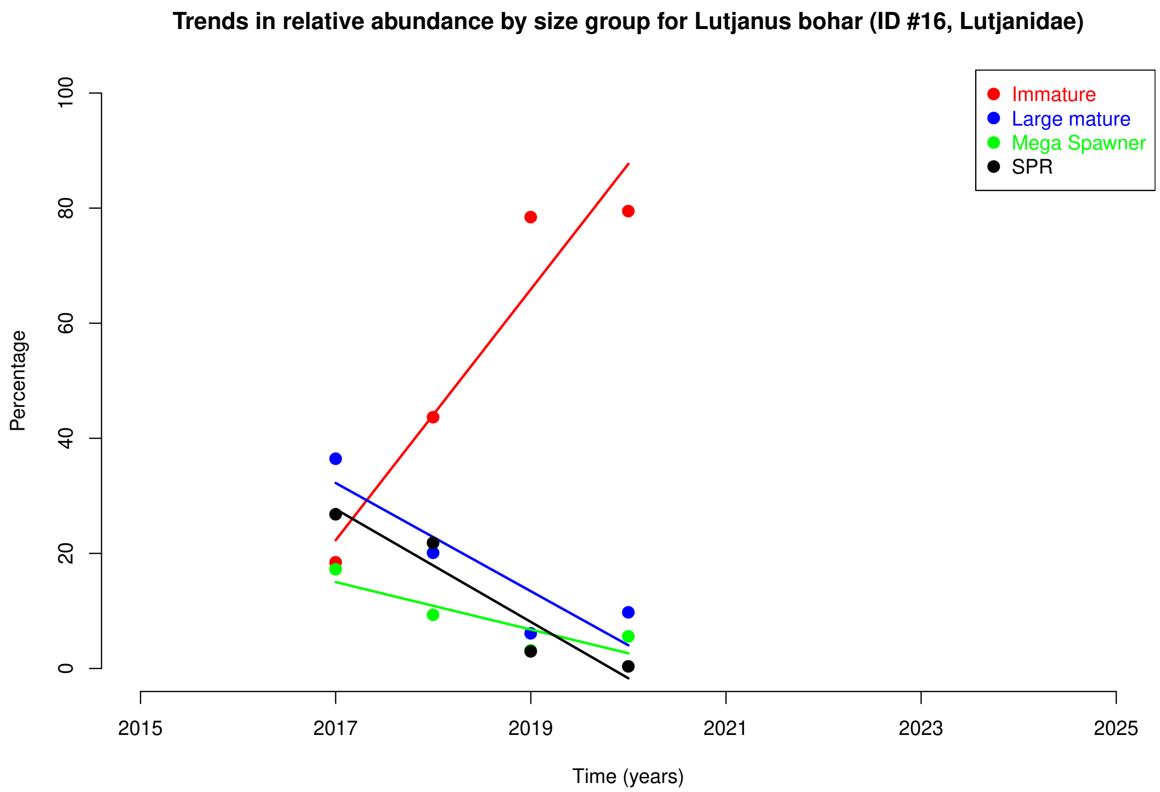
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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 Pristipomoides filamentosus (ID #9, 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: 0.046
% Large Mature falling over recent years, situation deteriorating. P: 0.206
% Mega Spawner falling over recent years, situation deteriorating. P: 0.236
% SPR falling over recent years, situation deteriorating. P: 0.178


Catch length frequency for Lutjanus bohar (ID #16, Lutjanidae)
Most Recent 365 Days. N (Catch) = 42,238, n (Sample) = 1,056.
80 %
13 %
6 %
Trade Limit 31 cm
L−maturity 47 cm
L−optimum 63 cm
L−infinity 79 cm
L−max 88 cm
L−median 31 cm
Lx−codrs 88 cm
SPR 1 %
Trade Limit
L−maturity
L−optimum
L−max
L−median
L−infinity
Frequency
Total Length (cm)


Trends in relative abundance by size group for Lutjanus bohar (ID #16, Lutjanidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
Time (years)

The percentages of Lutjanus bohar (ID #16, Lutjanidae) in most recent 365 days.
N (Catch) =42,238, n (Sample) = 1,056
Immature (< 47cm): 80%
Small mature (>= 47cm, < 63cm): 13%
Large mature (>= 63cm): 6%
Mega spawner (>= 69.3cm): 3% (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.

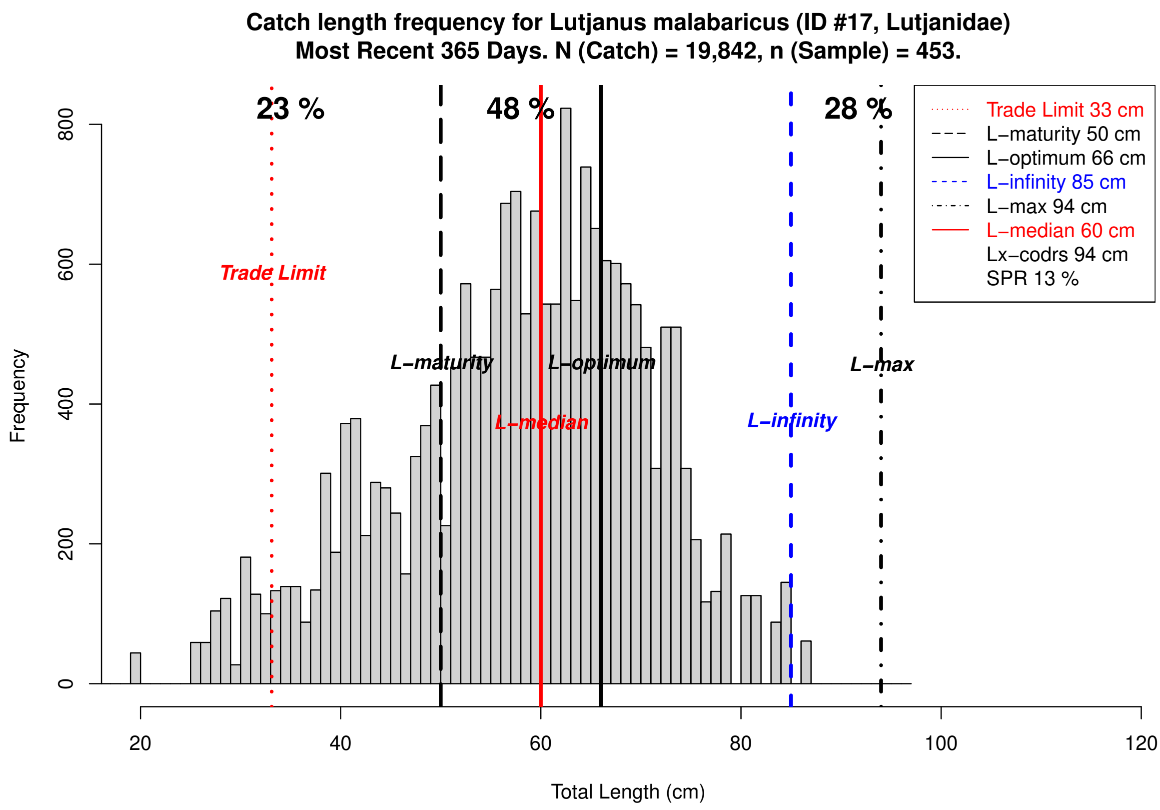
The majority of the fish in the catch have not had a chance to reproduce before capture. This fishery is most likely overfished already if fishing mortality is high for all size classes in the population. An immediate shift away from targeting juvenile fish and a reduction in overall fishing pressure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

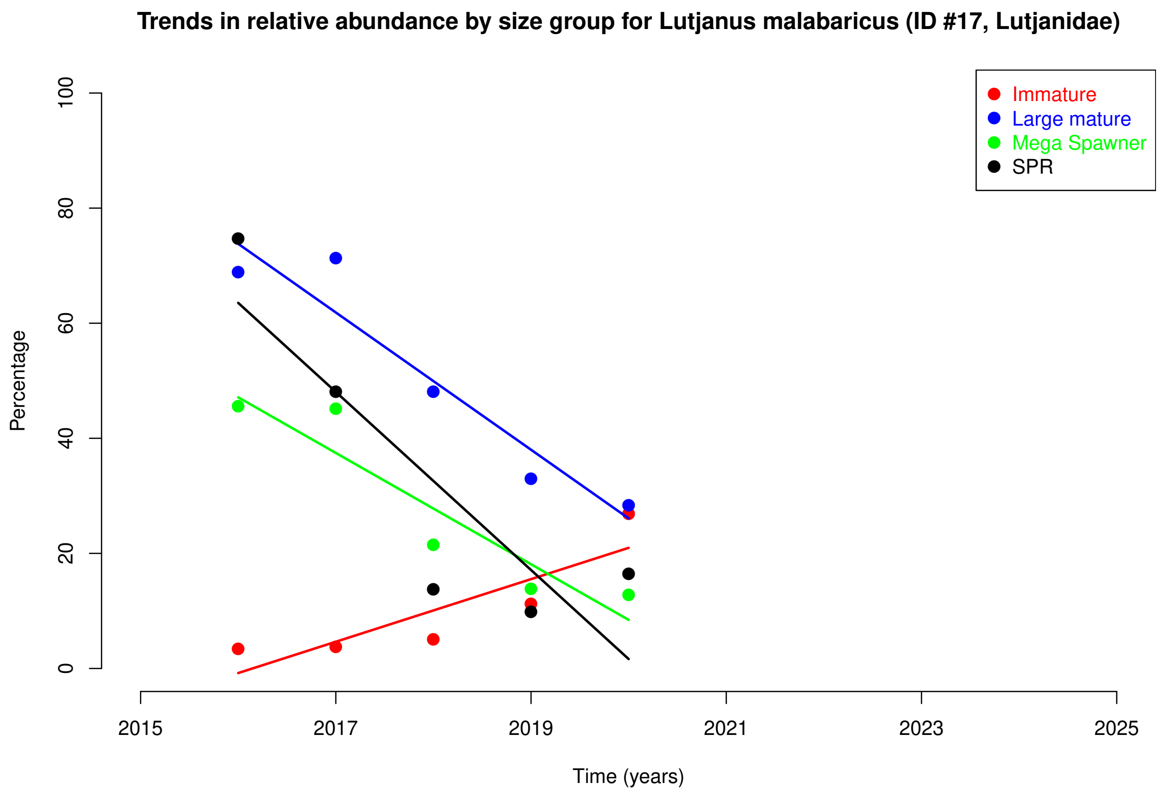
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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 bohar (ID #16, Lutjanidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature rising over recent years, situation deteriorating. P: 0.047
% Large Mature falling over recent years, situation deteriorating. P: 0.106
% Mega Spawner falling over recent years, situation deteriorating. P: 0.137
% SPR falling over recent years, situation deteriorating. P: 0.046


Catch length frequency for Lutjanus malabaricus (ID #17, Lutjanidae)
Most Recent 365 Days. N (Catch) = 19,842, n (Sample) = 453.
23 %
48 %
28 %
Trade Limit 33 cm
L−maturity 50 cm
L−optimum 66 cm
L−infinity 85 cm
L−max 94 cm
L−median 60 cm
Lx−codrs 94 cm
SPR 13 %
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 malabaricus (ID #17, Lutjanidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
Time (years)

The percentages of Lutjanus malabaricus (ID #17, Lutjanidae) in most recent 365 days.
N (Catch) =19,842, n (Sample) = 453
Immature (< 50cm): 23%
Small mature (>= 50cm, < 66cm): 48%
Large mature (>= 66cm): 28%
Mega spawner (>= 72.6cm): 13% (subset of large mature fish)
Spawning Potential Ratio: 13 %

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.

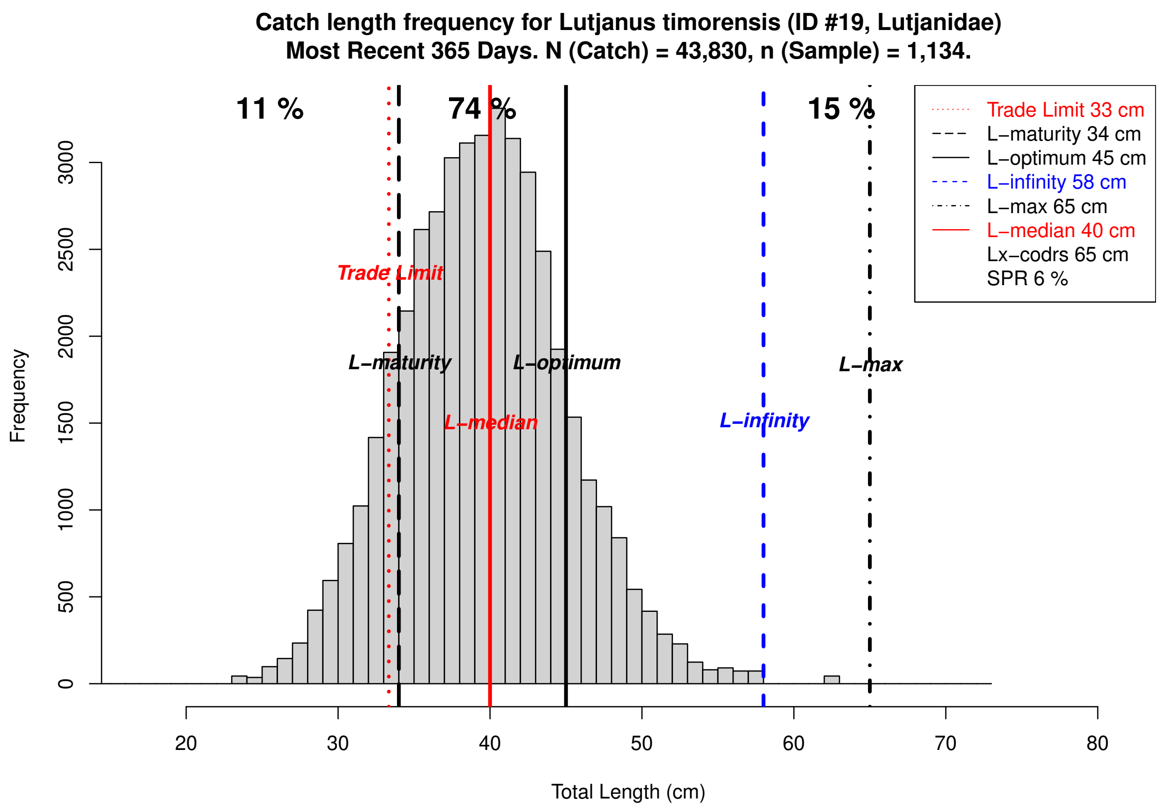
Between 20% and 30% of the fish in the catch are specimens that have not yet reproduced. This is reason for concern in terms of potential overfishing through overharvesting of juveniles, if fishing pressure is high and percentages immature fish would further rise. Targeting larger fish and avoiding small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

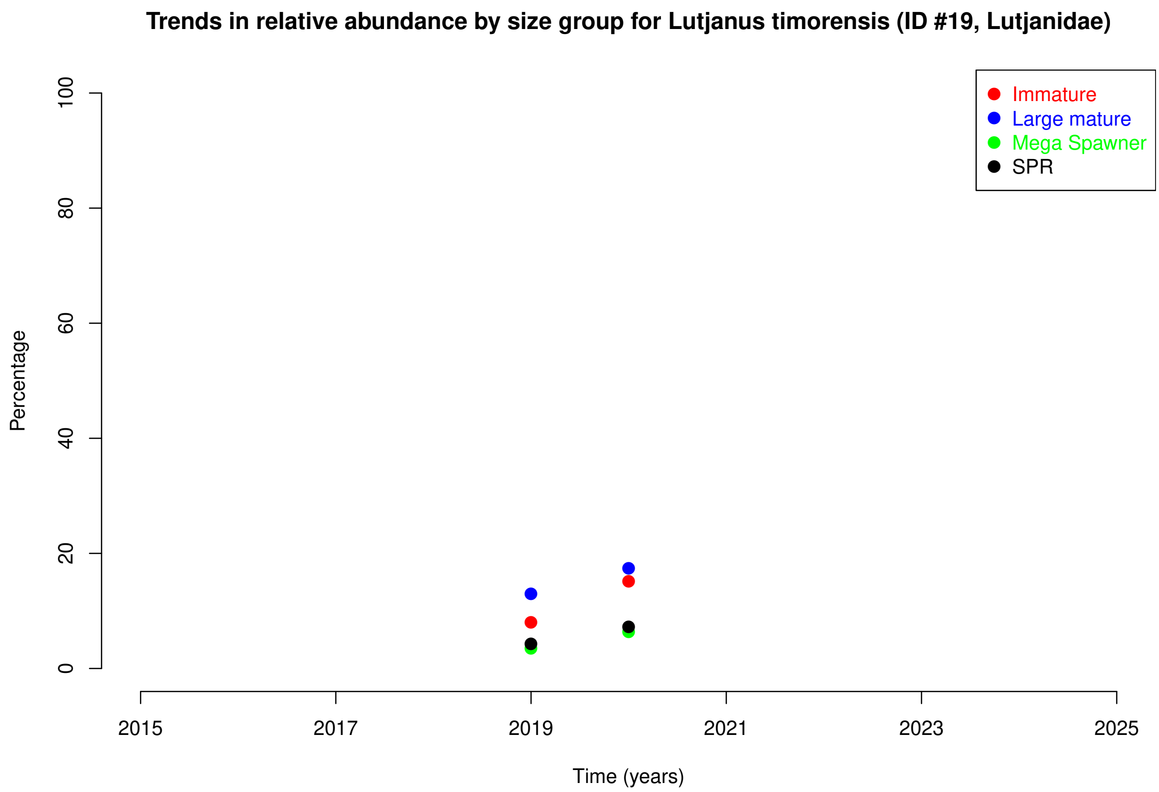
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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 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: 0.057
% Large Mature falling over recent years, situation deteriorating. P: 0.013
% Mega Spawner falling over recent years, situation deteriorating. P: 0.021
% SPR falling over recent years, situation deteriorating. P: 0.053


Catch length frequency for Lutjanus timorensis (ID #19, Lutjanidae)
Most Recent 365 Days. N (Catch) = 43,830, n (Sample) = 1,134.
11 %
74 %
15 %
Trade Limit 33 cm
L–maturity 34 cm
L–optimum 45 cm
L–infinity 58 cm
L–max 65 cm
L–median 40 cm
Lx–codrs 65 cm
SPR 6 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
Frequency
Total Length (cm)


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

The percentages of Lutjanus timorensis (ID #19, Lutjanidae) in most recent 365 days.
N (Catch) =43,830, n (Sample) = 1,134
Immature (< 34cm): 11%
Small mature (>= 34cm, < 45cm): 74%
Large mature (>= 45cm): 15%
Mega spawner (>= 49.5cm): 4% (subset of large mature fish)
Spawning Potential Ratio: 6 %

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.

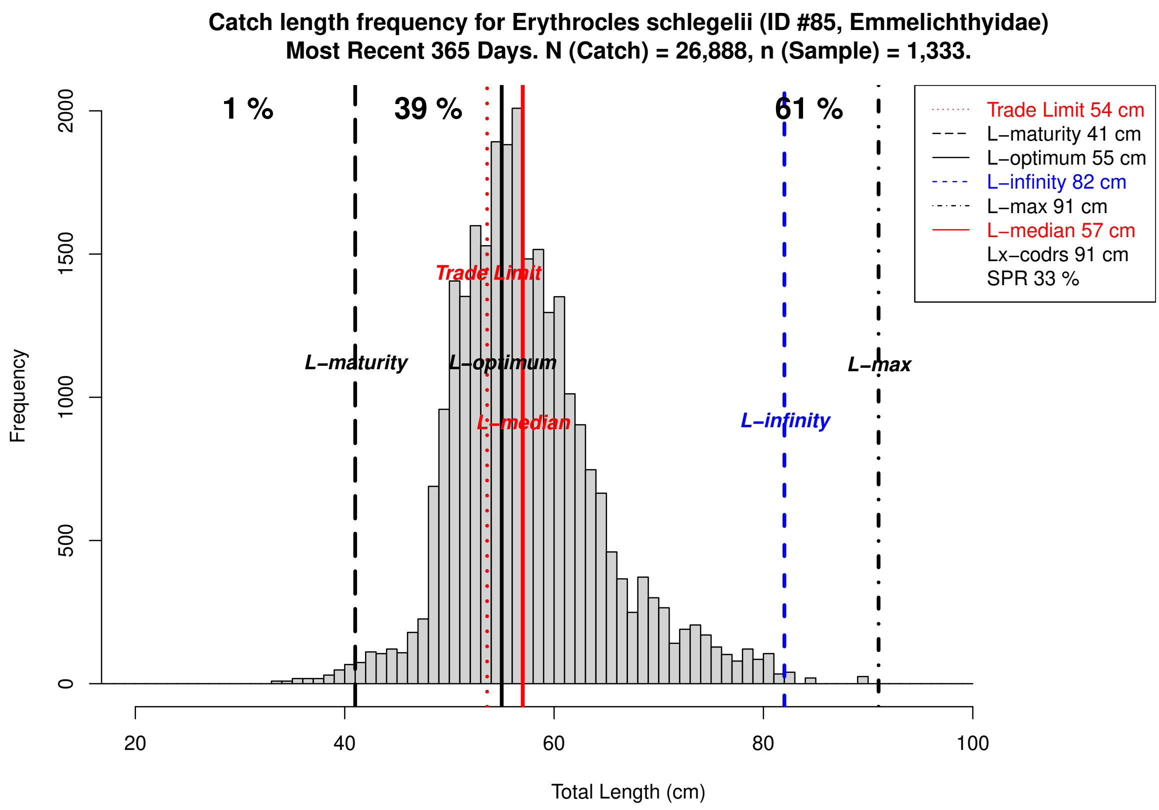
Between 10% and 20% of the fish in the catch are juveniles that have not yet reproduced. There is no immediate concern in terms of overfishing through over harvesting of juveniles, but the fishery needs to be monitored closely for any further increase in this indicator and incentives need to be geared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

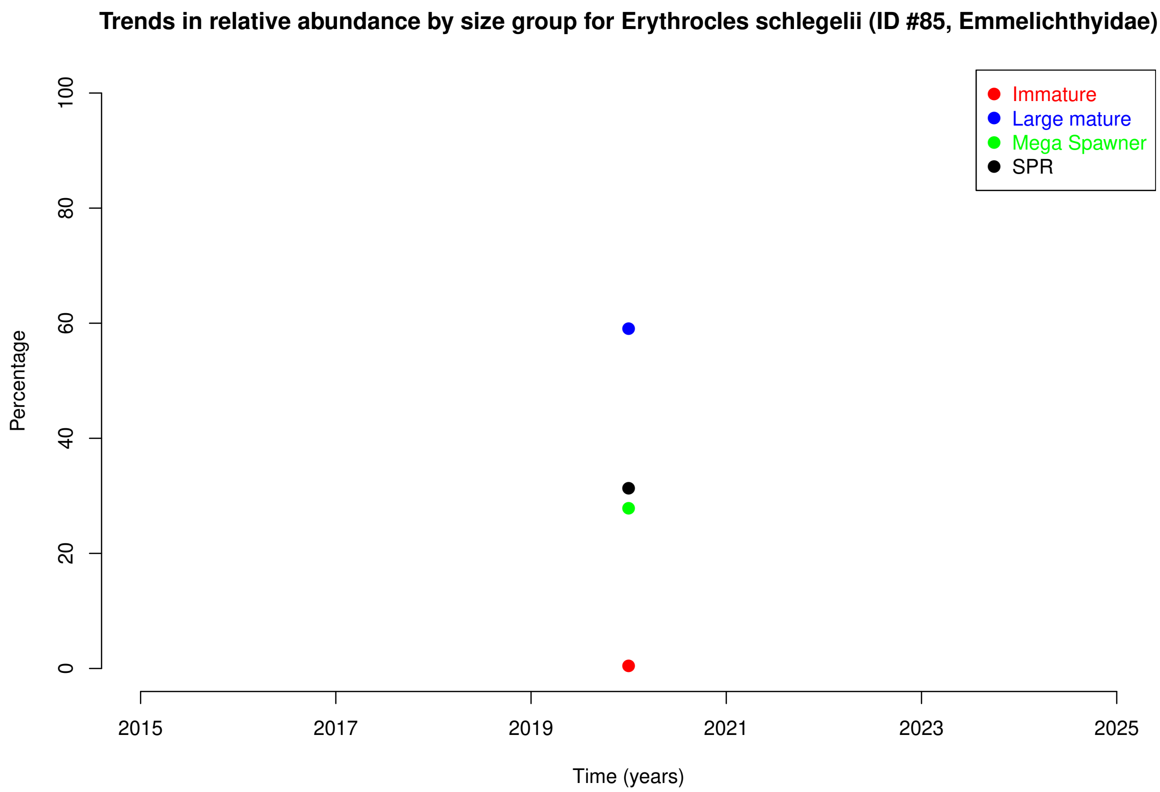
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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

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

Trends in relative abundance by size group for Lutjanus timorensis (ID #19, Lutjanidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature trend not available.
% Large Mature trend not available.
% Mega Spawner trend not available.
% SPR trend not available.


Catch length frequency for Erythrocles schlegelii (ID #85, Emmelichthyidae)
Most Recent 365 Days. N (Catch) = 26,888, n (Sample) = 1,333.
1 %
39 %
61 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
Trade Limit 54 cm
L–maturity 41 cm
L–optimum 55 cm
L–infinity 82 cm
L–max 91 cm
L–median 57 cm
Lx–codrs 91 cm
SPR 33 %
Frequency
0
500
1000
1500
2000
20
40
60
80
100
Total Length (cm)


Trends in relative abundance by size group for Erythrocles schlegelii (ID #85, Emmelichthyidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
0
20
40
60
80
100
2015
2017
2019
2021
2023
2025
Time (years)

The percentages of Erythrocles schlegelii (ID #85, Emmelichthyidae) in most recent 365 days.
N (Catch) =26,888, n (Sample) = 1,333
Immature (< 41cm): 1%
Small mature (>= 41cm, < 55cm): 39%
Large mature (>= 55cm): 61%
Mega spawner (>= 60.5cm): 30% (subset of large mature fish)
Spawning Potential Ratio: 33 %

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.

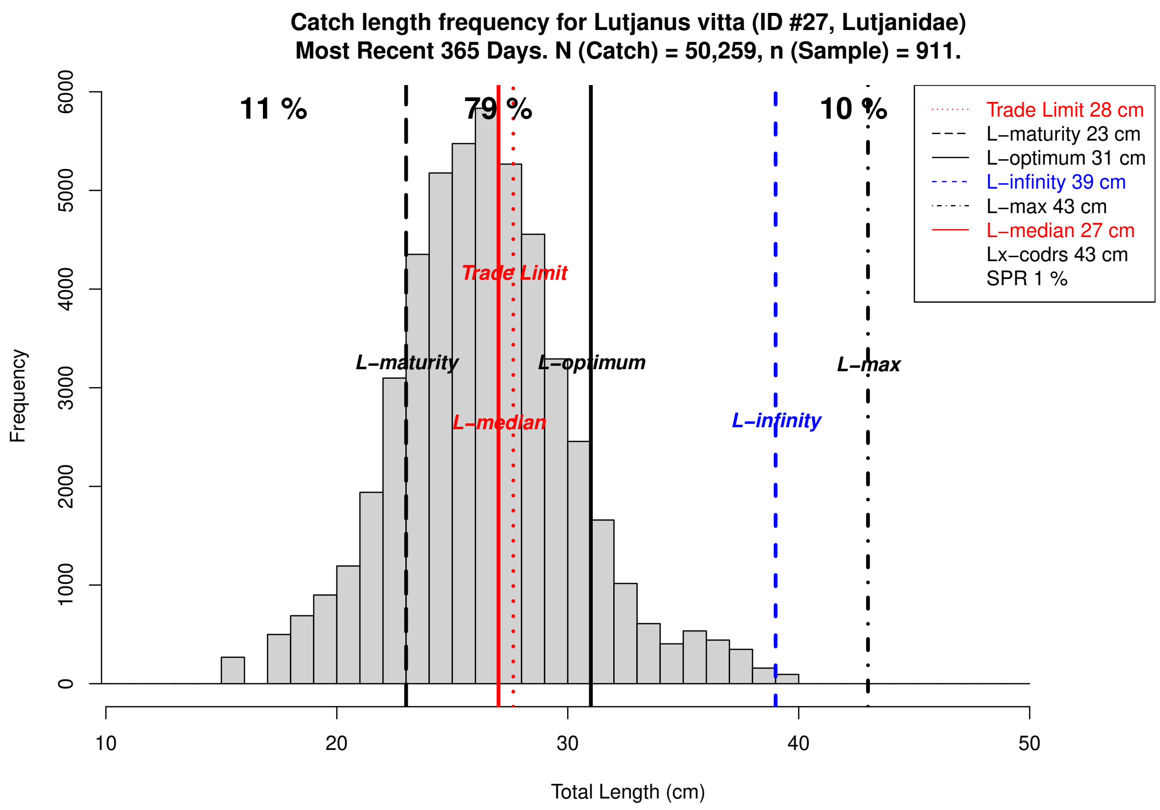
At least 90% of the fish in the catch are mature specimens that have spawned at least once before they were caught. The fishery does not depend on immature size classes for this species and is considered safe for this indicator. This fishery will not be causing overfishing through over harvesting of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

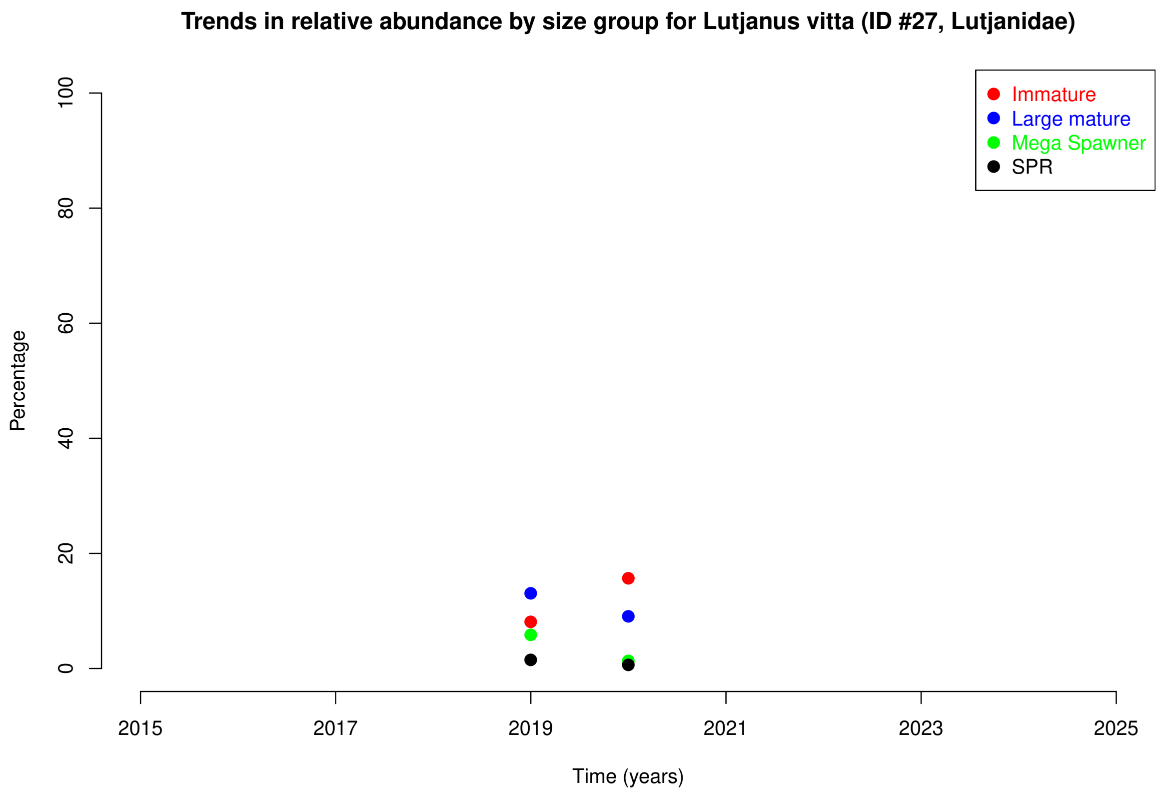
The majority of the catch consists of size classes around or above the optimum harvest size. This means that the impact of the fishery is minimized for this species. Potentially higher yields of this species could be achieved by catching them at somewhat smaller size, although capture of smaller specimen 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 Erythrocles schlegelii (ID #85, Emmelichthyidae), 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.


Catch length frequency for Lutjanus vitta (ID #27, Lutjanidae)
Most Recent 365 Days. N (Catch) = 50,259, n (Sample) = 911.
11 %
79 %
10 %
Trade Limit 28 cm
L–maturity 23 cm
L–optimum 31 cm
L–infinity 39 cm
L–max 43 cm
L–median 27 cm
Lx–codrs 43 cm
SPR 1 %
Trade Limit
L–maturity
L–optimum
L–max
L–median
L–infinity
Frequency
Total Length (cm)


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

The percentages of Lutjanus vitta (ID #27, Lutjanidae) in most recent 365 days.
N (Catch) =50,259, n (Sample) = 911
Immature (< 23cm): 11%
Small mature (>= 23cm, < 31cm): 79%
Large mature (>= 31cm): 10%
Mega spawner (>= 34.1cm): 4% (subset of large mature fish)
Spawning Potential Ratio: 1 %

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

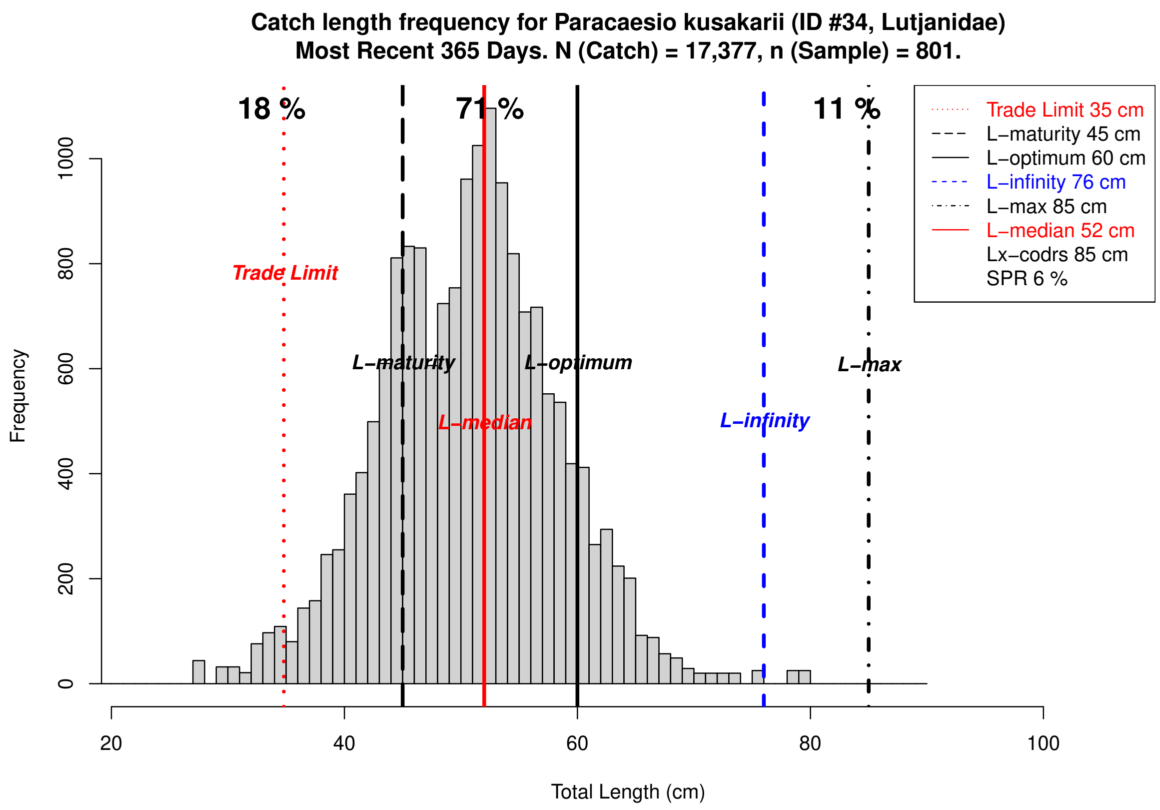
Between 10% and 20% of the fish in the catch are juveniles that have not yet reproduced. There is no immediate concern in terms of overfishing through over harvesting of juveniles, but the fishery needs to be monitored closely for any further increase in this indicator and incentives need to be geared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

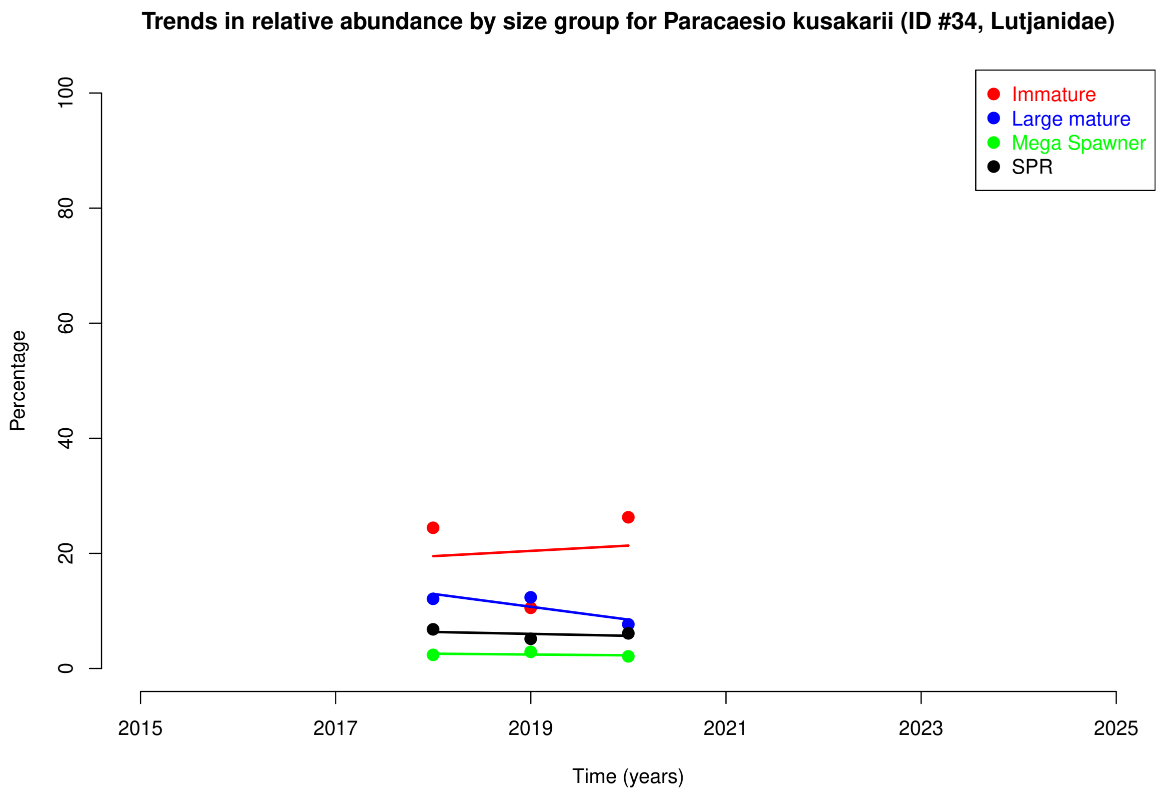
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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 trend not available.
% Large Mature trend not available.
% Mega Spawner trend not available.
% SPR trend not available.


Catch length frequency for Paracaesio kusakarii (ID #34, Lutjanidae)
Most Recent 365 Days. N (Catch) = 17,377, n (Sample) = 801.
18 %
71 %
11 %
Trade Limit 35 cm
L−maturity 45 cm
L−optimum 60 cm
L−infinity 76 cm
L−max 85 cm
L−median 52 cm
Lx−codrs 85 cm
SPR 6 %
Trade Limit
L−maturity
L−optimum
L−max
L−median
L−infinity
Frequency
0
200
400
600
800
1000
20
40
60
80
100
Total Length (cm)


Trends in relative abundance by size group for Paracaesio kusakarii (ID #34, 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 Paracaesio kusakarii (ID #34, Lutjanidae) in most recent 365 days.
N (Catch) =17,377, n (Sample) = 801
Immature (< 45cm): 18%
Small mature (>= 45cm, < 60cm): 71%
Large mature (>= 60cm): 11%
Mega spawner (>= 66cm): 3% (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.

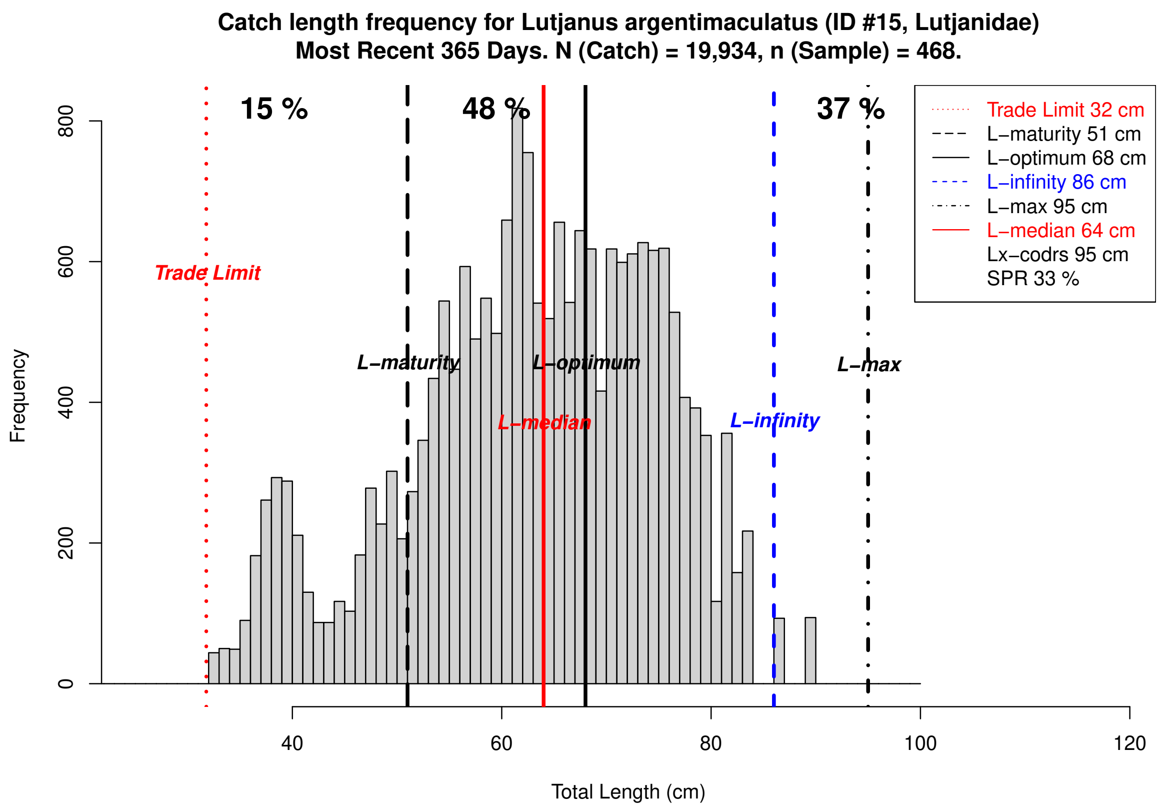
Between 10% and 20% of the fish in the catch are juveniles that have not yet reproduced. There is no immediate concern in terms of overfishing through over harvesting of juveniles, but the fishery needs to be monitored closely for any further increase in this indicator and incentives need to be geared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

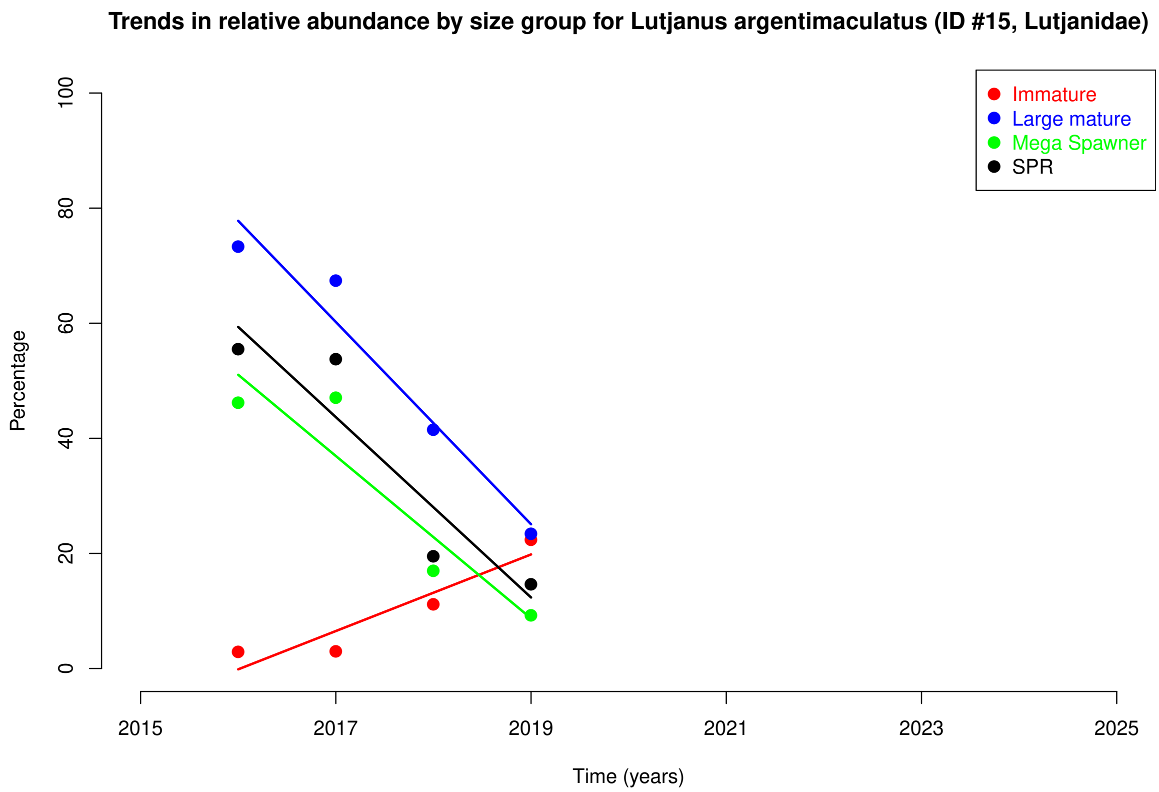
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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 Paracaesio kusakarii (ID #34, 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: 0.932
% Large Mature falling over recent years, situation deteriorating. P: 0.357
% Mega Spawner falling over recent years, situation deteriorating. P: 0.775
% SPR falling over recent years, situation deteriorating. P: 0.729


Catch length frequency for Lutjanus argentimaculatus (ID #15, Lutjanidae)
Most Recent 365 Days. N (Catch) = 19,934, n (Sample) = 468.
15 %
48 %
37 %
Trade Limit
L−maturity
L−optimum
L−median
L−infinity
L−max
Trade Limit 32 cm
L−maturity 51 cm
L−optimum 68 cm
L−infinity 86 cm
L−max 95 cm
L−median 64 cm
Lx−codrs 95 cm
SPR 33 %
Frequency
Total Length (cm)


Trends in relative abundance by size group for Lutjanus argentimaculatus (ID #15, Lutjanidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
Time (years)

The percentages of Lutjanus argentimaculatus (ID #15, Lutjanidae) in most recent 365 days.
N (Catch) =19,934, n (Sample) = 468
Immature (< 51cm): 15%
Small mature (>= 51cm, < 68cm): 48%
Large mature (>= 68cm): 37%
Mega spawner (>= 74.8cm): 20% (subset of large mature fish)
Spawning Potential Ratio: 33 %

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.

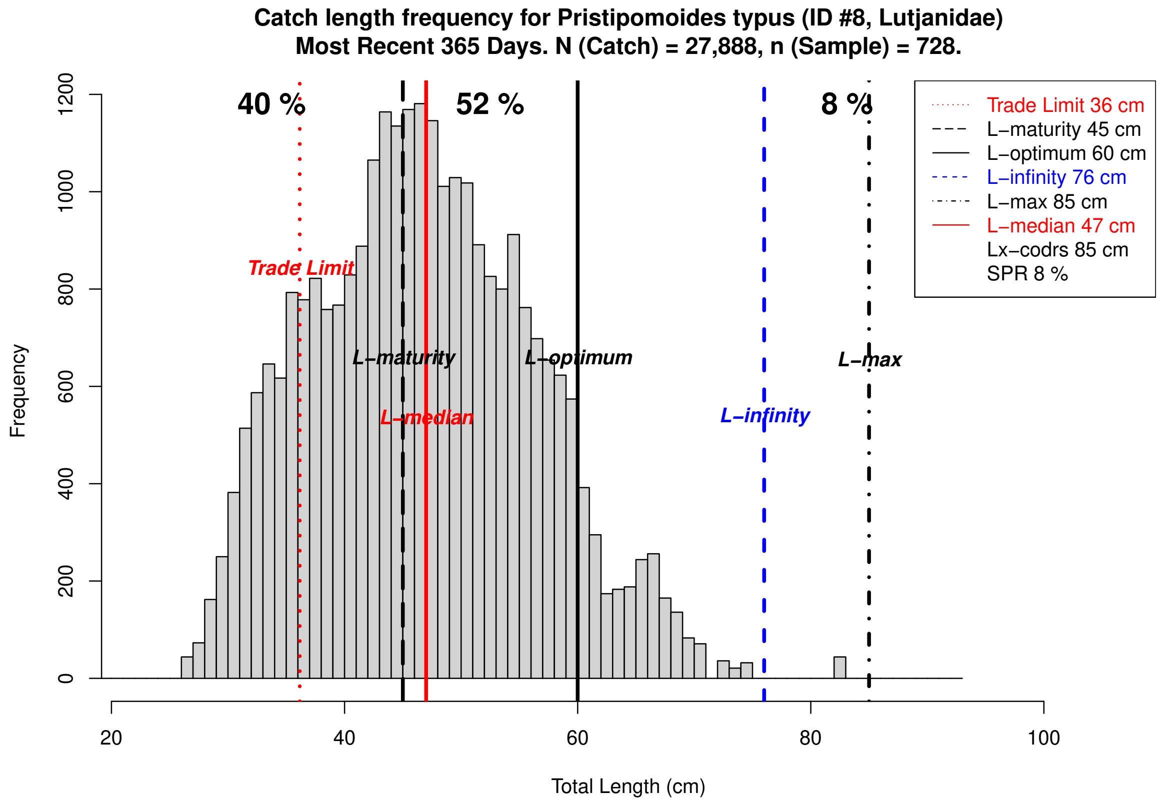
Between 10% and 20% of the fish in the catch are juveniles that have not yet reproduced. There is no immediate concern in terms of overfishing through over harvesting of juveniles, but the fishery needs to be monitored closely for any further increase in this indicator and incentives need to be geared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

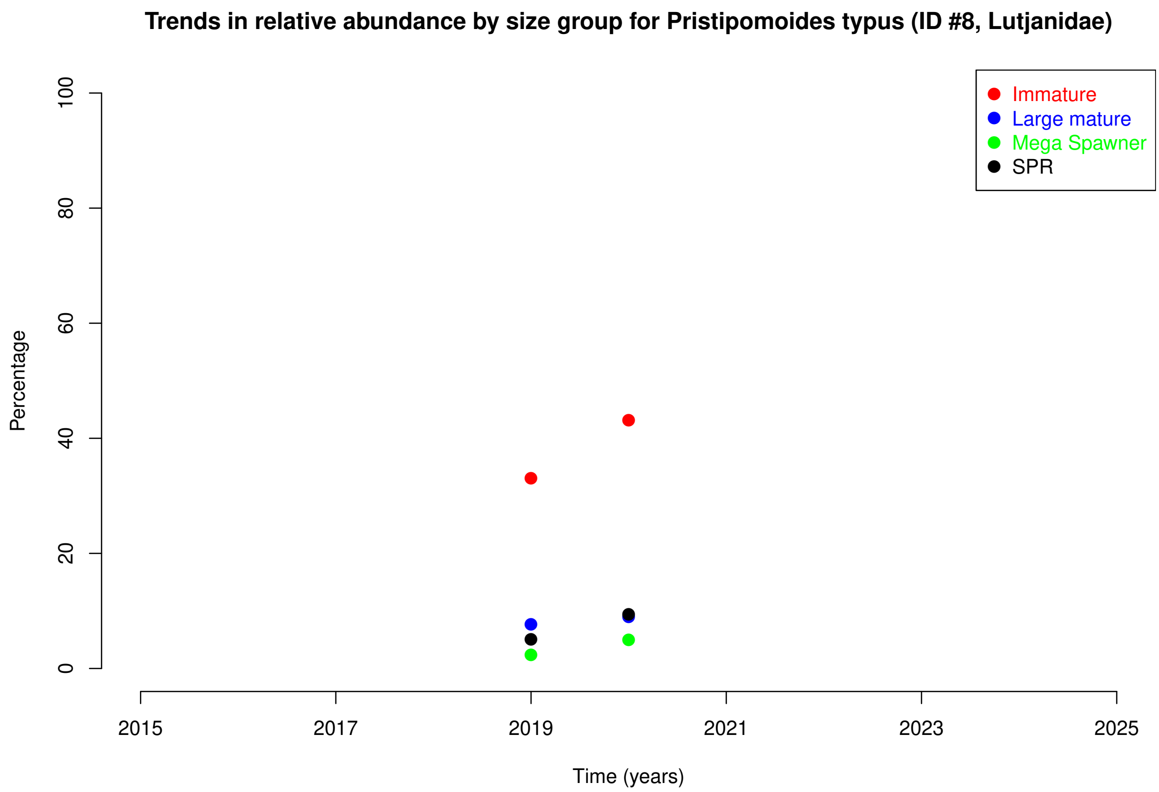
The bulk of the catch includes age groups that have just matured and are about to achieve their full growth potential. This indicates that the fishery is probably at least being fully exploited. Risk level is medium.

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 Lutjanus argentimaculatus (ID #15, 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: 0.066
% Large Mature falling over recent years, situation deteriorating. P: 0.024
% Mega Spawner falling over recent years, situation deteriorating. P: 0.072
% SPR falling over recent years, situation deteriorating. P: 0.071


Catch length frequency for Pristipomoides typus (ID #8, Lutjanidae)
Most Recent 365 Days. N (Catch) = 27,888, n (Sample) = 728.
40 %
52 %
8 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
Trade Limit 36 cm
L–maturity 45 cm
L–optimum 60 cm
L–infinity 76 cm
L–max 85 cm
L–median 47 cm
Lx–codrs 85 cm
SPR 8 %
Frequency
0
200
400
600
800
1000
1200
20
40
60
80
100
Total Length (cm)


Trends in relative abundance by size group for Pristipomoides typus (ID #8, 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 typus (ID #8, Lutjanidae) in most recent 365 days.
N (Catch) =27,888, n (Sample) = 728
Immature (< 45cm): 40%
Small mature (>= 45cm, < 60cm): 52%
Large mature (>= 60cm): 8%
Mega spawner (>= 66cm): 4% (subset of large mature fish)
Spawning Potential Ratio: 8 %

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

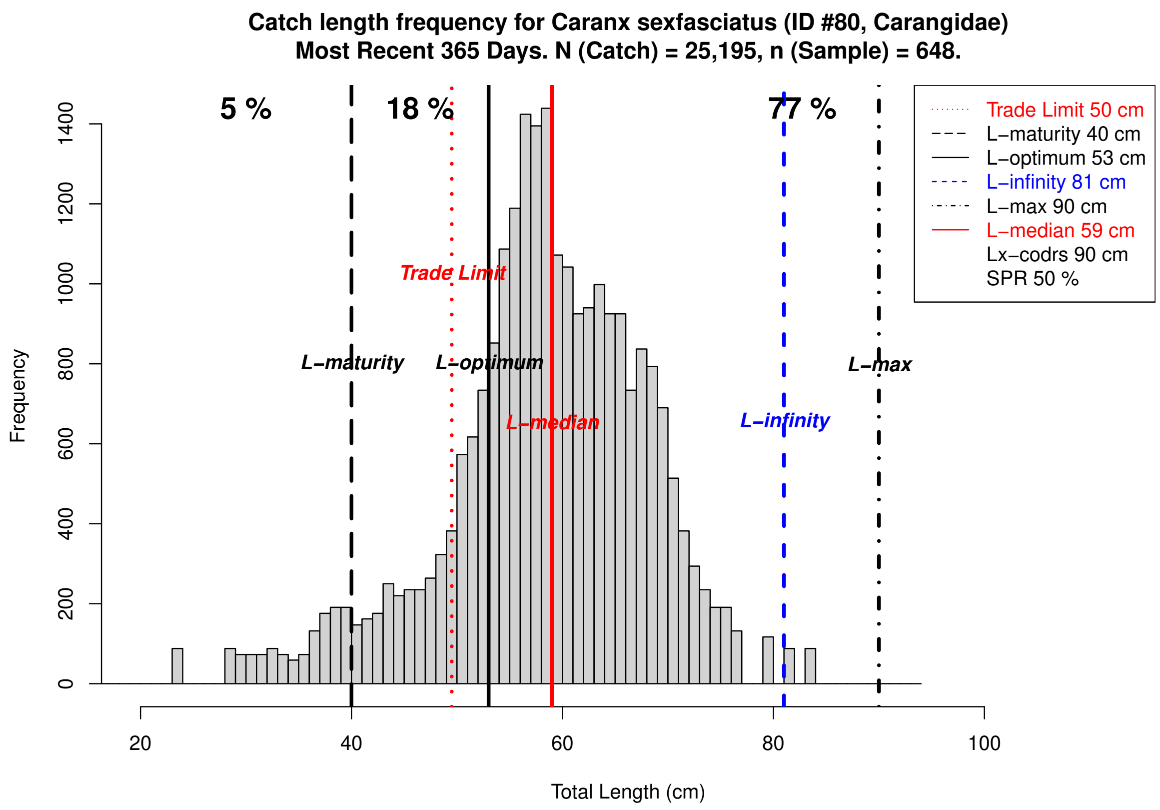
Between 30% and 50% of the fish in the catch are immature and have not had a chance to reproduce before capture. The fishery is in immediate danger of overfishing through overharvesting of juveniles, if fishing pressure is high. Catching small and immature fish needs to be actively avoided and a limit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

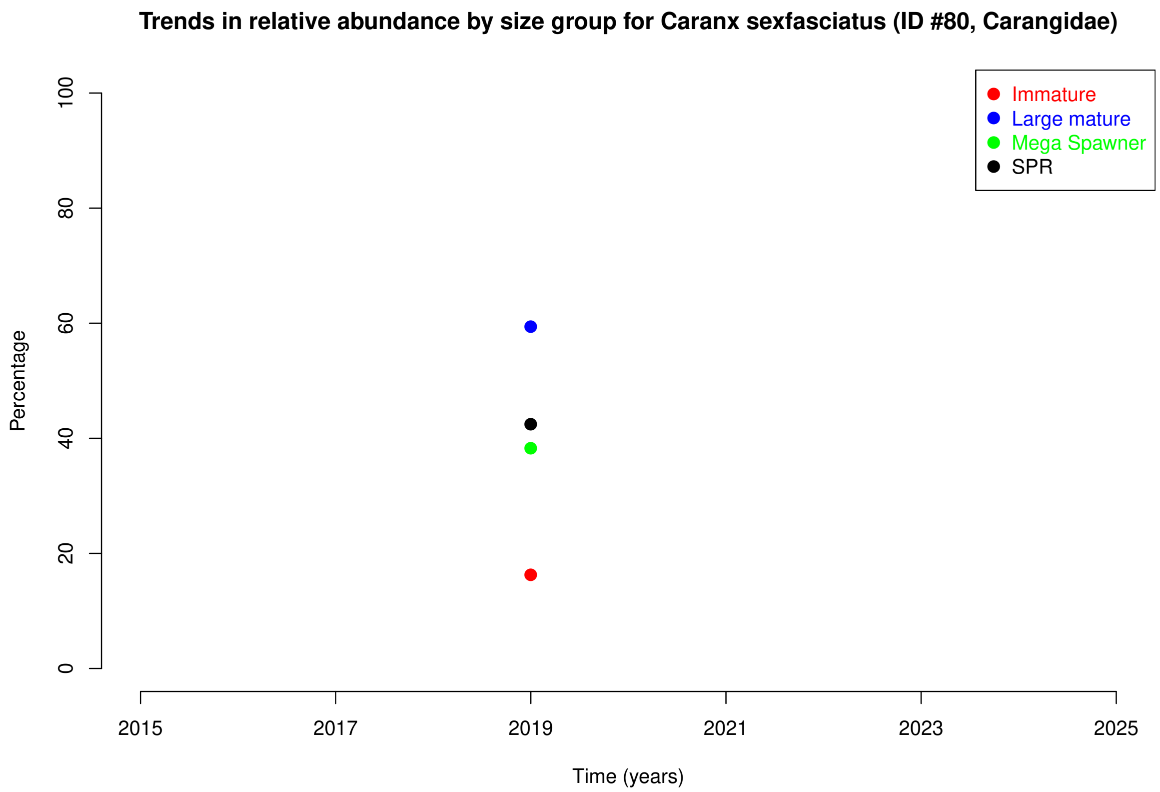
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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

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

Trends in relative abundance by size group for Pristipomoides typus (ID #8, Lutjanidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature trend not available.
% Large Mature trend not available.
% Mega Spawner trend not available.
% SPR trend not available.


Catch length frequency for Caranx sexfasciatus (ID #80, Carangidae)
Most Recent 365 Days. N (Catch) = 25,195, n (Sample) = 648.
5 %
18 %
77 %
Trade Limit
L−maturity
L−optimum
L−median
L−infinity
L−max
Trade Limit 50 cm
L−maturity 40 cm
L−optimum 53 cm
L−infinity 81 cm
L−max 90 cm
L−median 59 cm
Lx−codrs 90 cm
SPR 50 %
Frequency
Total Length (cm)


Trends in relative abundance by size group for Caranx sexfasciatus (ID #80, Carangidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
Time (years)

The percentages of Caranx sexfasciatus (ID #80, Carangidae) in most recent 365 days.
N (Catch) =25,195, n (Sample) = 648
Immature (< 40cm): 5%
Small mature (>= 40cm, < 53cm): 18%
Large mature (>= 53cm): 77%
Mega spawner (>= 58.3cm): 54% (subset of large mature fish)
Spawning Potential Ratio: 50 %

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.

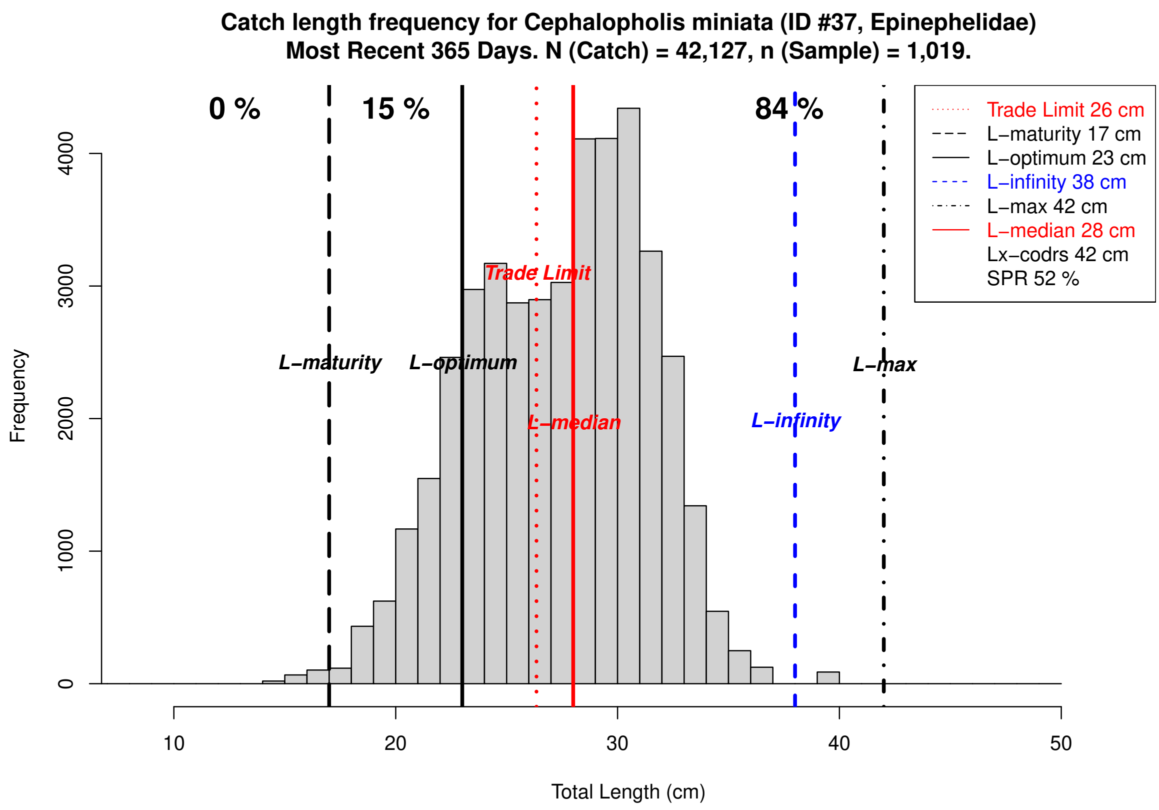
At least 90% of the fish in the catch are mature specimens that have spawned at least once before they were caught. The fishery does not depend on immature size classes for this species and is considered safe for this indicator. This fishery will not be causing overfishing through over harvesting of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

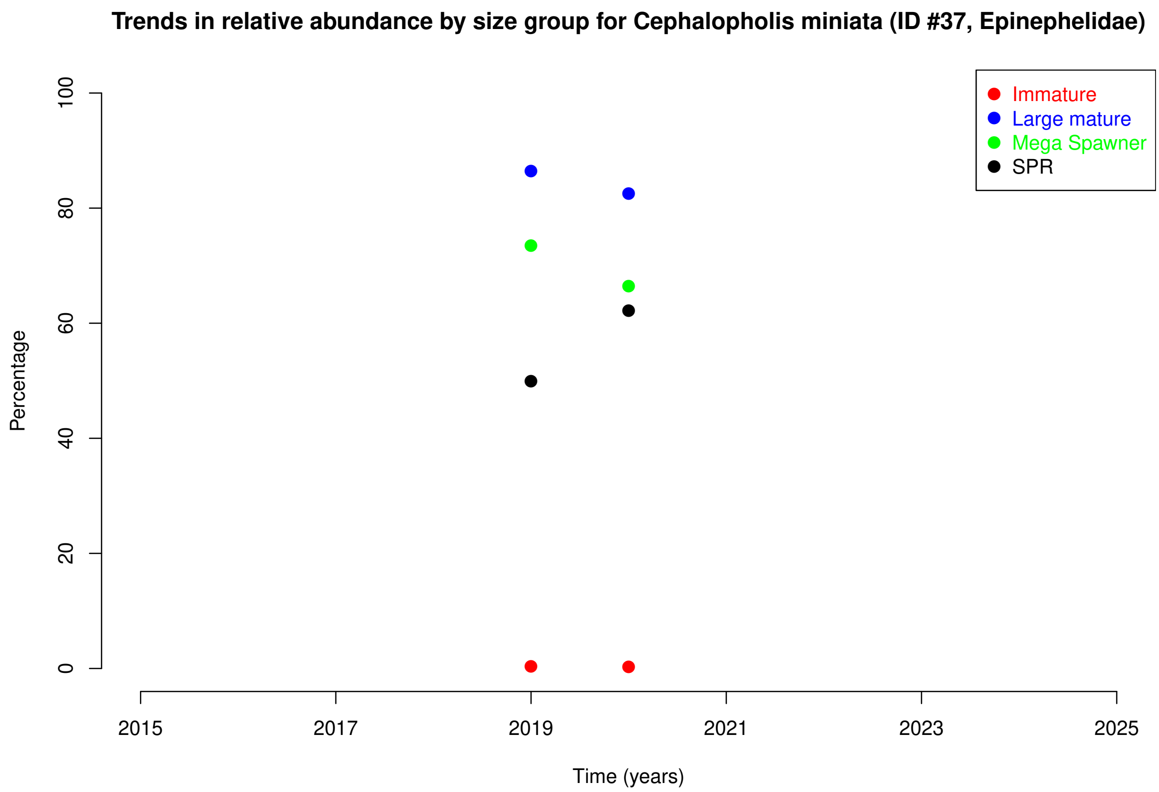
The majority of the catch consists of size classes around or above the optimum harvest size. This means that the impact of the fishery is minimized for this species. Potentially higher yields of this species could be achieved by catching them at somewhat smaller size, although capture of smaller specimen 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 more than 40%. The stock is probably not over exploited, and the risk that the fishery will cause further stock decline is small. Risk level is low.

Trends in relative abundance by size group for Caranx sexfasciatus (ID #80, Carangidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature trend not available.
% Large Mature trend not available.
% Mega Spawner trend not available.
% SPR trend not available.


Catch length frequency for Cephalopholis miniata (ID #37, Epinephelidae)
Most Recent 365 Days. N (Catch) = 42,127, n (Sample) = 1,019.
0 %
15 %
84 %
Trade Limit 26 cm
L−maturity 17 cm
L−optimum 23 cm
L−infinity 38 cm
L−max 42 cm
L−median 28 cm
Lx−codrs 42 cm
SPR 52 %
Trade Limit
L−maturity
L−optimum
L−median
L−infinity
L−max
Frequency
0
1000
2000
3000
4000
10
20
30
40
50
Total Length (cm)


Trends in relative abundance by size group for Cephalopholis miniata (ID #37, Epinephelidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
0
20
40
60
80
100
2015
2017
2019
2021
2023
2025
Time (years)

The percentages of Cephalopholis miniata (ID #37, Epinephelidae) in most recent 365 days.
N (Catch) =42,127, n (Sample) = 1,019
Immature (< 17cm): 0%
Small mature (>= 17cm, < 23cm): 15%
Large mature (>= 23cm): 84%
Mega spawner (>= 25.3cm): 70% (subset of large mature fish)
Spawning Potential Ratio: 52 %

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 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 Cephalopholis miniata (ID #37, Epinephelidae), 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 714.

Rank	#ID	Species	Trade Limit Prop. Lmat	Immature %	Exploitation %	Mega Spawn %	SPR %
1	7	Pristipomoides multidens	0.73	38	82	7	19
2	4	Etelis sp.	0.50	40	94	1	3
3	1	Aphareus rutilans	0.78	55	93	1	6
4	20	Lutjanus gibbus	1.07	40	91	4	3
5	70	Gymnocranius grandoculis	0.85	5	60	21	29
6	6	Etelis coruscans	0.59	59	95	2	3
7	2	Aprion virescens	0.81	50	82	5	11
8	45	Epinephelus areolatus	1.31	3	37	48	16
9	66	Lethrinus olivaceus	0.62	3	17	70	37
10	9	Pristipomoides filamentosus	0.69	84	96	3	0
11	16	Lutjanus bohar	0.67	80	94	3	1
12	17	Lutjanus malabaricus	0.66	23	72	13	13
13	19	Lutjanus timorensis	0.98	11	85	4	6
14	85	Erythrocles schlegelii	1.31	1	39	30	33
15	27	Lutjanus vitta	1.20	11	90	4	1
16	34	Paracaesio kusakarii	0.77	18	89	3	6
17	15	Lutjanus argentimaculatus	0.62	15	63	20	33
18	8	Pristipomoides typus	0.80	40	92	4	8
19	80	Caranx sexfasciatus	1.24	5	23	54	50
20	37	Cephalopholis miniata	1.55	0	16	70	52
21	39	Cephalopholis sonnerati	1.03	11	52	32	26
22	81	Caranx tille	1.30	9	49	33	73
23	5	Etelis radiosus	0.71	66	95	1	4
24	78	Caranx ignobilis	0.89	18	83	8	13
25	38	Cephalopholis sexmaculata	1.34	3	37	48	26
26	28	Lutjanus boutton	1.20	0	55	22	28
27	62	Variola albimarginata	1.45	2	23	63	55
28	63	Lethrinus lentjan	1.05	2	64	19	28
29	18	Lutjanus sebae		unknown	unknown	unknown	unknown
30	58	Epinephelus amblycephalus		unknown	unknown	unknown	unknown
31	10	Pristipomoides sieboldii	0.83	12	98	0	0
32	90	Diagramma pictum		unknown	unknown	unknown	unknown
33	31	Symphorus nematophorus		unknown	unknown	unknown	unknown
34	50	Epinephelus coioides	0.96	5	43	43	87
35	69	Wattsia mossambica	1.09	5	66	14	20
36	67	Lethrinus amboinensis	1.00	4	40	47	32
37	35	Paracaesio stonei	0.87	2	88	2	3
38	61	Plectropomus leopardus	1.08	10	50	34	59
39	48	Epinephelus bilobatus		unknown	unknown	unknown	unknown
40	94	Sphyraena forsteri	1.45	2	30	36	16
41	22	Pinjalo lewisi	0.96	1	79	3	4
42	33	Paracaesio xanthura	0.98	5	85	2	10
43	65	Lethrinus nebulosus		unknown	unknown	unknown	unknown
44	93	Sphyraena barracuda		unknown	unknown	unknown	unknown
45	79	Caranx lugubris	1.54	8	56	29	37
47	84	Seriola rivoliana	1.00	28	78	13	14
48	60	Plectropomus maculatus	0.91	1	37	45	55
49	46	Epinephelus bleekeri		unknown	unknown	unknown	unknown
50	43	Epinephelus morrhua		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 714.

Rank	#ID	Species	Trade Limit	Immature	Exploitation	Mega Spawn	SPR
1	7	Pristipomoides multidens	**high**	**high**	**high**	**high**	**high**
2	4	Etelis sp.	**high**	**high**	**high**	**high**	**high**
3	1	Aphareus rutilans	**high**	**high**	**high**	**high**	**high**
4	20	Lutjanus gibbus	**medium**	**high**	**high**	**high**	**high**
5	70	Gymnocranius grandoculis	**high**	**low**	**medium**	**medium**	**medium**
6	6	Etelis coruscans	**high**	**high**	**high**	**high**	**high**
7	2	Aprion virescens	**high**	**high**	**high**	**high**	**high**
8	45	Epinephelus areolatus	**low**	**low**	**low**	**low**	**high**
9	66	Lethrinus olivaceus	**high**	**low**	**low**	**low**	**medium**
10	9	Pristipomoides filamentosus	**high**	**high**	**high**	**high**	**high**
11	16	Lutjanus bohar	**high**	**high**	**high**	**high**	**high**
12	17	Lutjanus malabaricus	**high**	**medium**	**high**	**high**	**high**
13	19	Lutjanus timorensis	**medium**	**medium**	**high**	**high**	**high**
14	85	Erythrocles schlegelii	**low**	**low**	**low**	**low**	**medium**
15	27	Lutjanus vitta	**low**	**medium**	**high**	**high**	**high**
16	34	Paracaesio kusakarii	**high**	**medium**	**high**	**high**	**high**
17	15	Lutjanus argentimaculatus	**high**	**medium**	**medium**	**high**	**medium**
18	8	Pristipomoides typus	**high**	**high**	**high**	**high**	**high**
19	80	Caranx sexfasciatus	**low**	**low**	**low**	**low**	**low**
20	37	Cephalopholis miniata	**low**	**low**	**low**	**low**	**low**
21	39	Cephalopholis sonnerati	**medium**	**medium**	**medium**	**low**	**medium**
22	81	Caranx tille	**low**	**low**	**low**	**low**	**low**
23	5	Etelis radiosus	**high**	**high**	**high**	**high**	**high**
24	78	Caranx ignobilis	**high**	**medium**	**high**	**high**	**high**
25	38	Cephalopholis sexmaculata	**low**	**low**	**low**	**low**	**medium**
26	28	Lutjanus boutton	**low**	**low**	**medium**	**medium**	**medium**
27	62	Variola albimarginata	**low**	**low**	**low**	**low**	**low**
28	63	Lethrinus lentjan	**medium**	**low**	**medium**	**high**	**medium**
29	18	Lutjanus sebae	**unknown**	**unknown**	**unknown**	**unknown**	**unknown**
30	58	Epinephelus amblycephalus	**unknown**	**unknown**	**unknown**	**unknown**	**unknown**
31	10	Pristipomoides sieboldii	**high**	**medium**	**high**	**high**	**high**
32	90	Diagramma pictum	**unknown**	**unknown**	**unknown**	**unknown**	**unknown**
33	31	Symphorus nematophorus	**unknown**	**unknown**	**unknown**	**unknown**	**unknown**
34	50	Epinephelus coioides	**medium**	**low**	**low**	**low**	**low**
35	69	Wattsia mossambica	**medium**	**low**	**high**	**high**	**high**
36	67	Lethrinus amboinensis	**medium**	**low**	**low**	**low**	**medium**
37	35	Paracaesio stonei	**high**	**low**	**high**	**high**	**high**
38	61	Plectropomus leopardus	**medium**	**low**	**medium**	**low**	**low**
39	48	Epinephelus bilobatus	**unknown**	**unknown**	**unknown**	**unknown**	**unknown**
40	94	Sphyraena forsteri	**low**	**low**	**low**	**low**	**high**
41	22	Pinjalo lewisi	**medium**	**low**	**high**	**high**	**high**
42	33	Paracaesio xanthura	**medium**	**low**	**high**	**high**	**high**
43	65	Lethrinus nebulosus	**unknown**	**unknown**	**unknown**	**unknown**	**unknown**
44	93	Sphyraena barracuda	**unknown**	**unknown**	**unknown**	**unknown**	**unknown**
45	79	Caranx lugubris	**low**	**low**	**medium**	**medium**	**medium**
47	84	Seriola rivoliana	**medium**	**medium**	**high**	**high**	**high**
48	60	Plectropomus maculatus	**medium**	**low**	**low**	**low**	**low**
49	46	Epinephelus bleekeri	**unknown**	**unknown**	**unknown**	**unknown**	**unknown**
50	43	Epinephelus morrhua	**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 714.

Rank	#ID	Species	% Immature	% Large Mature	% Mega Spawner	% SPR
1	7	Pristipomoides multidens	**deteriorating**	**deteriorating**	**deteriorating**	**improving**
2	4	Etelis sp.	**improving**	**improving**	**improving**	**improving**
3	1	Aphareus rutilans	**deteriorating**	**deteriorating**	**deteriorating**	**stable**
4	20	Lutjanus gibbus	**unknown**	**unknown**	**unknown**	**unknown**
5	70	Gymnocranius grandoculis	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
6	6	Etelis coruscans	**deteriorating**	**improving**	**improving**	**improving**
7	2	Aprion virescens	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
8	45	Epinephelus areolatus	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
9	66	Lethrinus olivaceus	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
10	9	Pristipomoides filamentosus	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
11	16	Lutjanus bohar	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
12	17	Lutjanus malabaricus	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
13	19	Lutjanus timorensis	**unknown**	**unknown**	**unknown**	**unknown**
14	85	Erythrocles schlegelii	**unknown**	**unknown**	**unknown**	**unknown**
15	27	Lutjanus vitta	**unknown**	**unknown**	**unknown**	**unknown**
16	34	Paracaesio kusakarii	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
17	15	Lutjanus argentimaculatus	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
18	8	Pristipomoides typus	**unknown**	**unknown**	**unknown**	**unknown**
19	80	Caranx sexfasciatus	**unknown**	**unknown**	**unknown**	**unknown**
20	37	Cephalopholis miniata	**unknown**	**unknown**	**unknown**	**unknown**
21	39	Cephalopholis sonnerati	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
22	81	Caranx tille	**unknown**	**unknown**	**unknown**	**unknown**
23	5	Etelis radiosus	**unknown**	**unknown**	**unknown**	**unknown**
24	78	Caranx ignobilis	**deteriorating**	**deteriorating**	**deteriorating**	**deteriorating**
25	38	Cephalopholis sexmaculata	**unknown**	**unknown**	**unknown**	**unknown**
26	28	Lutjanus boutton	**unknown**	**unknown**	**unknown**	**unknown**
27	62	Variola albimarginata	**unknown**	**unknown**	**unknown**	**unknown**
28	63	Lethrinus lentjan	**unknown**	**unknown**	**unknown**	**unknown**
29	18	Lutjanus sebae	**unknown**	**unknown**	**unknown**	**unknown**
30	58	Epinephelus amblycephalus	**unknown**	**unknown**	**unknown**	**unknown**
31	10	Pristipomoides sieboldii	**unknown**	**unknown**	**unknown**	**unknown**
32	90	Diagramma pictum	**unknown**	**unknown**	**unknown**	**unknown**
33	31	Symphorus nematophorus	**unknown**	**unknown**	**unknown**	**unknown**
34	50	Epinephelus coioides	**unknown**	**unknown**	**unknown**	**unknown**
35	69	Wattsia mossambica	**unknown**	**unknown**	**unknown**	**unknown**
36	67	Lethrinus amboinensis	**unknown**	**unknown**	**unknown**	**unknown**
37	35	Paracaesio stonei	**unknown**	**unknown**	**unknown**	**unknown**
38	61	Plectropomus leopardus	**unknown**	**unknown**	**unknown**	**unknown**
39	48	Epinephelus bilobatus	**unknown**	**unknown**	**unknown**	**unknown**
40	94	Sphyraena forsteri	**unknown**	**unknown**	**unknown**	**unknown**
41	22	Pinjalo lewisi	**unknown**	**unknown**	**unknown**	**unknown**
42	33	Paracaesio xanthura	**unknown**	**unknown**	**unknown**	**unknown**
43	65	Lethrinus nebulosus	**unknown**	**unknown**	**unknown**	**unknown**
44	93	Sphyraena barracuda	**unknown**	**unknown**	**unknown**	**unknown**
45	79	Caranx lugubris	**unknown**	**unknown**	**unknown**	**unknown**
47	84	Seriola rivoliana	**unknown**	**unknown**	**unknown**	**unknown**
48	60	Plectropomus maculatus	**unknown**	**unknown**	**unknown**	**unknown**
49	46	Epinephelus bleekeri	**unknown**	**unknown**	**unknown**	**unknown**
50	43	Epinephelus morrhua	**unknown**	**unknown**	**unknown**	**unknown**

5 Discussion and conclusions

Deepwater drop line fishing for snappers, groupers and emperors occurs throughout WPP 714 (in the Banda Sea) on deep slopes and seamounts at depths between 50 and 500 meters. The Banda Sea is deep, with very steep slopes around the islands, reefs and seamounts, which makes this area mostly suitable for drop line fishing around those structures. Some bottom long line fishing (targeting a similar species spectrum) in this general region occurs in a few areas with a flatter bottom profile at depths ranging from 50 to 150 meters, for example by small scale vessels based in the Banggai Islands in the North of WPP 714. Bottom long line fishing by larger vessels is more common in areas with larger and relatively shallower slopes, such as for example the Java Sea to the West and the Arafura Sea to the East.

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 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. Drop line fisheries are characterized by a very low impact on habitat at the fishing grounds, whereas some more 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 (Table 5.7 and Table 5.8). 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 high potential for overfishing in the deep slope fisheries.

Based on available length frequencies of multi-species snapper, grouper and emperor catches from WPP 714, the risks of overfishing are high (Table Table 4.1 and Table 4.2) and SPR is dangerously low (Table 5.1) for most of the larger snappers which are common on deep slopes in this fisheries management area. The deep water snapper feeding aggregations occur at predictable and well known locations and these large snappers are therefore among the most vulnerable species in these fisheries. Fishing mortality 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 well below the size where these fish reach maturity. Bigger specimen of the largest snapper species are becoming extremely rare in Indonesia.

Fishing effort and fishing mortality have been too high in recent years in WPP 714 and the situation is currently not improving. Time trends for the top 10 snapper species (ranked by abundance) either show continued decline of the stocks or unclear patterns, judging from trends in size based indicators (Table 4.3). Those trends in length based indicators can also be compared with trends in CpUE by gear types and boat size category (Tables 5.2 to 5.6), although fishing at aggregating sites (including bottom FADs) may be masking the direct effect on CpUE. Overall we are currently looking at a high risk of overfishing for all major snapper species in WPP 714, combined with a worrisome trend of deterioration in these snapper stocks, based on the size based stock assessments from the bottom long line fisheries.

Interestingly though, the groupers seem to be less vulnerable to the deep slope hook and line fisheries than the snappers are. Impact by the deep slope drop line and long line fisheries on grouper populations is limited compared to the snappers. This may be because most groupers are staying closer to high rugosity bottom habitat, which is avoided by long line vessels due to risk of entanglement, while drop line fishers are targeting schooling snappers that are hovering higher in the water column, above the grouper habitat. Fishing mortality (from deep slope hook and line fisheries) in large mature groupers seems to be considerably lower than what we see for the snappers.

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

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

Overall there is a clear scope for some straightforward fisheries improvements supported by relatively uncomplicated fisheries management policies and regulations. Our first recommendation for industry led fisheries improvements is for traders to adjust trading limits (size at which fishers receive premium prices) to the length at maturity for all target species. For a number of important species these trade limits urgently 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.

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 catcher boats to target larger specimen. The captains can certainly do this by using their day to day experiences, selecting locations, fishing depths, habitat types, hook sizes, etc. Literature data shows habitat separation between size groups in many species, as well as size selectivity of specific hook sizes. Captains know about this from experience.

Market preference for small size classes (“plate size” or “golden size”) could potentially be adjusted by awareness campaigns that clarify to the public that such sizes for many species actually represent immature juveniles and targeting these specifically will impair fisheries sustainability. Filleting techniques for larger fish can be adjusted to relatively thin slicing under an angle to produce “natural cuts” which are similar to “plate size” fillets but lacking the skin. This may produce a higher value product than the currently more common cutting of thick “portions” from large fillets, which are less preferred in some markets. A switch to “natural cut” fillets from larger fish could be combined with price incentives for larger fish by fishing companies, which could lead to a more sustainable trade especially if supported by size based policies and regulation like minimum sizes.

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

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 714, even though we can see some differences with other fisheries management areas in Indonesia.

One very much 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 714, 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	Pristipomoides multidens	19	19	17	29	15	NA	NA	NA	NA
2	Etelis sp.	NA	NA	0	4	2	NA	NA	NA	NA
3	Aphareus rutilans	NA	NA	5	7	5	NA	NA	NA	NA
4	Lutjanus gibbus	NA	NA	NA	2	4	NA	NA	NA	NA
5	Gymnocranius grandoculis	80	88	52	25	NA	NA	NA	NA	NA
6	Etelis coruscans	NA	NA	1	1	2	NA	NA	NA	NA
7	Aprion virescens	13	16	14	11	14	NA	NA	NA	NA
8	Epinephelus areolatus	40	63	21	17	13	NA	NA	NA	NA
9	Lethrinus olivaceus	100	85	34	36	39	NA	NA	NA	NA
10	Pristipomoides filamentosus	NA	52	5	1	0	NA	NA	NA	NA
11	Lutjanus bohar	NA	27	22	3	0	NA	NA	NA	NA
12	Lutjanus malabaricus	75	48	14	10	16	NA	NA	NA	NA
13	Lutjanus timorensis	NA	NA	NA	4	7	NA	NA	NA	NA
14	Erythrocles schlegelii	NA	NA	NA	NA	31	NA	NA	NA	NA
15	Lutjanus vitta	NA	NA	NA	1	1	NA	NA	NA	NA
16	Paracaesio kusakarii	NA	NA	7	5	6	NA	NA	NA	NA
17	Lutjanus argentimaculatus	55	54	20	15	NA	NA	NA	NA	NA
18	Pristipomoides typus	NA	NA	NA	5	9	NA	NA	NA	NA
19	Caranx sexfasciatus	NA	NA	NA	42	NA	NA	NA	NA	NA
20	Cephalopholis miniata	NA	NA	NA	50	62	NA	NA	NA	NA

Table 5.2: CpUE (kg/GT/day) trends by fleet segment for Etelis sp. in WPP 714

CpUE	2016	2017	2018	2019	2020	2021	2022	2023	2024
Nano Dropline	0.4	NA	1.1	0.1	0.4	NA	NA	NA	NA
Nano Longline	0.3	0.6	1.3	NA	0.2	NA	NA	NA	NA
Small Dropline	0.4	NA	NA	0.5	0.1	NA	NA	NA	NA
Small Longline	0.4	NA	NA	9.2	2.7	NA	NA	NA	NA
Medium Dropline	0.0	2.7	2.1	5.2	7.2	NA	NA	NA	NA
Medium Longline	0.4	0.0	NA	1.4	2.7	NA	NA	NA	NA
Large Dropline	0.6	NA	1.0	3.9	15.9	NA	NA	NA	NA
Large Longline	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 5.3: CpUE (kg/GT/day) trends by fleet segment for Aphareus rutilans in WPP 714

CpUE	2016	2017	2018	2019	2020	2021	2022	2023	2024
Nano Dropline	0.8	1.0	2.6	2.4	2.8	NA	NA	NA	NA
Nano Longline	0.4	0.5	NA	0.2	2.7	NA	NA	NA	NA
Small Dropline	0.8	9.8	0.0	1.2	0.4	NA	NA	NA	NA
Small Longline	0.8	NA	0.2	3.2	2.2	NA	NA	NA	NA
Medium Dropline	2.3	0.1	6.1	0.5	0.6	NA	NA	NA	NA
Medium Longline	0.8	0.1	0.1	1.6	2.2	NA	NA	NA	NA
Large Dropline	0.5	0.6	0.9	0.9	0.7	NA	NA	NA	NA
Large Longline	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 5.4: CpUE (kg/GT/day) trends by fleet segment for Pristipomoides multidens in WPP 714

CpUE	2016	2017	2018	2019	2020	2021	2022	2023	2024
Nano Dropline	2.7	3.0	2.9	1.4	1.2	NA	NA	NA	NA
Nano Longline	5.4	4.3	1.8	0.2	0.8	NA	NA	NA	NA
Small Dropline	2.7	0.4	NA	0.8	NA	NA	NA	NA	NA
Small Longline	2.7	0.3	NA	7.8	1.0	NA	NA	NA	NA
Medium Dropline	0.0	0.1	2.4	2.1	2.3	NA	NA	NA	NA
Medium Longline	2.7	4.1	4.4	1.4	1.0	NA	NA	NA	NA
Large Dropline	0.6	1.8	0.7	0.0	0.1	NA	NA	NA	NA
Large Longline	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 5.5: CpUE (kg/GT/day) trends by fleet segment for Lethrinus olivaceus in WPP 714

CpUE	2016	2017	2018	2019	2020	2021	2022	2023	2024
Nano Dropline	2.5	0.5	10.1	2.2	1.7	NA	NA	NA	NA
Nano Longline	5.5	1.6	1.0	1.2	0.8	NA	NA	NA	NA
Small Dropline	2.5	NA	0.3	0.2	0.1	NA	NA	NA	NA
Small Longline	2.5	0.9	1.1	0.2	1.1	NA	NA	NA	NA
Medium Dropline	0.1	NA	NA	NA	0.0	NA	NA	NA	NA
Medium Longline	2.5	2.7	0.2	1.4	1.1	NA	NA	NA	NA
Large Dropline	0.0	0.2	0.0	0.1	0.0	NA	NA	NA	NA
Large Longline	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 5.6: CpUE (kg/GT/day) trends by fleet segment for all species in WPP 714

CpUE	2016	2017	2018	2019	2020	2021	2022	2023	2024
Nano Dropline	31.6	20.9	43.4	19.1	15.9	NA	NA	NA	NA
Nano Longline	63.2	65.4	45.4	21.9	18.4	NA	NA	NA	NA
Small Dropline	31.6	16.3	8.3	10.1	3.4	NA	NA	NA	NA
Small Longline	31.6	26.5	57.2	32.6	17.9	NA	NA	NA	NA
Medium Dropline	5.4	6.2	25.2	13.7	20.7	NA	NA	NA	NA
Medium Longline	31.6	20.6	15.4	17.8	17.9	NA	NA	NA	NA
Large Dropline	4.6	13.4	7.7	10.1	33.2	NA	NA	NA	NA
Large Longline	NA	NA	NA	NA	NA	NA	NA	NA	NA

Table 5.7: Sample sizes over the period 2016 to 2024 for the others species in WPP 714 Dropline

Family Name	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total	%Catch
Acanthuridae	0	2	0	48	9	0	0	0	0	59	0.071
Ariidae	0	0	10	14	1	0	0	0	0	25	0.030
Ariommatidae	0	0	0	5	0	0	0	0	0	5	0.006
Balistidae	0	0	4	113	51	0	0	0	0	168	0.201
Belonidae	0	0	0	0	1	0	0	0	0	1	0.001
Bramidae	1	0	0	0	0	0	0	0	0	1	0.001
Caesionidae	0	0	1	16	37	0	0	0	0	54	0.065
Carangidae	0	4	139	999	321	0	0	0	0	1463	1.753
Coryphaenidae	0	0	3	7	4	0	0	0	0	14	0.017
Ephippidae	0	0	0	2	1	0	0	0	0	3	0.004
Epinephelidae	2	20	12	1423	712	0	0	0	0	2169	2.599
Fistulariidae	0	0	0	1	0	0	0	0	0	1	0.001
Gempylidae	0	0	0	47	0	0	0	0	0	47	0.056
Haemulidae	0	0	0	13	2	0	0	0	0	15	0.018
Holocentridae	0	18	1	1722	591	0	0	0	0	2332	2.794
Labridae	0	0	1	4	1	0	0	0	0	6	0.007
Latidae	0	0	0	0	3	0	0	0	0	3	0.004
Lethrinidae	0	7	44	612	238	0	0	0	0	901	1.079
Lutjanidae	1	21	29	1201	562	0	0	0	0	1814	2.173
Malacanthidae	0	0	0	5	9	0	0	0	0	14	0.017
Mugilidae	0	0	0	0	1	0	0	0	0	1	0.001
Mullidae	0	3	0	55	28	0	0	0	0	86	0.103
Muraenesocidae	0	0	0	1	0	0	0	0	0	1	0.001
Nemipteridae	0	0	12	106	147	0	0	0	0	265	0.317
Other	4	9	59	112	45	0	0	0	0	229	0.274
Priacanthidae	0	0	3	155	121	0	0	0	0	279	0.334
Rays	0	0	0	20	3	0	0	0	0	23	0.028
Scaridae	0	0	0	10	2	0	0	0	0	12	0.014
Scombridae	1	2	154	547	74	0	0	0	0	778	0.932
Serranidae	0	0	0	1	2	0	0	0	0	3	0.004
Sharks	0	0	17	59	18	0	0	0	0	94	0.113
Siganidae	0	0	0	0	4	0	0	0	0	4	0.005
Sphyraenidae	0	10	3	124	11	0	0	0	0	148	0.177
Tetraodontidae	0	0	0	1	0	0	0	0	0	1	0.001
Zanclidae	0	0	0	0	1	0	0	0	0	1	0.001
Total	9	96	492	7423	3000	0	0	0	0	11020	13.203

Table 5.8: Sample sizes over the period 2016 to 2024 for the others species in WPP 714 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	0	2	0	0	0	0	0	0	0	2	0.002
Ariommatidae	0	0	0	0	0	0	0	0	0	0	0.000
Balistidae	0	0	5	11	7	0	0	0	0	23	0.028
Belonidae	0	0	0	0	0	0	0	0	0	0	0.000
Bramidae	5	0	0	0	0	0	0	0	0	5	0.006
Caesionidae	0	0	0	0	0	0	0	0	0	0	0.000
Carangidae	27	5	11	29	9	0	0	0	0	81	0.097
Coryphaenidae	0	0	0	0	0	0	0	0	0	0	0.000
Ephippidae	0	0	0	2	0	0	0	0	0	2	0.002
Epinephelidae	82	57	34	53	17	0	0	0	0	243	0.291
Fistulariidae	0	0	0	0	0	0	0	0	0	0	0.000
Gempylidae	0	0	0	1	0	0	0	0	0	1	0.001
Haemulidae	2	1	0	8	2	0	0	0	0	13	0.016
Holocentridae	2	0	0	59	15	0	0	0	0	76	0.091
Labridae	0	0	0	0	0	0	0	0	0	0	0.000
Latidae	0	0	0	0	0	0	0	0	0	0	0.000
Lethrinidae	3	21	2	237	144	0	0	0	0	407	0.488
Lutjanidae	2	11	0	235	90	0	0	0	0	338	0.405
Malacanthidae	0	0	0	0	0	0	0	0	0	0	0.000
Mugilidae	0	0	0	0	0	0	0	0	0	0	0.000
Mullidae	0	0	0	4	1	0	0	0	0	5	0.006
Muraenesocidae	0	0	0	0	0	0	0	0	0	0	0.000
Nemipteridae	0	0	0	104	64	0	0	0	0	168	0.201
Other	45	50	13	54	7	0	0	0	0	169	0.202
Priacanthidae	0	0	0	109	27	0	0	0	0	136	0.163
Rays	12	2	0	96	27	0	0	0	0	137	0.164
Scaridae	0	0	0	1	0	0	0	0	0	1	0.001
Scombridae	39	22	4	54	0	0	0	0	0	119	0.143
Serranidae	0	0	0	0	0	0	0	0	0	0	0.000
Sharks	67	54	58	52	12	0	0	0	0	243	0.291
Siganidae	0	0	0	0	0	0	0	0	0	0	0.000
Sphyraenidae	1	1	5	9	0	0	0	0	0	16	0.019
Tetraodontidae	0	0	0	3	0	0	0	0	0	3	0.004
Zanclidae	0	0	0	0	0	0	0	0	0	0	0.000
Total	287	226	132	1121	422	0	0	0	0	2188	2.621

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