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Length-Based Stock Assessment Of A Species Complex In Deepwater Demersal Fisheries Targeting Snappers In Indonesia Fishery Management Area WPP 718

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Table of contents

1 Introduction

This report presents a length-based assessment of the multi-species deep shelf and slope fisheries targeting snappers, groupers, croakers, grunts and emperors, at depths ranging from 50 to 500 meters in fisheries management area (WPP) 718 in the Arafura Sea. Drop line and long line vessels fish in this area operate alongside a number of other gear types including traps, bottom set gillnets and other types of nets. Bottom long line vessels fish on the shelf area as well as on the top of the slopes that drop to deeper waters. Drop liners fish those slopes also to greater depths into the Banda Sea and the Timor Trough. All gear types operate on both sides of the borders of WPP 718 and neighboring areas, where habitats are continuous. Drop line fishers operating on the deep slopes often fish across multiple fisheries management areas, including WPP 718, within each fishing trip.

Various fleets are operating in this region, including long liners from Probolinggo, Timika, Dobo and Tual, drop liners from Kema (North Sulawesi) and Ternate and gillnet operations from Timika and other bases. Vessels from most of these fleets contributed data to the current assessment. Some vessels are based and operate entirely within the WPP 718 boundaries, while others like some of the medium scale drop liners from Kema and Ternate make trips to locations up to 1,000 kilometers away from their home ports. Various staging points and logistical hubs are used by the Arafura Sea fishing fleets, throughout Eastern Indonesia.

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. Gillnet operations work mostly over the shallower parts of the shelf area at depths overlapping with the long line fisheries.

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 718, 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 718 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.

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

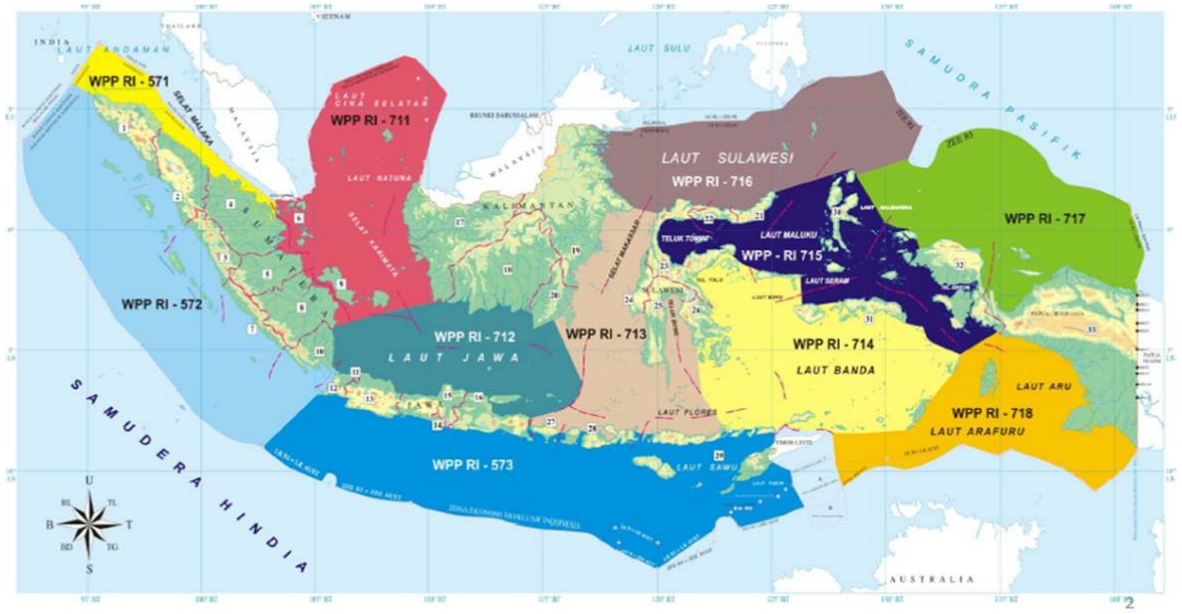


Figure 1.1: Fisheries Management Areas (*Wilayah Pengelolaan Perikanan* or WPP) in Indonesian marine waters.

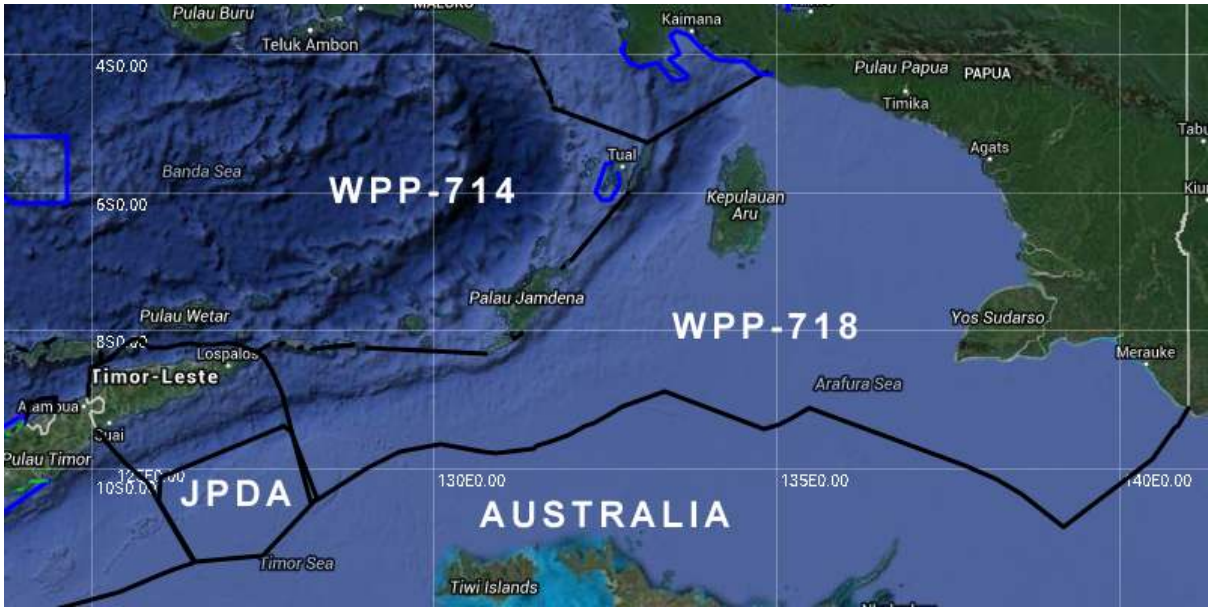


Figure 1.2: Bathymetric map of the Arafura Sea, WPP 718, with adjacent marine areas, in Eastern Indonesia. Black lines are WPP boundaries, blue lines are MPA boundaries.

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 718

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	100	Atrobucca brevis	1000	0.013	2.940	TL	46.15	46.15	384144
2	17	Lutjanus malabaricus	500	0.009	3.137	FL	33.11	33.11	230058
3	7	Pristipomoides multidens	500	0.020	2.944	FL	31.18	34.92	75152
4	64	Lethrinus laticaudis	300	0.020	2.986	FL	25.16	26.35	73500
5	45	Epinephelus areolatus	300	0.011	3.048	FL	28.18	28.77	24723
6	18	Lutjanus sebae	500	0.009	3.208	FL	29.97	31.26	21182
7	91	Pomadasys kaakan	300	0.017	2.985	TL	26.57	26.57	20026
8	77	Caranx bucculentus	2000	0.023	3.033	FL	42.51	49.83	11653
9	8	Pristipomoides typus	500	0.014	2.916	TL	36.16	36.16	9730
10	25	Lutjanus russelli	300	0.020	2.907	FL	27.28	28.49	9364
11	89	Diagramma labiosum	500	0.014	2.988	FL	33.08	36.71	8861
12	75	Carangoides chrysophrys	1000	0.027	2.902	FL	37.68	42.12	7843
13	27	Lutjanus vitta	300	0.017	2.978	FL	26.72	27.64	7045
14	50	Epinephelus coioides	1500	0.011	3.084	TL	46.94	46.94	6215
15	24	Lutjanus johnii	300	0.020	2.907	FL	27.28	28.49	5922
16	63	Lethrinus lentjan	300	0.020	2.986	FL	25.16	26.35	5370
17	70	Gymnocranius grandoculis	500	0.032	2.885	FL	28.43	30.53	5223
18	58	Epinephelus amblycephalus	1500	0.012	3.057	TL	45.99	45.99	5142
19	99	Protonibea diacanthus	1000	0.013	2.940	TL	46.15	46.15	4716
20	21	Lutjanus erythropterus	500	0.024	2.870	FL	31.79	31.79	4213
21	46	Epinephelus bleekeri	300	0.009	3.126	TL	28.09	28.09	4103
22	15	Lutjanus argentimaculatus	500	0.034	2.792	FL	31.22	31.78	3727
23	88	Glaucosoma buergeri	500	0.045	2.725	TL	30.40	30.40	3528
24	41	Epinephelus latifasciatus	1500	0.010	3.088	TL	48.00	48.00	2895
25	65	Lethrinus nebulosus	500	0.019	2.996	FL	30.03	32.14	2825
26	78	Caranx ignobilis	2000	0.027	2.913	FL	46.78	54.36	2739
27	9	Pristipomoides filamentosus	500	0.038	2.796	FL	29.70	33.27	2715
28	86	Argyrops spinifer	300	0.055	2.670	TL	25.11	27.87	2454
29	4	Etelis sp.	500	0.022	2.950	FL	30.16	32.84	2112
30	72	Carangoides coeruleopinnatus	1000	0.032	2.902	FL	35.35	40.12	2068
31	39	Cephalopholis sonnerati	300	0.015	3.058	TL	25.78	25.78	1795
32	66	Lethrinus olivaceus	300	0.029	2.851	FL	25.49	27.50	1590
33	34	Paracaesio kusakarii	500	0.011	3.135	FL	30.96	34.80	1562
34	14	Lutjanus bitaeniatus	500	0.014	2.980	FL	33.61	34.18	1517
35	19	Lutjanus timorensis	500	0.009	3.137	FL	33.11	33.34	1403
36	98	Rachycentron canadum	1000	0.003	3.088	FL	60.67	67.28	1214
37	20	Lutjanus gibbus	500	0.015	3.091	FL	28.87	31.09	1202
38	1	Aphareus rutilans	1000	0.015	2.961	FL	42.20	49.61	1196
39	81	Caranx tille	2000	0.032	2.930	FL	43.43	49.51	1173
40	80	Caranx sexfasciatus	2000	0.032	2.930	FL	43.43	49.51	1037
41	26	Lutjanus lemniscatus	300	0.020	2.907	FL	27.28	28.49	1010
42	56	Epinephelus multinotatus	1500	0.017	2.964	TL	46.90	46.90	961
43	76	Carangoides gymnostethus	1000	0.046	2.746	FL	37.88	41.55	916
44	60	Plectropomus maculatus	500	0.016	3.000	FL	31.76	31.76	792
45	54	Epinephelus stictus	300	0.027	3.000	SL	22.37	28.24	789
46	69	Wattsia mossambica	500	0.040	2.824	FL	28.21	29.34	631
47	16	Lutjanus bohar	500	0.016	3.059	FL	29.70	31.31	587
48	35	Paracaesio stonei	500	0.024	2.960	FL	28.78	32.35	547
49	74	Carangoides malabaricus	1000	0.023	3.020	FL	34.20	39.74	544
50	49	Epinephelus malabaricus	1500	0.013	3.034	TL	46.85	46.85	537

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 718

Rank	Species	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
1	Atrobucca brevis	239	1258	90638	274579	17430	0	0	0	0	384144
2	Lutjanus malabaricus	14886	40668	72606	75306	26592	0	0	0	0	230058
3	Pristipomoides multidens	8930	10271	12811	35716	7424	0	0	0	0	75152
4	Lethrinus laticaudis	3621	9428	27255	20123	13073	0	0	0	0	73500
5	Epinephelus areolatus	1694	1048	2694	15750	3537	0	0	0	0	24723
6	Lutjanus sebae	1879	3275	5207	9317	1504	0	0	0	0	21182
7	Pomadasys kaakan	2537	2325	6270	6143	2751	0	0	0	0	20026
8	Caranx bucculentus	265	2939	3648	4743	58	0	0	0	0	11653
9	Pristipomoides typus	4355	1526	223	3238	388	0	0	0	0	9730
10	Lutjanus russelli	203	1043	2349	3569	2200	0	0	0	0	9364
11	Diagramma labiosum	404	1060	2915	3693	789	0	0	0	0	8861
12	Carangoides chrysophrys	429	694	1993	3578	1149	0	0	0	0	7843
13	Lutjanus vitta	561	621	1678	2917	1268	0	0	0	0	7045
14	Epinephelus coioides	468	642	1749	2488	868	0	0	0	0	6215
15	Lutjanus johnii	466	1103	2024	1744	585	0	0	0	0	5922
16	Lethrinus lentjan	525	913	948	2316	668	0	0	0	0	5370
17	Gymnocranius grandoculis	507	622	599	3131	364	0	0	0	0	5223
18	Epinephelus amblycephalus	205	483	603	3121	730	0	0	0	0	5142
19	Protonibea diacanthus	128	668	694	2713	513	0	0	0	0	4716
20	Lutjanus erythropterus	242	872	815	1909	375	0	0	0	0	4213
21	Epinephelus bleekeri	129	338	838	2278	520	0	0	0	0	4103
22	Lutjanus argentimaculatus	340	602	710	1740	335	0	0	0	0	3727
23	Glaucosoma buergeri	65	122	241	2840	260	0	0	0	0	3528
24	Epinephelus latifasciatus	100	294	502	1716	283	0	0	0	0	2895
25	Lethrinus nebulosus	14	476	339	1862	134	0	0	0	0	2825
26	Caranx ignobilis	67	156	1176	1219	121	0	0	0	0	2739
27	Pristipomoides filamentosus	1215	154	442	753	151	0	0	0	0	2715
28	Argyrops spinifer	101	148	488	1368	349	0	0	0	0	2454
29	Etelis sp.	662	853	257	317	23	0	0	0	0	2112
30	Carangoides coeruleopinnatus	185	430	918	457	78	0	0	0	0	2068
31	Cephalopholis sonnerati	145	74	37	1438	101	0	0	0	0	1795
32	Lethrinus olivaceus	75	180	41	1192	102	0	0	0	0	1590
33	Paracaesio kusakarii	427	161	725	248	1	0	0	0	0	1562
34	Lutjanus bitaeniatus	51	215	214	737	300	0	0	0	0	1517
35	Lutjanus timorensis	361	252	91	657	42	0	0	0	0	1403
36	Rachycentron canadum	77	289	232	474	142	0	0	0	0	1214
37	Lutjanus gibbus	18	95	27	924	138	0	0	0	0	1202
38	Aphareus rutilans	603	83	161	343	6	0	0	0	0	1196
39	Caranx tille	39	175	249	645	65	0	0	0	0	1173
40	Caranx sexfasciatus	54	225	186	476	96	0	0	0	0	1037
41	Lutjanus lemniscatus	61	87	75	693	94	0	0	0	0	1010
42	Epinephelus multinotatus	136	74	67	662	22	0	0	0	0	961
43	Carangoides gymnostethus	86	80	185	483	82	0	0	0	0	916
44	Plectropomus maculatus	7	26	180	459	120	0	0	0	0	792
45	Epinephelus stictus	4	4	93	586	102	0	0	0	0	789
46	Wattsia mossambica	156	51	105	270	49	0	0	0	0	631
47	Lutjanus bohar	180	92	36	263	16	0	0	0	0	587
48	Paracaesio stonei	222	71	149	103	2	0	0	0	0	547
49	Carangoides malabaricus	82	191	226	8	37	0	0	0	0	544
50	Epinephelus malabaricus	17	62	116	287	55	0	0	0	0	537

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.

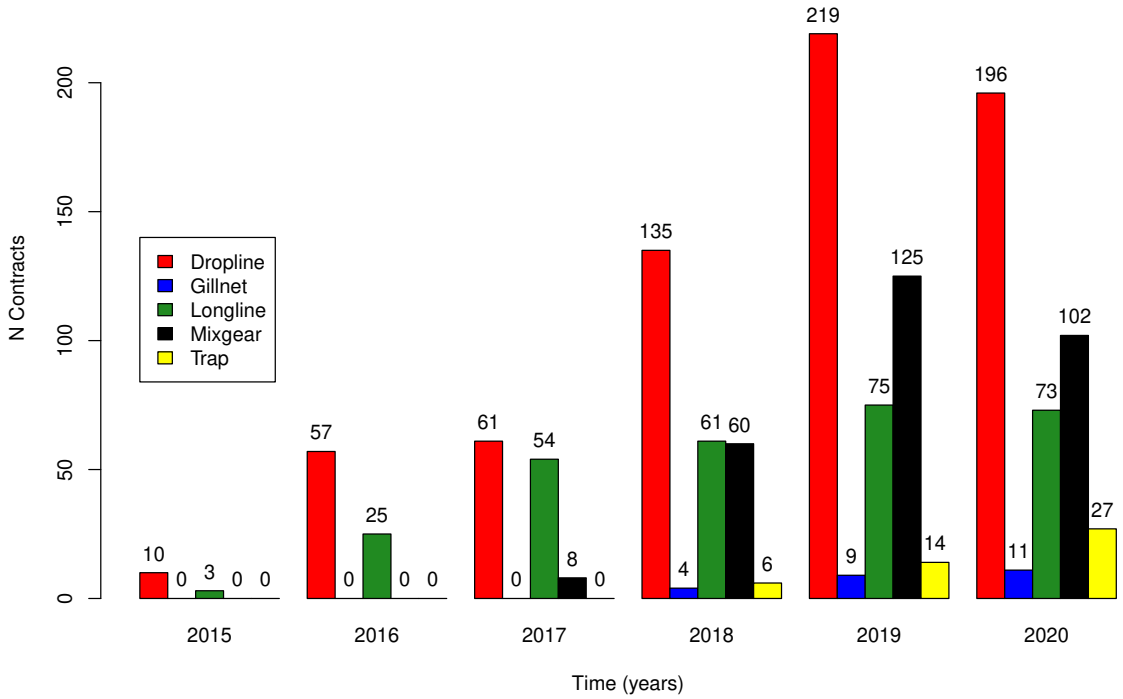


Figure 2.3: Number of CODRS contractors by gear type actively fishing in Indonesian waters.

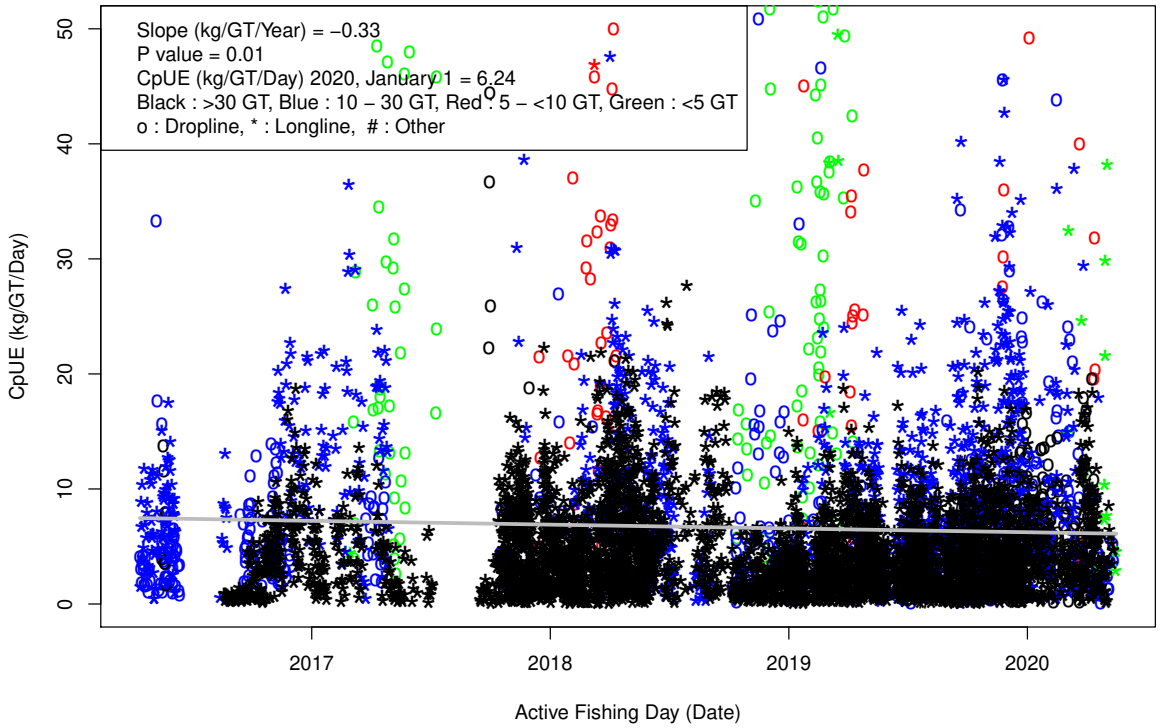


Figure 2.4: Catch per Unit of Effort in WPP 718.

Table 2.1: Number of CODRS deployed by gear type and boat size category in WPP 718

N	Dropline	Longline	Gillnet	Trap	Mix Gear	Total
Nano	1	2	NA	NA	NA	3
Small	3	0	0	NA	NA	3
Medium	9	6	0	NA	NA	15
Large	0	15	4	NA	NA	19
Total	13	23	4	0	0	40

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 718 for the most recent 365 days

kg/GT/Day	Dropline	Longline	Gillnet	Trap	Mix Gear
Nano	5.60	18.42	NA	NA	NA
Small	45.86	5.60	5.60	NA	NA
Medium	10.04	12.02	5.60	NA	NA
Large	7.64	4.31	6.18	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 718 for the most recent 365 days

N	Dropline	Longline	Gillnet	Trap	Mix Gear
Nano	1966	13	NA	NA	NA
Small	15	1966	1966	NA	NA
Medium	124	423	1966	NA	NA
Large	169	1201	21	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 718

Number of Boat	Dropline	Longline	Gillnet	Trap	Mix Gear	Total
Nano Dedicated	48	9	0	0	0	57
Nano Seasonal	0	0	0	0	0	0
Small Dedicated	7	6	1	0	0	14
Small Seasonal	2	0	0	0	0	2
Medium Dedicated	14	18	33	0	0	65
Medium Seasonal	91	6	0	0	0	97
Large Dedicated	9	145	93	0	0	247
Large Seasonal	0	0	0	0	0	0
Total	171	184	127	0	0	482

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 718

Total GT	Dropline	Longline	Gillnet	Trap	Mix Gear	Total
Nano Dedicated	139	27	0	0	0	166
Nano Seasonal	0	0	0	0	0	0
Small Dedicated	49	44	8	0	0	101
Small Seasonal	18	0	0	0	0	18
Medium Dedicated	346	431	857	0	0	1633
Medium Seasonal	1603	114	0	0	0	1717
Large Dedicated	693	10185	7021	0	0	17899
Large Seasonal	0	0	0	0	0	0
Total	2848	10800	7886	0	0	21534

Table 2.7: Total catch in metric tons per year by fishing gear and boat size category in WPP 718 for the most recent 365 days

Total Catch	Dropline	Longline	Gillnet	Trap	Mix Gear	Total
Nano Dedicated	156	116	0	0	0	273
Nano Seasonal	0	0	0	0	0	0
Small Dedicated	479	63	11	0	0	553
Small Seasonal	87	0	0	0	0	87
Medium Dedicated	709	1103	1238	0	0	3050
Medium Seasonal	1643	146	0	0	0	1789
Large Dedicated	879	10397	6550	0	0	17827
Large Seasonal	0	0	0	0	0	0
Total	3952	11826	7800	0	0	23579

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 718 for the most recent 365 days.

Species	Weight MT	Weight %	Cumulative % Weight	Immature % Number	Immature % Weight	Risk Immature
Lutjanus malabaricus	9579	41	41	16	7	Med
Atrobucca brevis	2812	12	53	17	8	Med
Pristipomoides multidens	2560	11	63	33	14	High
Lethrinus laticaudis	1468	6	70	0	0	Low
Caranx bucculentus	1125	5	74	0	0	Low
Lutjanus sebae	766	3	78	24	12	Med
Diagramma labiosum	614	3	80	0	0	Low
Protonibea diacanthus	402	2	82	24	13	Med
Epinephelus coioides	367	2	84	14	3	Med
Carangoides chrysophrys	297	1	85	0	0	Low
Gymnocranius grandoculis	265	1	86	2	0	Low
Epinephelus areolatus	230	1	87	0	0	Low
Lethrinus nebulosus	209	1	88	1	0	Low
Pomadasys kaakan	198	1	89	0	0	Low
Epinephelus latifasciatus	188	1	89	8	2	Low
Epinephelus amblycephalus	186	1	90	3	1	Low
Lutjanus johnii	179	1	91	2	1	Low
Pristipomoides typus	161	1	92	20	8	Med
Lutjanus argentimaculatus	147	1	92	23	10	Med
Glaucosoma buergeri	146	1	93	1	0	Low
Total Top 20 Species	21899	93	93	15	7	Medium
Total Top 100 Species	23579	100	100	14	6	Medium

Table 2.9: Top 20 species by volume in Dropline fisheries with % immature fish in the catch in WPP 718 for the most recent 365 days.

Species	Weight MT	Weight %	Cumulative % Weight	Immature % Number	Immature % Weight	Risk Immature
Lutjanus malabaricus	1294	33	33	17	7	Med
Lethrinus laticaudis	704	18	51	0	0	Low
Protonibea diacanthus	320	8	59	22	13	Med
Pristipomoides multidens	284	7	66	25	9	Med
Diagramma labiosum	119	3	69	0	0	Low
Lethrinus nebulosus	106	3	72	2	0	Low
Lutjanus sebae	102	3	74	21	8	Med
Carangoides chrysophrys	86	2	76	0	0	Low
Caranx tille	77	2	78	0	0	Low
Pomadasys kaakan	76	2	80	1	0	Low
Gymnocranius grandoculis	70	2	82	2	0	Low
Lutjanus erythropterus	68	2	84	4	1	Low
Epinephelus coioides	66	2	85	3	1	Low
Lethrinus lentjan	53	1	87	2	0	Low
Lethrinus olivaceus	44	1	88	11	2	Med
Sphyraena putnamae	40	1	89	2	0	Low
Plectropomus maculatus	35	1	90	0	0	Low
Lutjanus johnii	31	1	90	4	1	Low
Lutjanus russelli	26	1	91	3	1	Low
Epinephelus bleekeri	25	1	92	3	0	Low
Total Top 20 Species	3626	92	92	10	5	Low
Total Top 100 Species	3952	100	100	10	5	Low

Table 2.10: Top 20 species by volume in Longline fisheries with % immature fish in the catch in WPP 718 for the most recent 365 days.

Species	Weight MT	Weight %	Cumulative % Weight	Immature % Number	Immature % Weight	Risk Immature
Lutjanus malabaricus	2905	25	25	21	8	Med
Atrobucca brevis	2644	22	47	17	8	Med
Pristipomoides multidens	2108	18	65	34	15	High
Lethrinus laticaudis	687	6	71	0	0	Low
Lutjanus sebae	623	5	76	24	12	Med
Epinephelus areolatus	196	2	77	1	0	Low
Carangoides chrysophrys	182	2	79	0	0	Low
Gymnocranius grandoculis	181	2	81	2	0	Low
Epinephelus latifasciatus	171	1	82	8	2	Low
Epinephelus amblycephalus	165	1	83	3	1	Low
Epinephelus coioides	139	1	85	15	4	Med
Glaucosoma buergeri	132	1	86	1	0	Low
Pristipomoides typus	128	1	87	19	8	Med
Lutjanus argentimaculatus	115	1	88	12	5	Med
Pomadasys kaakan	109	1	89	0	0	Low
Diagramma labiosum	107	1	90	0	0	Low
Epinephelus bleekeri	103	1	90	1	0	Low
Lethrinus nebulosus	91	1	91	0	0	Low
Lutjanus johnii	80	1	92	2	1	Low
Caranx ignobilis	70	1	92	9	6	Low
Total Top 20 Species	10936	92	92	17	8	Medium
Total Top 100 Species	11826	100	100	16	8	Medium

Table 2.11: Top 20 species by volume in Gillnet fisheries with % immature fish in the catch in WPP 718 for the most recent 365 days.

Species	Weight MT	Weight %	Cumulative % Weight	Immature % Number	Immature % Weight	Risk Immature
Lutjanus malabaricus	5380	69	69	13	6	Med
Caranx bucculentus	1070	14	83	0	0	Low
Diagramma labiosum	388	5	88	0	0	Low
Pristipomoides multidens	168	2	90	NA	NA	
Epinephelus coioides	162	2	92	NA	NA	
Atrobucca brevis	149	2	94	NA	NA	
Lethrinus laticaudis	78	1	95	NA	NA	
Lutjanus johnii	68	1	96	NA	NA	
Rachycentron canadum	51	1	96	NA	NA	
Lutjanus sebae	41	1	97	NA	NA	
Carangoides chrysophrys	29	0	97	NA	NA	
Pristipomoides typus	24	0	98	NA	NA	
Protonibea diacanthus	21	0	98	NA	NA	
Gymnocranius grandoculis	14	0	98	NA	NA	
Pomadasys kaakan	13	0	98	NA	NA	
Epinephelus areolatus	12	0	98	NA	NA	
Lethrinus nebulosus	11	0	98	NA	NA	
Epinephelus latifasciatus	10	0	99	NA	NA	
Epinephelus amblycephalus	10	0	99	NA	NA	
Lutjanus argentimaculatus	8	0	99	NA	NA	
Total Top 20 Species	7707	99	99	11	5	Medium
Total Top 100 Species	7800	100	100	11	5	Medium

Table 2.12: Top 20 species by volume in Trap fisheries with % immature fish in the catch in WPP 718 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
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 2.13: Top 20 species by volume in Mixgears fisheries with % immature fish in the catch in WPP 718 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
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

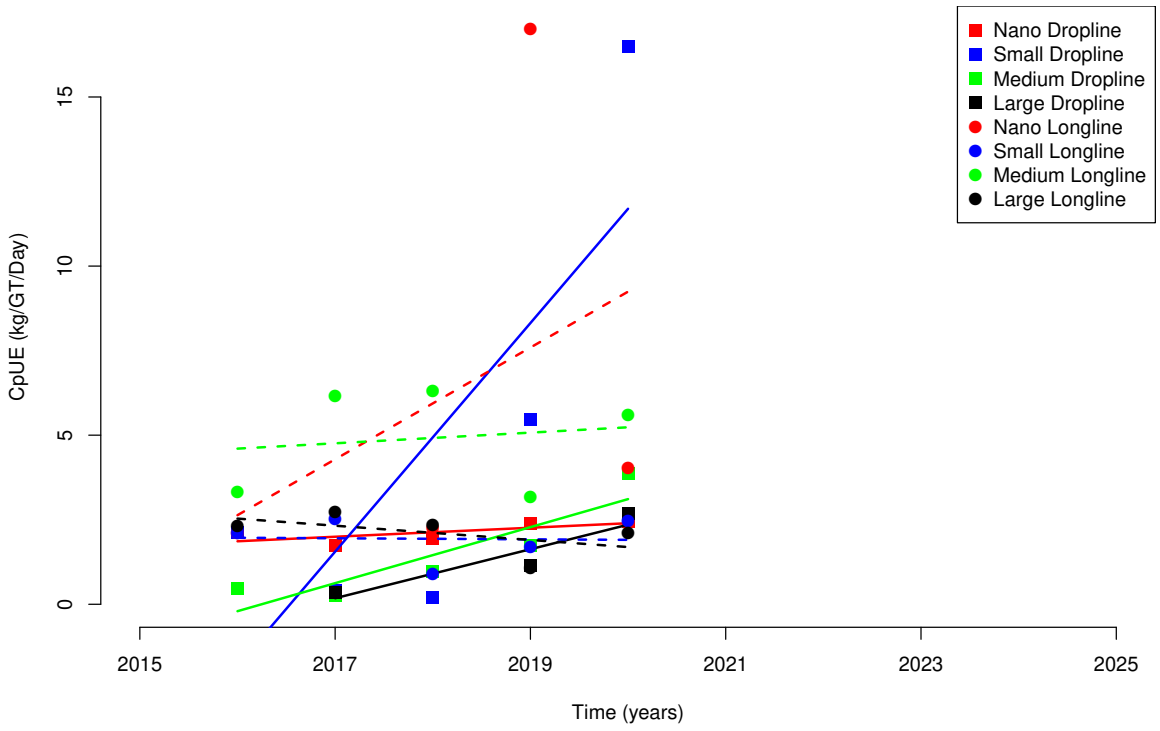


Figure 2.5: Catch per Unit of Effort per calendar year for Lutjanus malabaricus in WPP 718 for Dropline and Longline catches by fleet segment.
Solid lines and dashed lines for trends in Dropline CpUE and Longline CpUE respectively.

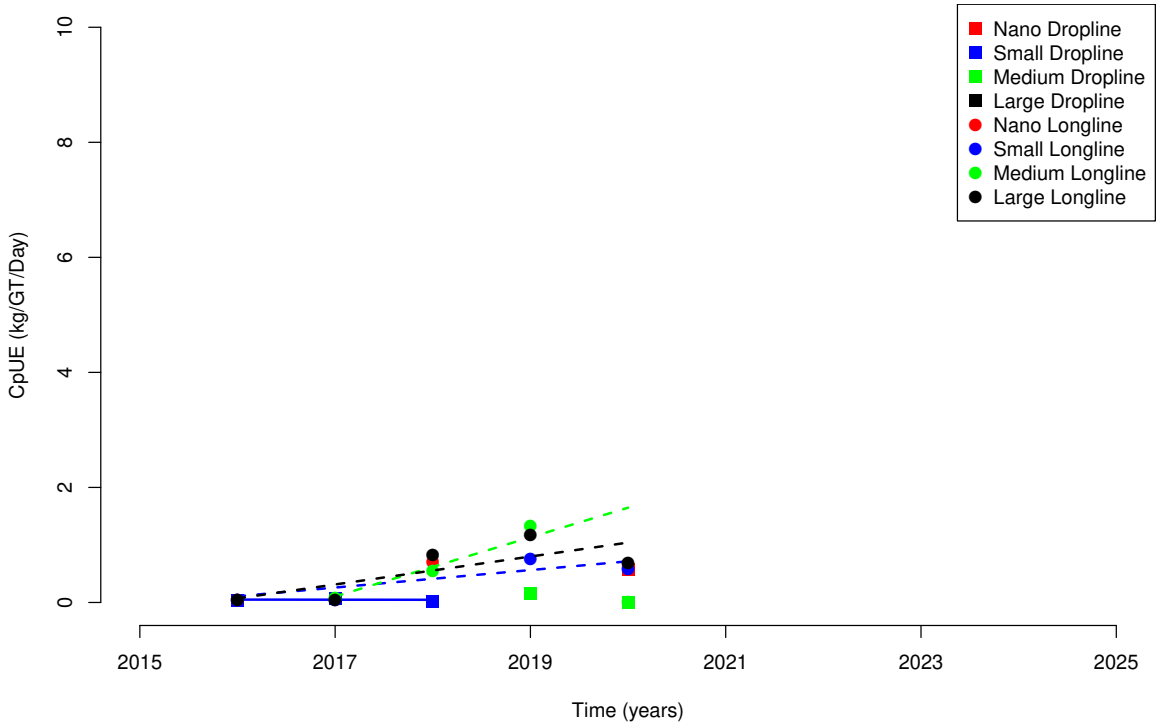


Figure 2.6: Catch per Unit of Effort per calendar year for Atrobucca brevis in WPP 718 for Dropline and Longline catches by fleet segment.
Solid lines and dashed lines for trends in Dropline CpUE and Longline CpUE respectively.

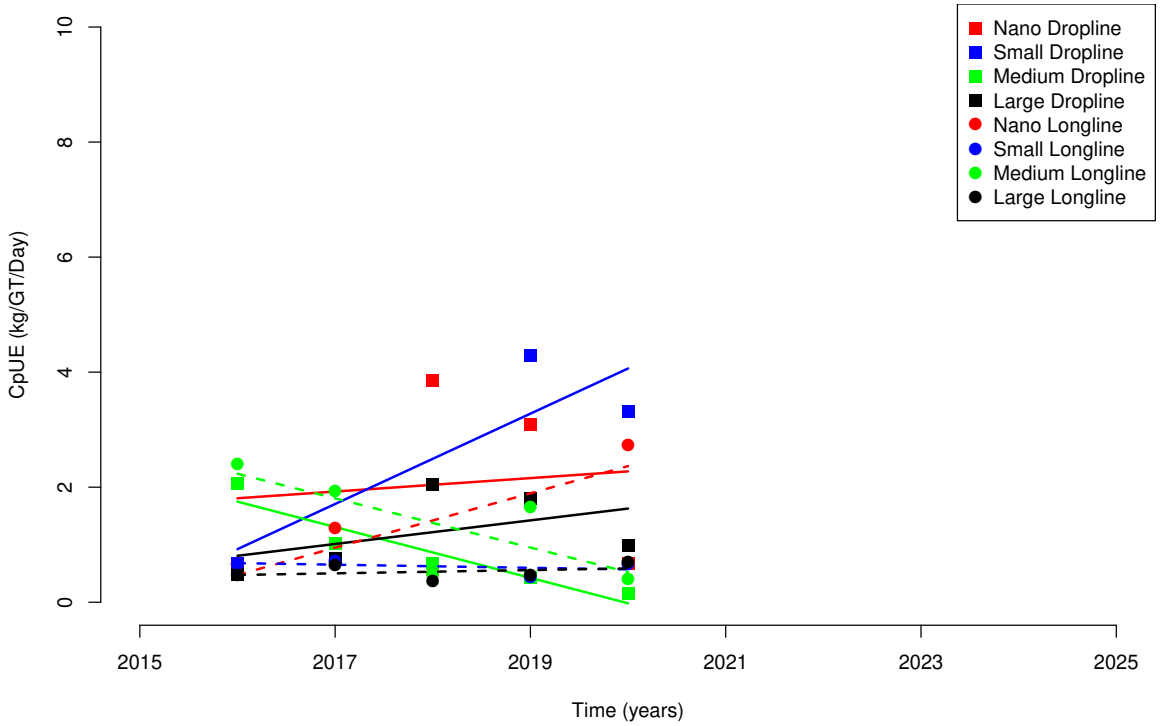


Figure 2.7: Catch per Unit of Effort per calendar year for Pristipomoides multidens in WPP 718 for Dropline and Longline catches by fleet segment.
Solid lines and dashed lines for trends in Dropline CpUE and Longline CpUE respectively.

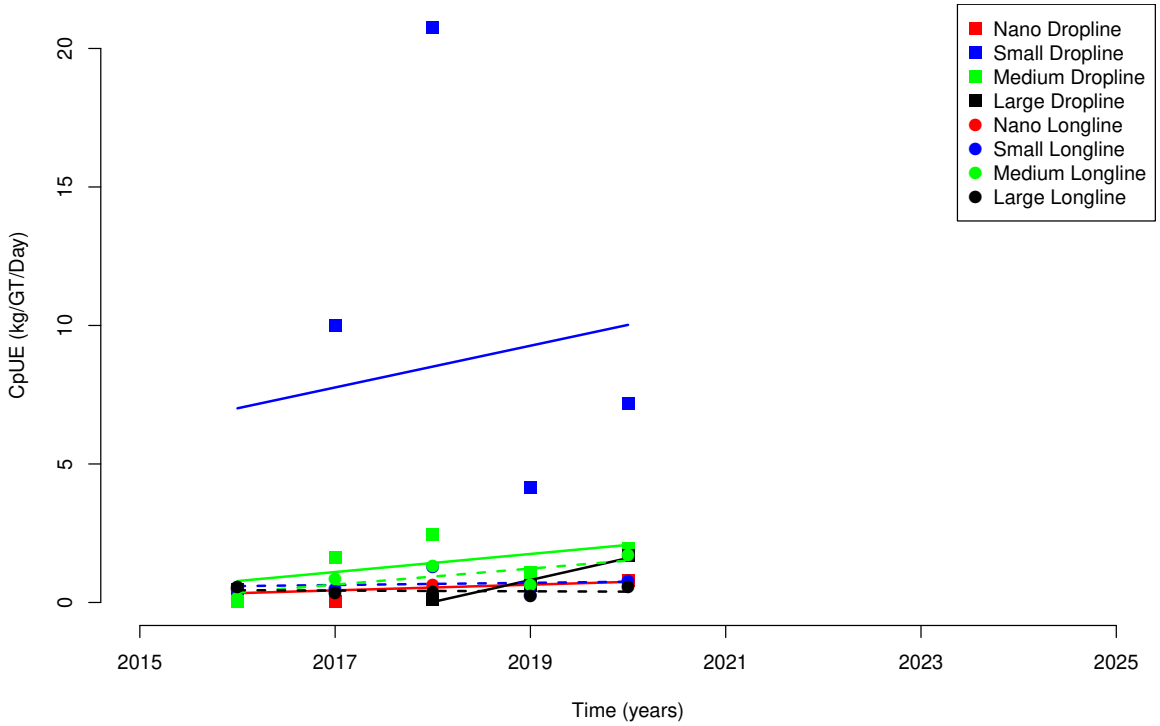


Figure 2.8: Catch per Unit of Effort per calendar year for Lethrinus laticaudis in WPP 718 for Dropline and Longline catches by fleet segment.
Solid lines and dashed lines for trends in Dropline CpUE and Longline CpUE respectively.

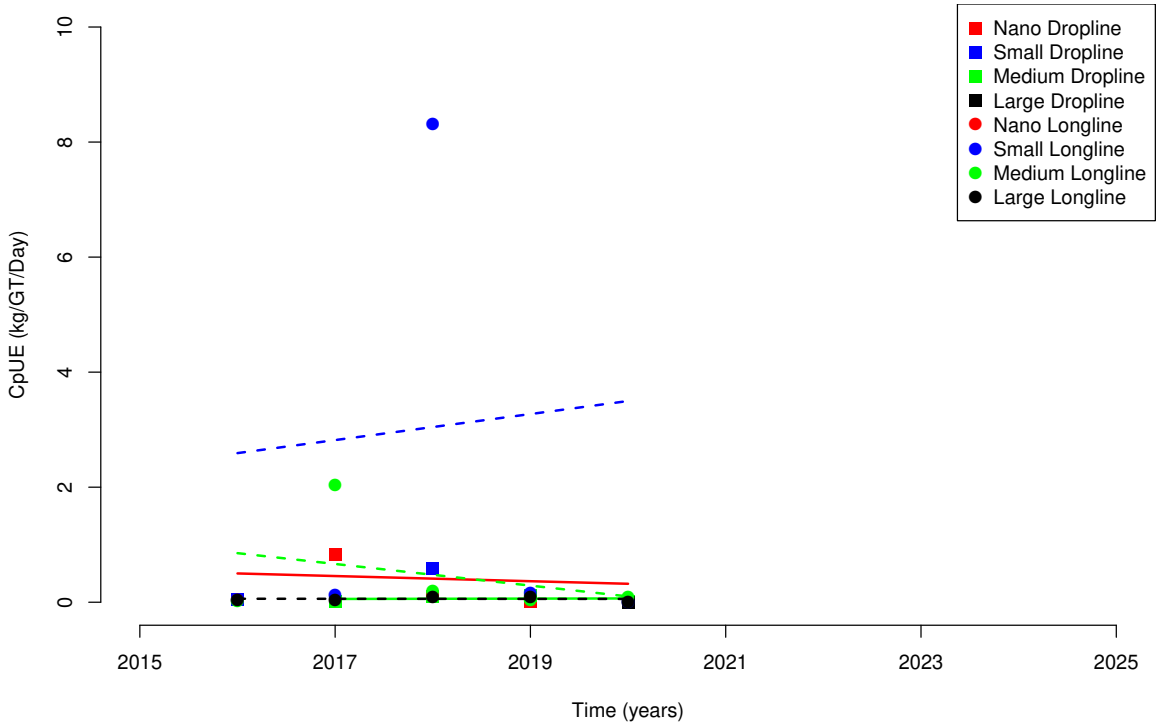


Figure 2.9: Catch per Unit of Effort per calendar year for Caranx bucculentus in WPP 718 for Dropline and Longline catches by fleet segment.
Solid lines and dashed lines for trends in Dropline CpUE and Longline CpUE respectively.

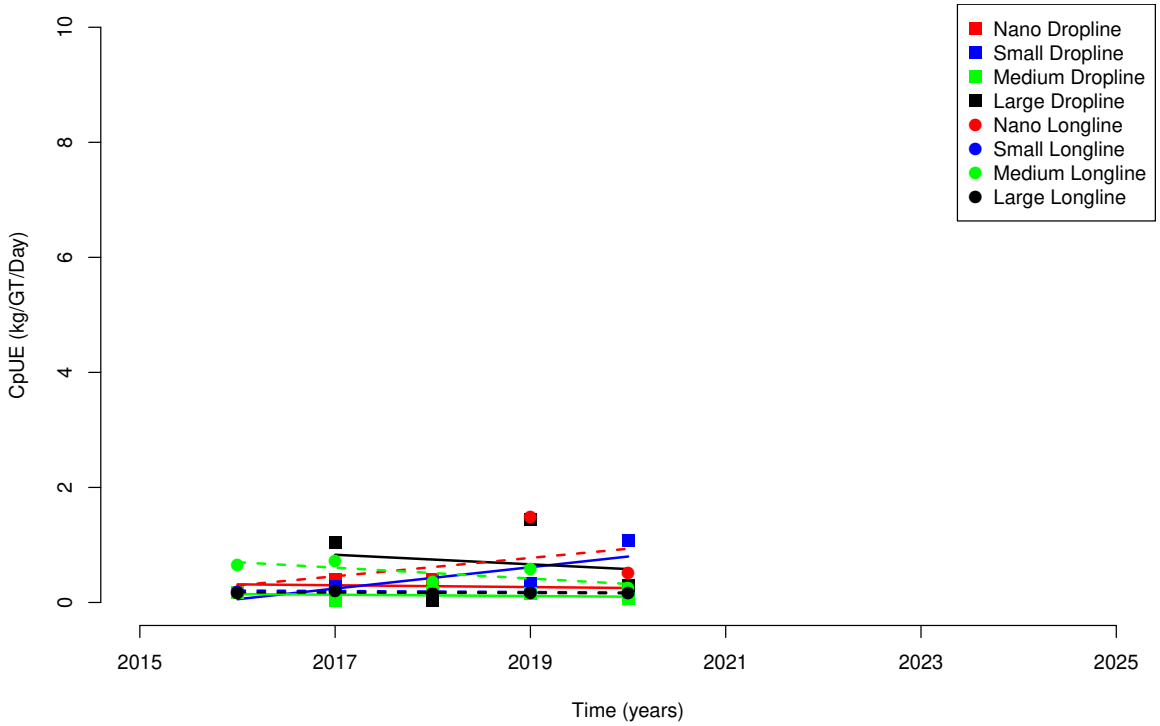


Figure 2.10: Catch per Unit of Effort per calendar year for Lutjanus sebae in WPP 718 for Dropline and Longline catches by fleet segment.
Solid lines and dashed lines for trends in Dropline CpUE and Longline CpUE respectively.

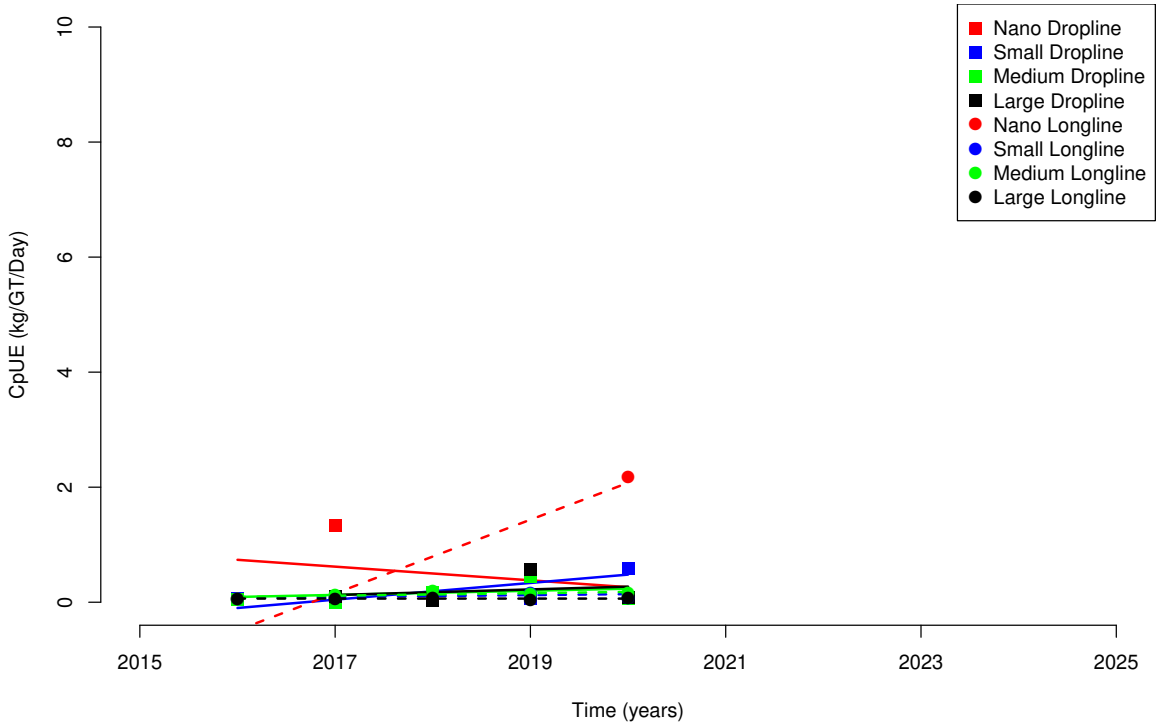


Figure 2.11: Catch per Unit of Effort per calendar year for Diagramma labiosum in WPP 718 for Dropline and Longline catches by fleet segment.
Solid lines and dashed lines for trends in Dropline CpUE and Longline CpUE respectively.

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 Sedepap	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

The Spot Trace data from the Timor Sea and Arafura Sea fisheries illustrate a classic "fishing the line" phenomenon. Many vessels fish right at the Indonesia - Australia border, on the edge of better managed fishing grounds on the Australian side, where fish densities are expected to be higher. Several drop line fishers were observed to operate illegally in Australian waters and some of these have been arrested by Australian patrol boats in 2015. Other vessels have been observed to illegally fish in Timor Leste waters. There is apparently little or no enforcement of fisheries regulations in Timor Leste waters and especially the Joint Petroleum Development Area or JPDA (Figure 3.1) is frequently targeted illegally by Indonesian vessels.

The Spot Trace data from WPP 718 and surrounding areas show great mobility of the medium-scale snapper fishing boats, making trips to fishing grounds that are up to 1,000 kilometres away from home ports (Figures 3.2 and 3.3). Not only are these fleets 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 on transport vessels in remote ports or offloading for air cargo at yet other places. Decision making on movements by boat owners 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. Most recently we are observing movement of staging ports but also of processing capacity to remote areas in the east such as the island of Penambulai, East of the Aru Islands. Fish is landed there and moved onto transport vessels bound for processing plants elsewhere in the country.

Therefore the fish that is processed in major processing centres like Probolinggo comes from a number of different fleets that operate throughout the waters of Eastern Indonesian, including also WPP 718. For the purpose of this report, all fishing trips, recorded (from SPOT data) within WPP 718, mostly from long line and drop line operations (Figures 3.4 and 3.5), were included in the analysis for this WPP. This includes fishing trips originating from outside the WPP, for example from Probolinggo, Bali or Kema.

Potential IUU issues include the operation by various fleets outside Indonesian waters in the East Timorese - Australian JPDA as well as in strictly Australian waters. Additional issues include the under marking of medium scale vessels to below 30GT, the licensing of the various fleets for various WPP and the operation of fleets from remote ports inside Marine Protected Areas throughout Eastern Indonesia. All this 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.

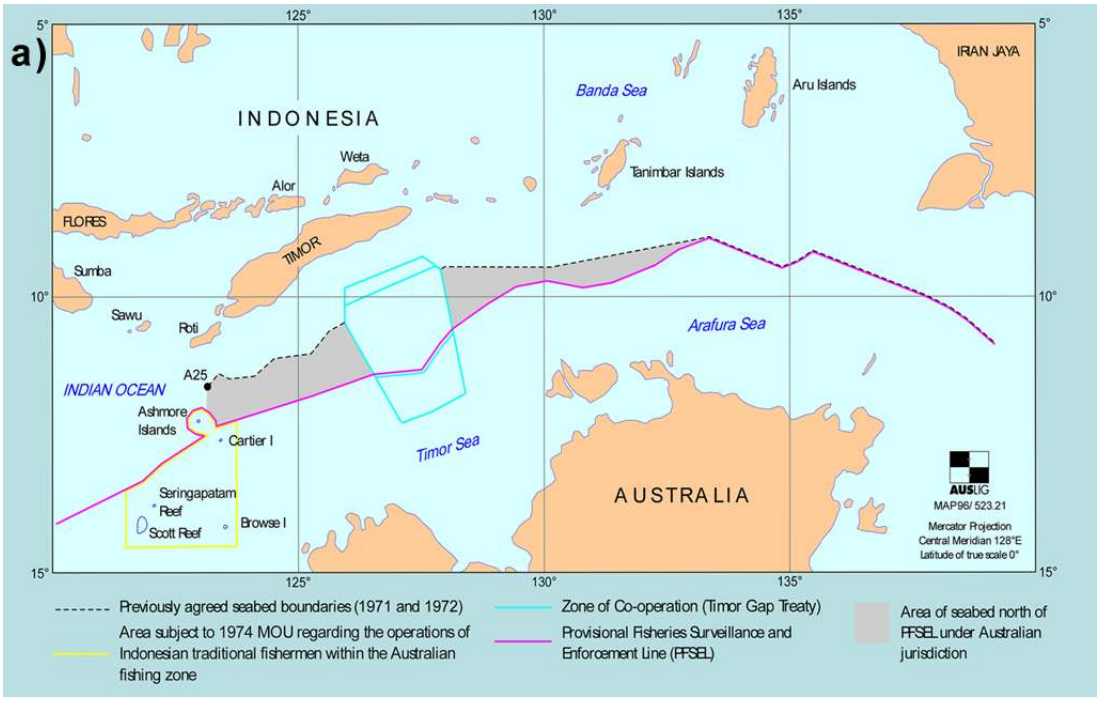
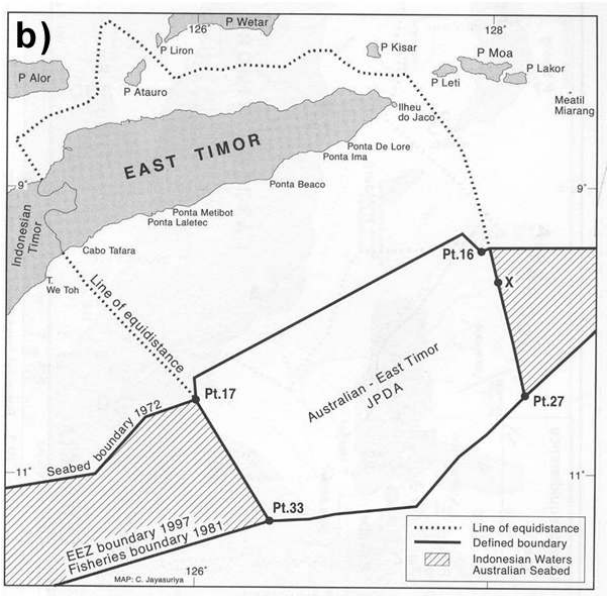


Figure 3.1: Timor Sea and Arafura Sea fishing grounds with current boundaries between Indonesia, East Timor and Australia.

a) The dotted line is the Australia - Indonesia Seabed Boundary. The pink line (PFSEL) is the Australia - Indonesia Fisheries Boundary. Indonesian vessels are allowed to fish in the grey area between the pink line and the dotted line, but not below the PFSEL. The light blue line is the boundary of the East Timor - Australia Zone of Cooperation which covers East Timorese fishing grounds where Indonesian fishing vessels are not allowed to fish. Australia does not enforce fisheries regulations here.

[h]



b) The shaded area between the Seabed Boundary and the Fisheries Boundary is Australian seabed, where fishers from Indonesia are allowed to fish. The Australian - East Timor zone of cooperation or "Joint Petroleum Development Area" (JPDA) is not open to fishers from Indonesia. East Timor is responsible for fishery surveillance within the JPDA.

Source: Australian Surveying & Land Information Group (AUSLIG) Commonwealth Department of Industry Science and Resources. MAP 96/523.21.1.

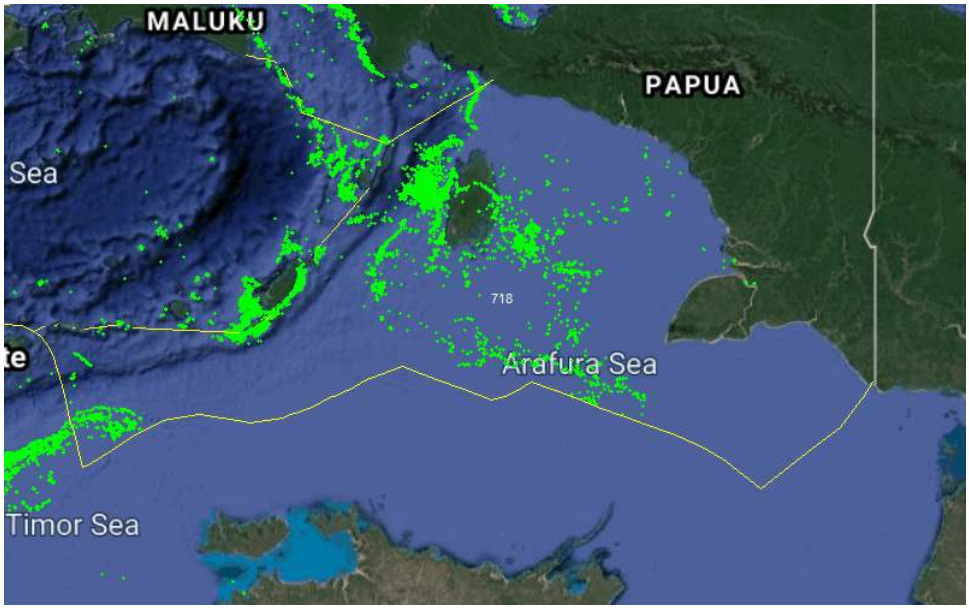


Figure 3.2: Fishing positions of dropliners participating in the CODRS program over the years 2014 - 2019 in WPP 718, as reported by Spot Trace. Reported positions during steaming, anchoring, or docking are excluded from this map.

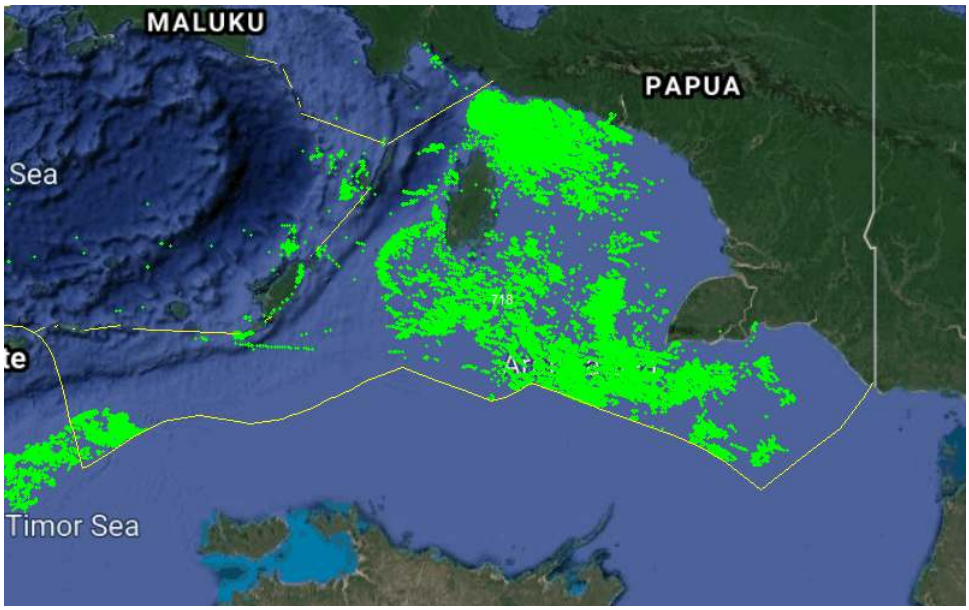
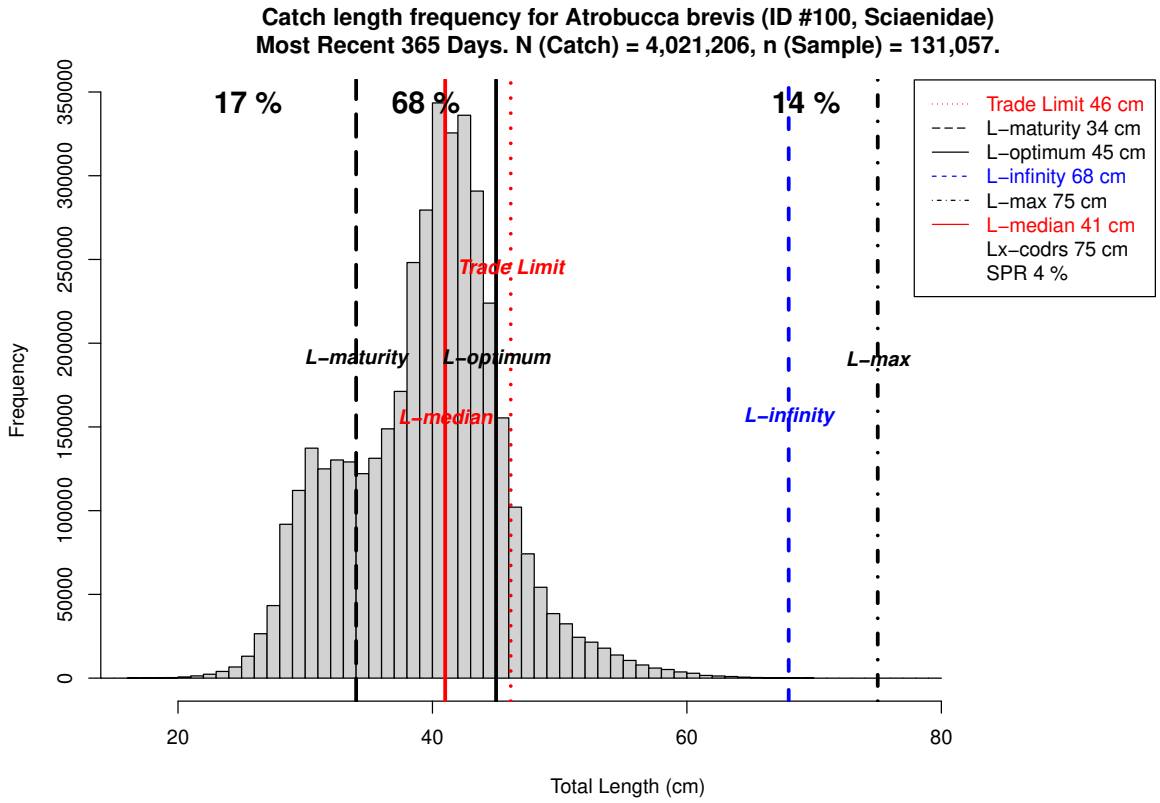


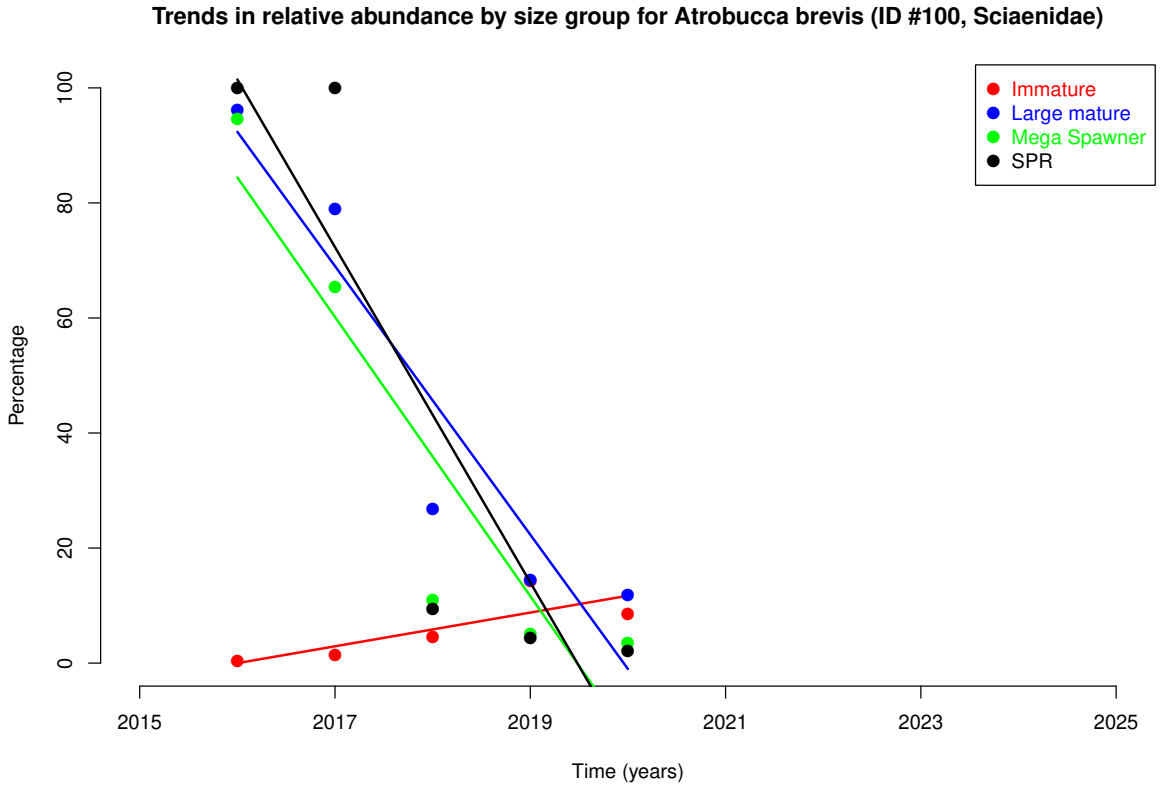
Figure 3.3: Fishing positions of longliners participating in the CODRS program over the years 2014 - 2019 in WPP 718, as reported by Spot Trace. Reported positions during steaming, anchoring, or docking are excluded from this map.

Figure 3.4: A typical snapper fishing boat from Probolinggo, Jawa Timur, operating in the Arafura Seas (WPP 718) and on nearby fishing grounds.

Figure 3.5: A typical snapper fishing boat from Dobo, Kepulauan Aru, Maluku, operating in the Arafura Seas (WPP 718) and on nearby fishing grounds.

4 Length-based assessments of Top 20 most abundant species in CODRS samples including all years in WPP 718





The percentages of Atrobucca brevis (ID #100, Sciaenidae) in most recent 365 days.
N (Catch) =4,021,206, n (Sample) = 131,057
Immature (< 34cm): 17%
Small mature (>= 34cm, < 45cm): 68%
Large mature (>= 45cm): 14%
Mega spawner (>= 49.5cm): 5% (subset of large mature fish)
Spawning Potential Ratio: 4 %

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

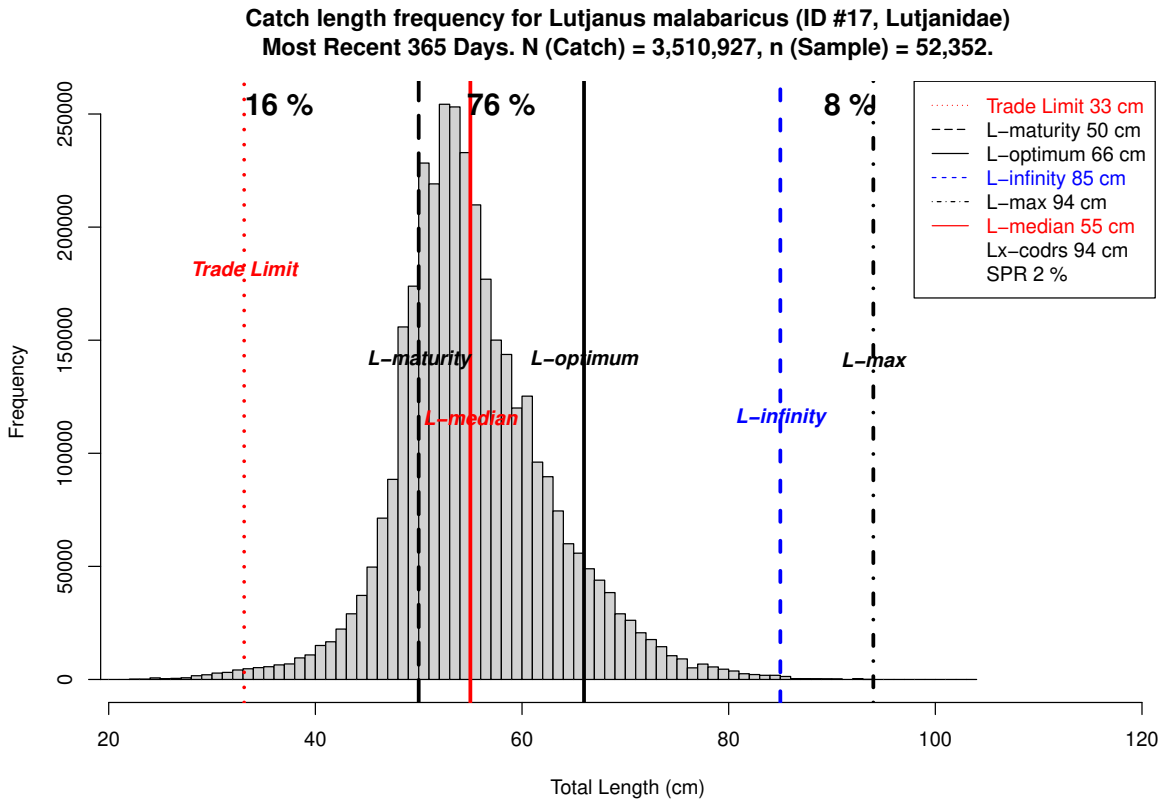
Between 10% and 20% of the fish in the catch are juveniles that have not yet reproduced. There is no immediate concern in terms of overfishing through over harvesting of juveniles, but the fishery needs to be monitored closely for any further increase in this indicator and incentives need to be geared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

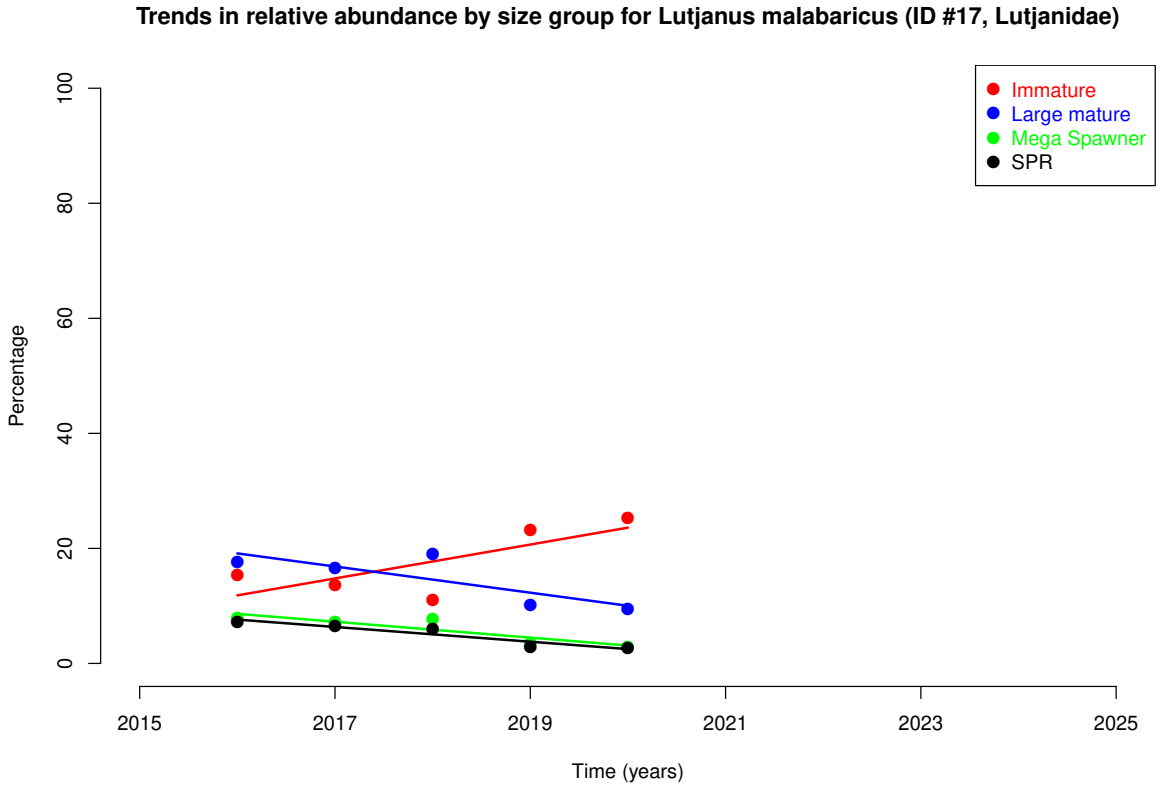
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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 Atrobucca brevis (ID #100, Sciaenidae), 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: 0.095
% Large Mature falling over recent years, situation deteriorating. P: 0.017
% Mega Spawner falling over recent years, situation deteriorating. P: 0.026
% SPR falling over recent years, situation deteriorating. P: 0.045


Catch length frequency for Lutjanus malabaricus (ID #17, Lutjanidae)
Most Recent 365 Days. N (Catch) = 3,510,927, n (Sample) = 52,352.
16 %
76 %
8 %
Trade Limit
L–maturity
L–optimum
L–max
L–median
L–infinity
Trade Limit 33 cm
L–maturity 50 cm
L–optimum 66 cm
L–infinity 85 cm
L–max 94 cm
L–median 55 cm
Lx–codrs 94 cm
SPR 2 %
Frequency
0
50000
100000
150000
200000
250000
20
40
60
80
100
120
Total Length (cm)


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

The percentages of Lutjanus malabaricus (ID #17, Lutjanidae) in most recent 365 days.
N (Catch) =3,510,927, n (Sample) = 52,352
Immature (< 50cm): 16%
Small mature (>= 50cm, < 66cm): 76%
Large mature (>= 66cm): 8%
Mega spawner (>= 72.6cm): 3% (subset of large mature fish)
Spawning Potential Ratio: 2 %

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

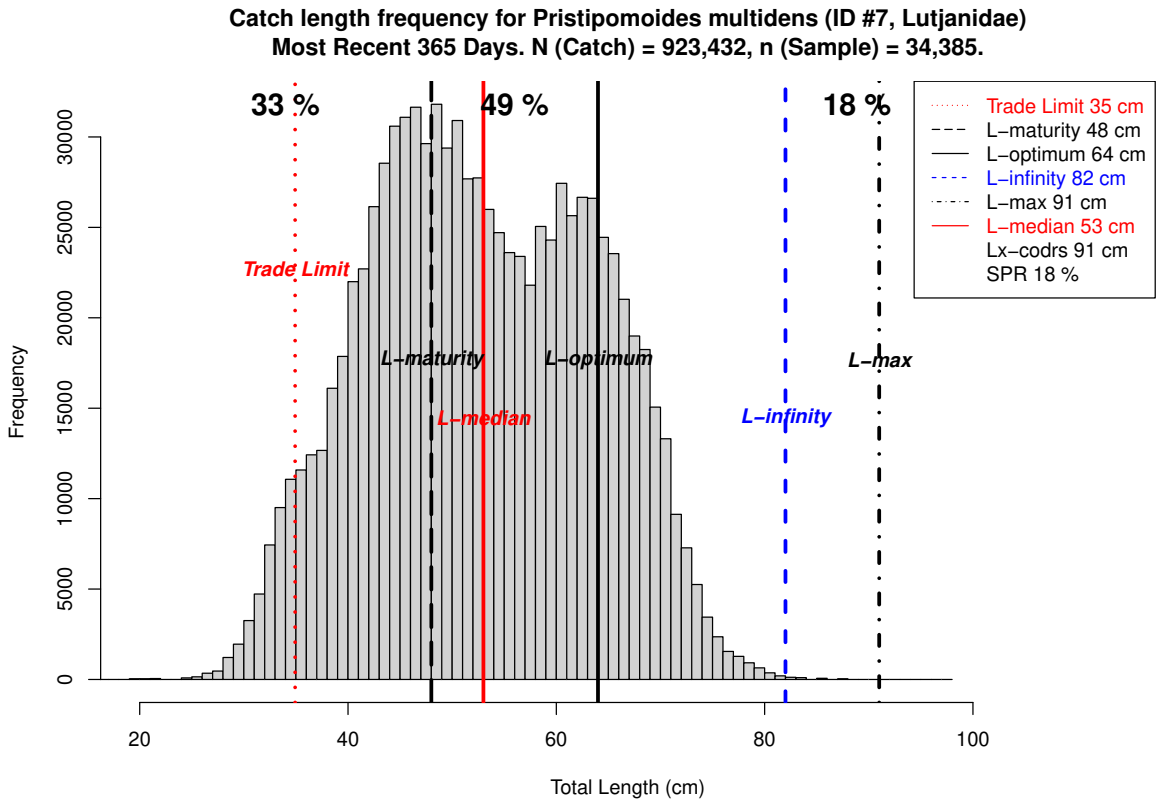
Between 10% and 20% of the fish in the catch are juveniles that have not yet reproduced. There is no immediate concern in terms of overfishing through over harvesting of juveniles, but the fishery needs to be monitored closely for any further increase in this indicator and incentives need to be geared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

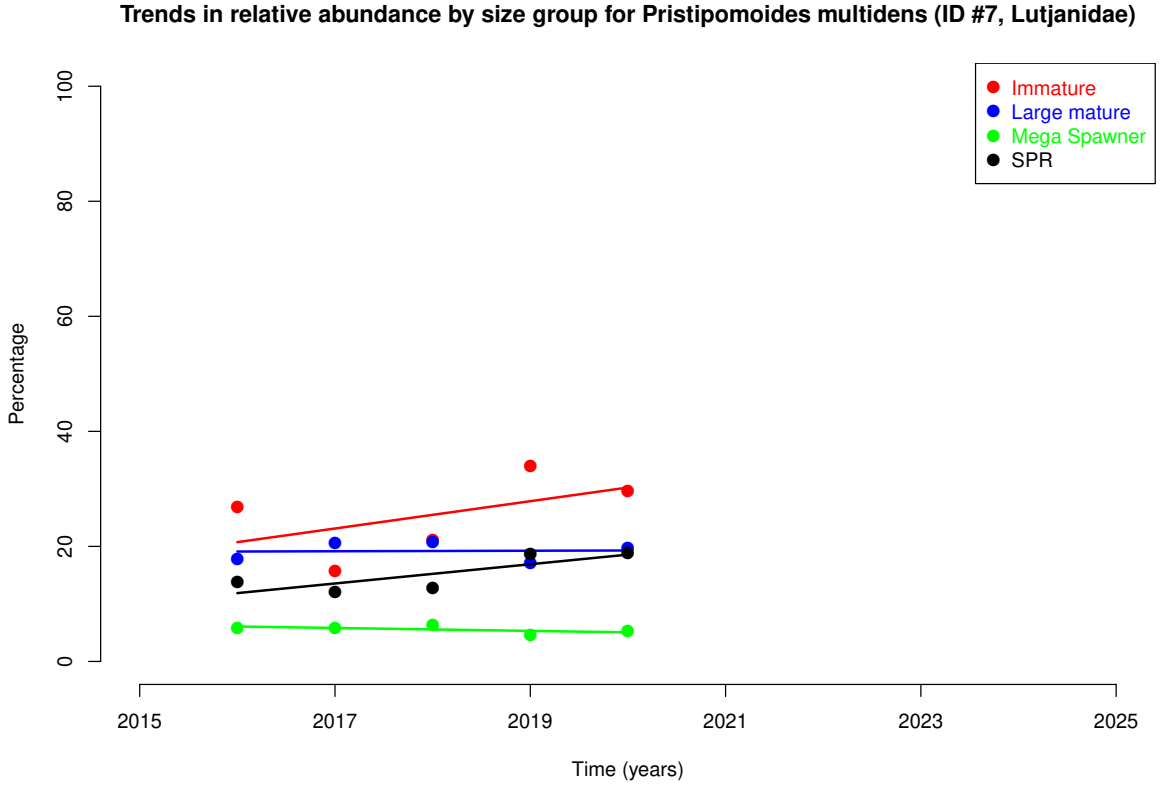
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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 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: 0.144
% Large Mature falling over recent years, situation deteriorating. P: 0.095
% Mega Spawner falling over recent years, situation deteriorating. P: 0.041
% SPR falling over recent years, situation deteriorating. P: 0.015


Catch length frequency for Pristipomoides multidens (ID #7, Lutjanidae)
Most Recent 365 Days. N (Catch) = 923,432, n (Sample) = 34,385.
33 %
49 %
18 %
Trade Limit
L–maturity
L–optimum
L–max
L–median
L–infinity
Trade Limit 35 cm
L–maturity 48 cm
L–optimum 64 cm
L–infinity 82 cm
L–max 91 cm
L–median 53 cm
Lx–codrs 91 cm
SPR 18 %
Frequency
0
5000
10000
15000
20000
25000
30000
20
40
60
80
100
Total Length (cm)


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

The percentages of Pristipomoides multidens (ID #7, Lutjanidae) in most recent 365 days.
N (Catch) =923,432, n (Sample) = 34,385
Immature (< 48cm): 33%
Small mature (>= 48cm, < 64cm): 49%
Large mature (>= 64cm): 18%
Mega spawner (>= 70.4cm): 5% (subset of large mature fish)
Spawning Potential Ratio: 18 %

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.

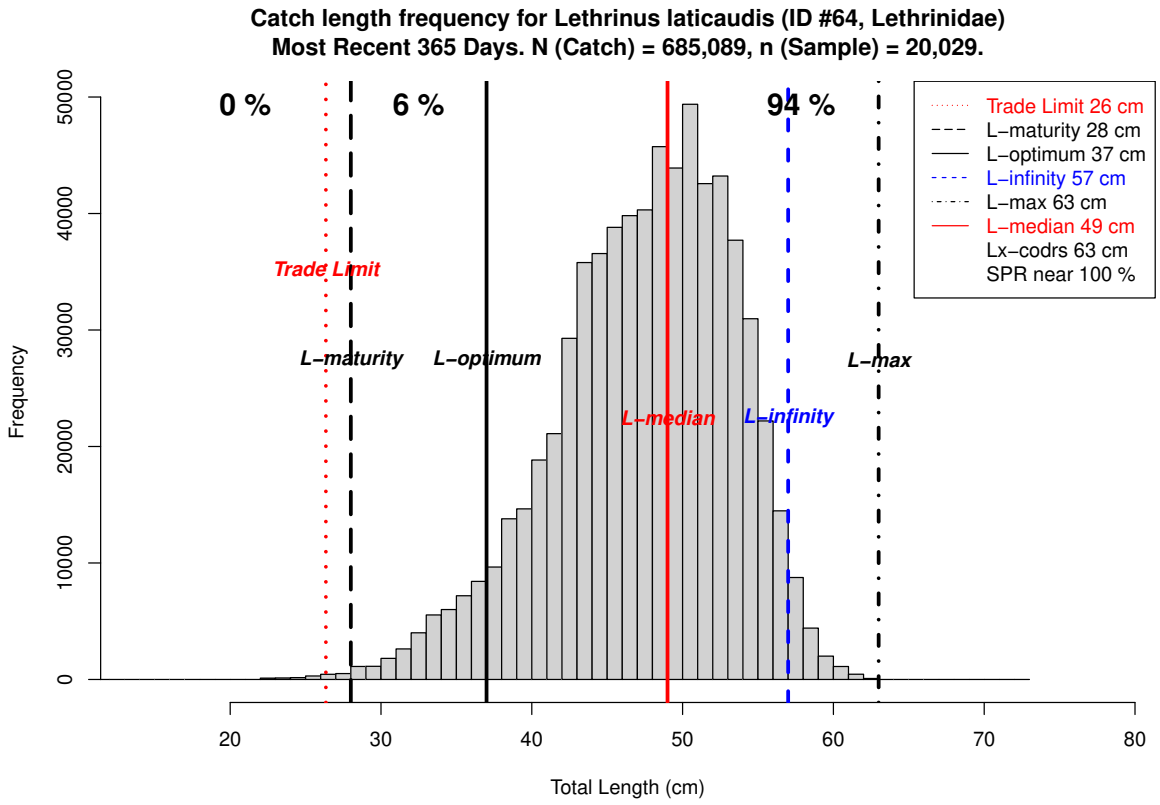
Between 30% and 50% of the fish in the catch are immature and have not had a chance to reproduce before capture. The fishery is in immediate danger of overfishing through overharvesting of juveniles, if fishing pressure is high. Catching small and immature fish needs to be actively avoided and a limit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

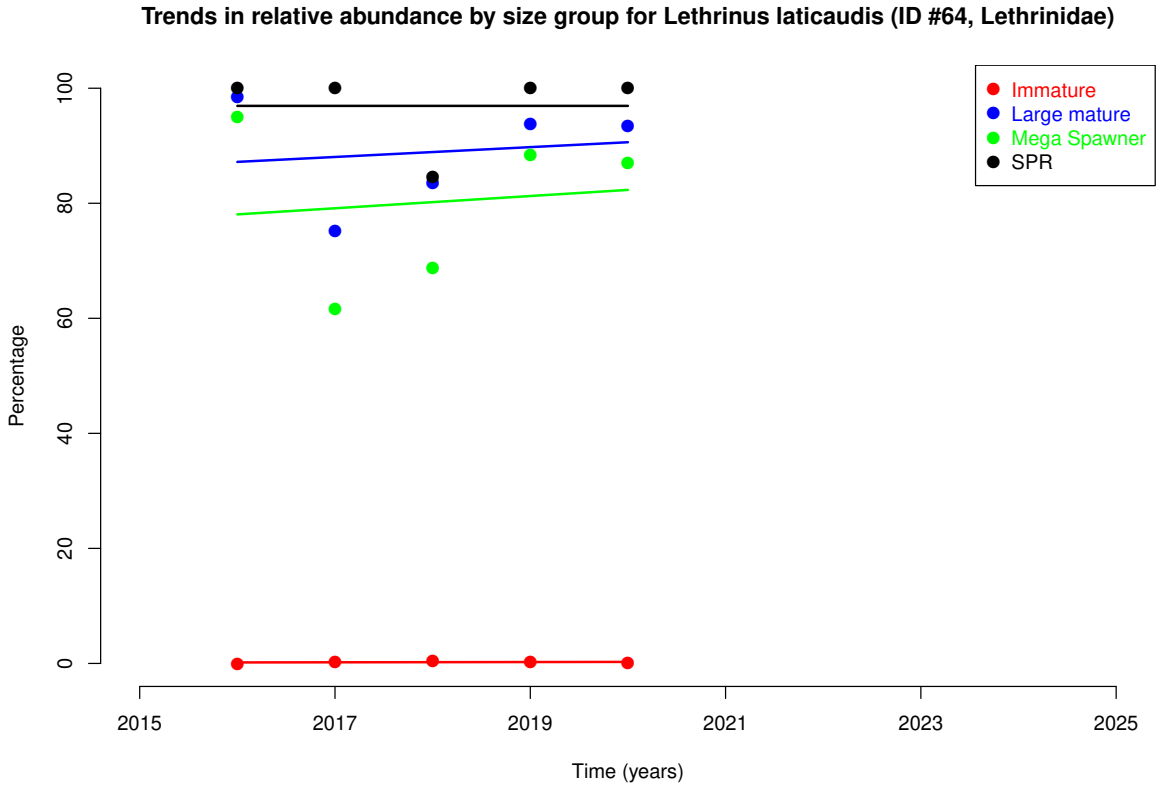
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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: 0.368
% Large Mature no trend over recent years, situation stable. P: 0.945
% Mega Spawner falling over recent years, situation deteriorating. P: 0.319
% SPR rising over recent years, situation improving. P: 0.097


Catch length frequency for Lethrinus laticaudis (ID #64, Lethrinidae)
Most Recent 365 Days. N (Catch) = 685,089, n (Sample) = 20,029.
0 %
6 %
94 %
Trade Limit 26 cm
L–maturity 28 cm
L–optimum 37 cm
L–infinity 57 cm
L–max 63 cm
L–median 49 cm
Lx–codrs 63 cm
SPR near 100 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
Frequency
0
10000
20000
30000
40000
50000
20
30
40
50
60
70
80
Total Length (cm)


Trends in relative abundance by size group for Lethrinus laticaudis (ID #64, Lethrinidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
0
20
40
60
80
100
2015
2017
2019
2021
2023
2025
Time (years)

The percentages of Lethrinus laticaudis (ID #64, Lethrinidae) in most recent 365 days.
N (Catch) =685,089, n (Sample) = 20,029
Immature (< 28cm): 0%
Small mature (>= 28cm, < 37cm): 6%
Large mature (>= 37cm): 94%
Mega spawner (>= 40.7cm): 89% (subset of large mature fish)
Spawning Potential Ratio: near 100 %

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

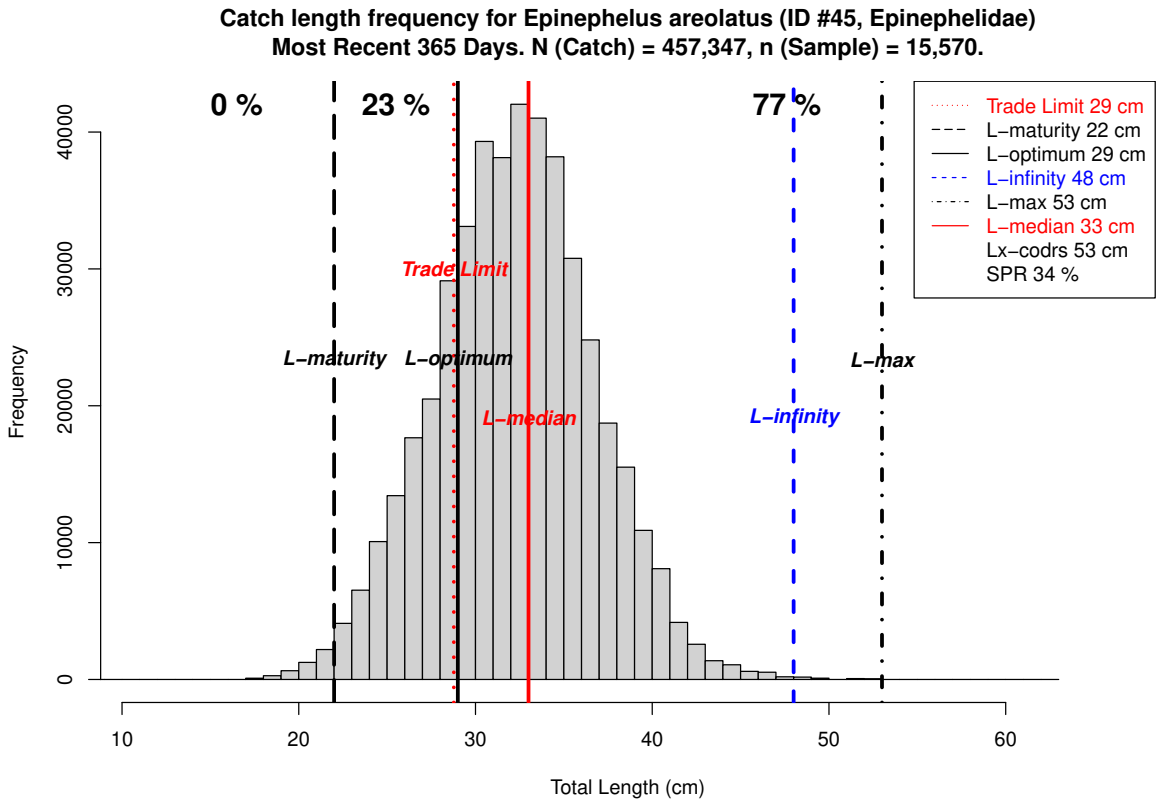
At least 90% of the fish in the catch are mature specimens that have spawned at least once before they were caught. The fishery does not depend on immature size classes for this species and is considered safe for this indicator. This fishery will not be causing overfishing through over harvesting of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

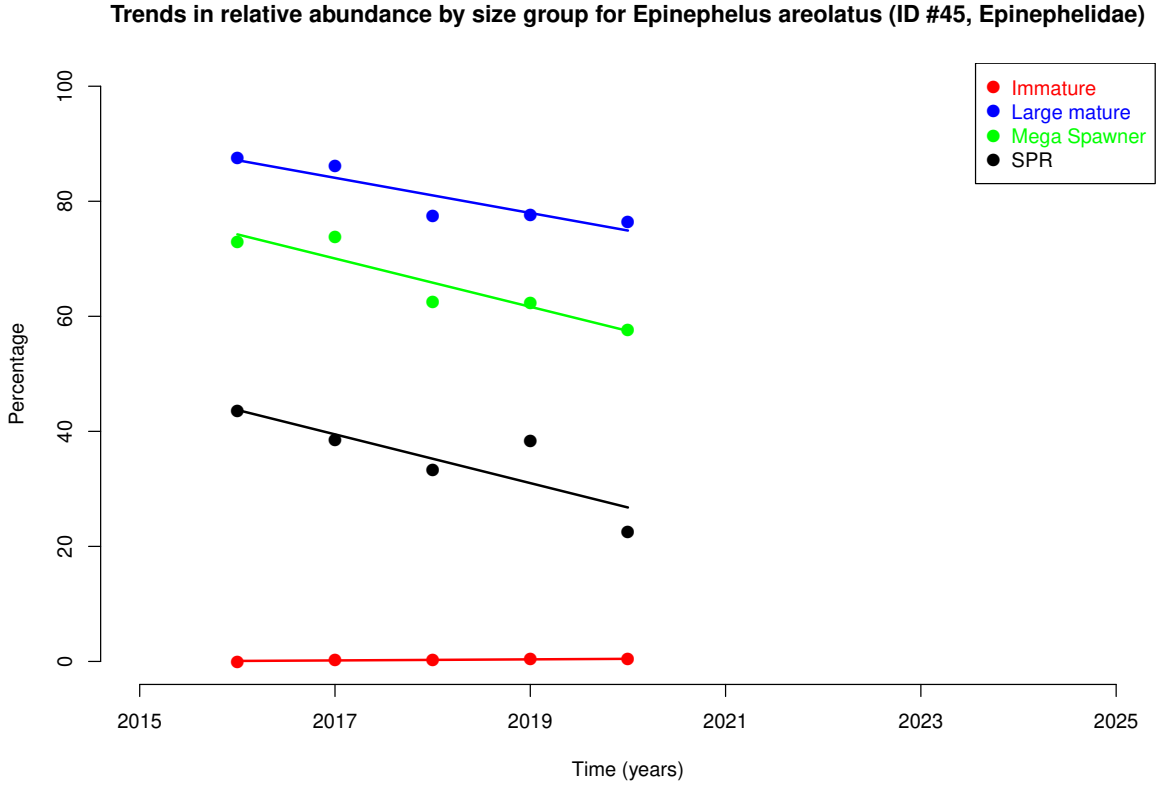
The majority of the catch consists of size classes around or above the optimum harvest size. This means that the impact of the fishery is minimized for this species. Potentially higher yields of this species could be achieved by catching them at somewhat smaller size, although capture of smaller specimen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

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

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

Trends in relative abundance by size group for Lethrinus laticaudis (ID #64, Lethrinidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature no trend over recent years, situation stable. P: 0.736
% Large Mature rising over recent years, situation improving. P: 0.818
% Mega Spawner rising over recent years, situation improving. P: 0.850
% SPR no trend over recent years, situation stable. P: 1.000


Catch length frequency for Epinephelus areolatus (ID #45, Epinephelidae)
Most Recent 365 Days. N (Catch) = 457,347, n (Sample) = 15,570.
0 %
23 %
77 %
Trade Limit 29 cm
L–maturity 22 cm
L–optimum 29 cm
L–infinity 48 cm
L–max 53 cm
L–median 33 cm
Lx–codrs 53 cm
SPR 34 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
Frequency
0
10000
20000
30000
40000
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) =457,347, n (Sample) = 15,570
Immature (< 22cm): 0%
Small mature (>= 22cm, < 29cm): 23%
Large mature (>= 29cm): 77%
Mega spawner (>= 31.9cm): 61% (subset of large mature fish)
Spawning Potential Ratio: 34 %

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

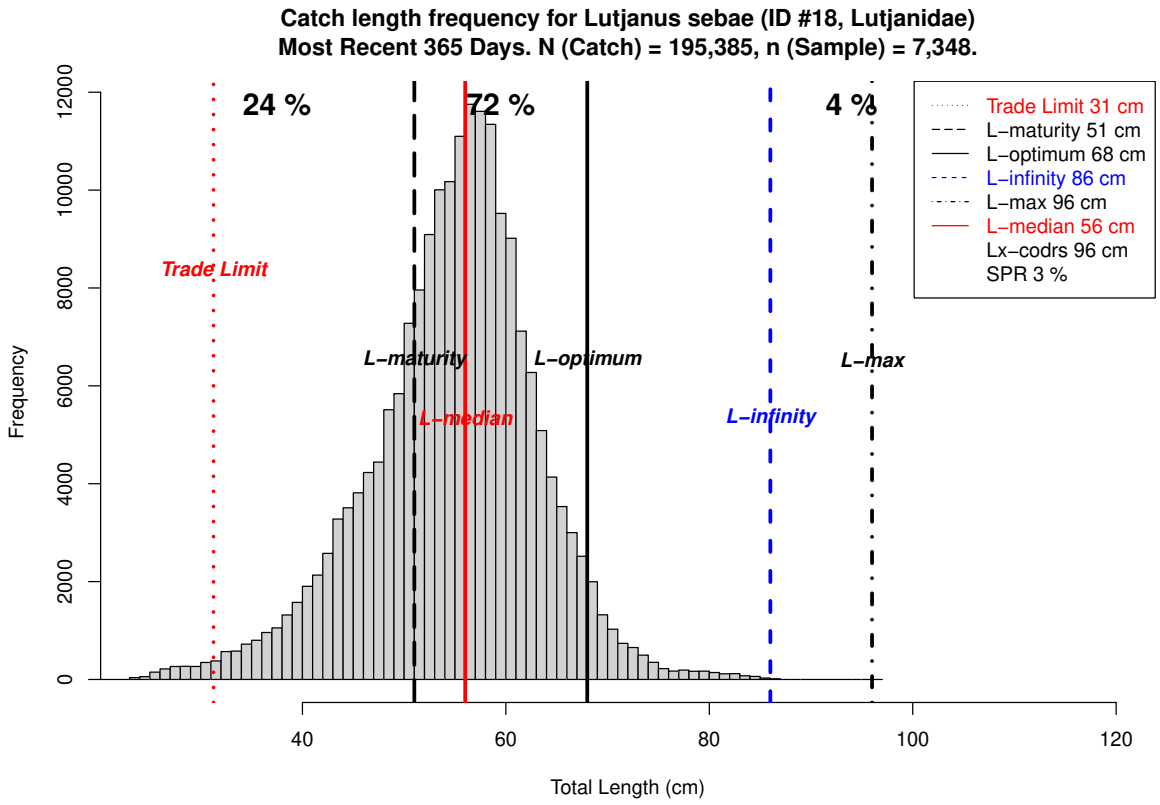
At least 90% of the fish in the catch are mature specimens that have spawned at least once before they were caught. The fishery does not depend on immature size classes for this species and is considered safe for this indicator. This fishery will not be causing overfishing through over harvesting of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

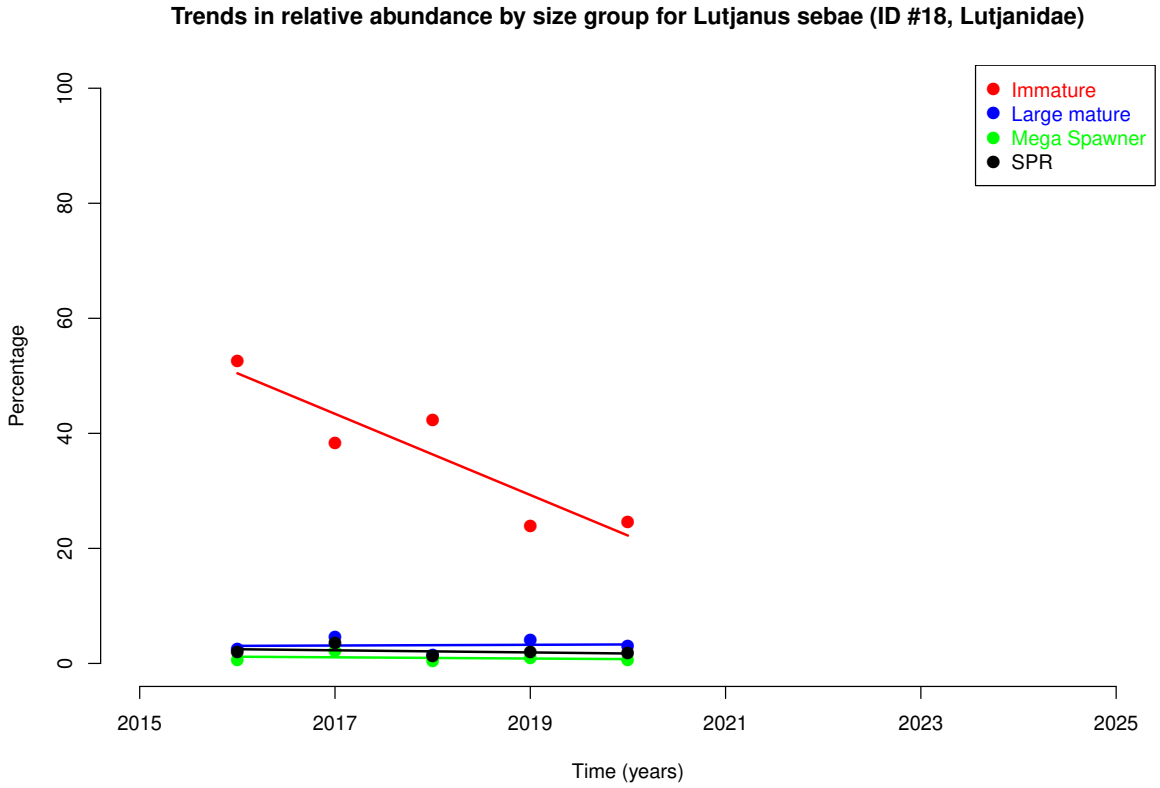
The majority of the catch consists of size classes around or above the optimum harvest size. This means that the impact of the fishery is minimized for this species. Potentially higher yields of this species could be achieved by catching them at somewhat smaller size, although capture of smaller specimen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

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

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

Trends in relative abundance by size group for Epinephelus areolatus (ID #45, Epinephelidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature no trend over recent years, situation stable. P: 0.047
% Large Mature falling over recent years, situation deteriorating. P: 0.032
% Mega Spawner falling over recent years, situation deteriorating. P: 0.021
% SPR falling over recent years, situation deteriorating. P: 0.078


Catch length frequency for Lutjanus sebae (ID #18, Lutjanidae)
Most Recent 365 Days. N (Catch) = 195,385, n (Sample) = 7,348.
24 %
72 %
4 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
Trade Limit 31 cm
L–maturity 51 cm
L–optimum 68 cm
L–infinity 86 cm
L–max 96 cm
L–median 56 cm
Lx–codrs 96 cm
SPR 3 %
Frequency
0
2000
4000
6000
8000
10000
12000
40
60
80
100
120
Total Length (cm)


Trends in relative abundance by size group for Lutjanus sebae (ID #18, Lutjanidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
0
20
40
60
80
100
2015
2017
2019
2021
2023
2025
Time (years)

The percentages of Lutjanus sebae (ID #18, Lutjanidae) in most recent 365 days.
N (Catch) =195,385, n (Sample) = 7,348
Immature (< 51cm): 24%
Small mature (>= 51cm, < 68cm): 72%
Large mature (>= 68cm): 4%
Mega spawner (>= 74.8cm): 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.

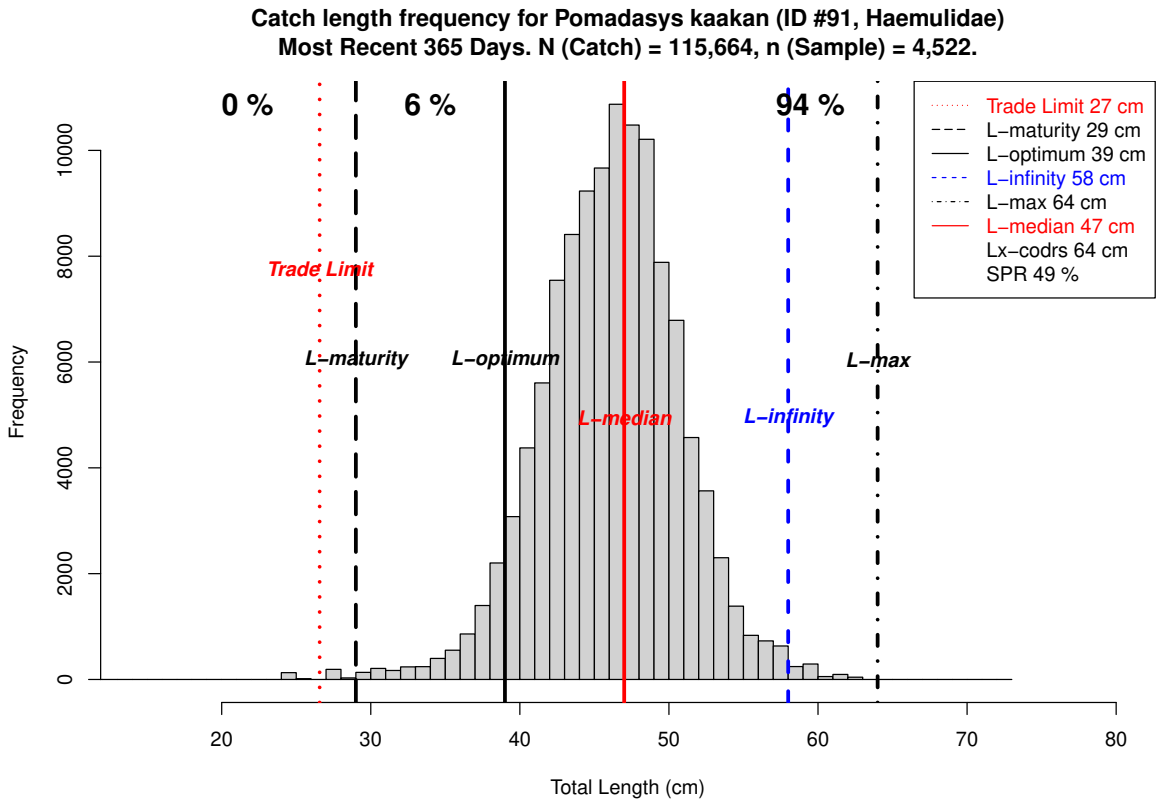
Between 20% and 30% of the fish in the catch are specimens that have not yet reproduced. This is reason for concern in terms of potential overfishing through overharvesting of juveniles, if fishing pressure is high and percentages immature fish would further rise. Targeting larger fish and avoiding small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

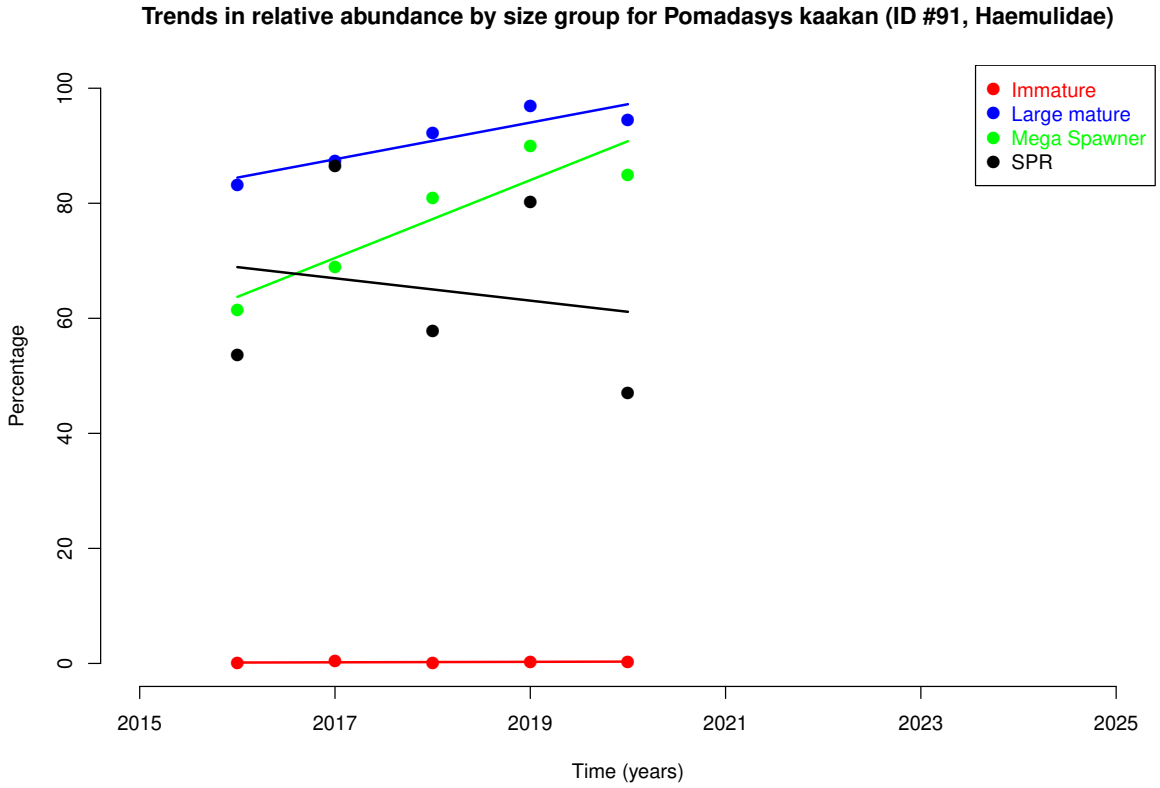
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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 sebae (ID #18, Lutjanidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature falling over recent years, situation improving. P: 0.031
% Large Mature no trend over recent years, situation stable. P: 0.900
% Mega Spawner falling over recent years, situation deteriorating. P: 0.701
% SPR falling over recent years, situation deteriorating. P: 0.560


Catch length frequency for Pomadasys kaakan (ID #91, Haemulidae)
Most Recent 365 Days. N (Catch) = 115,664, n (Sample) = 4,522.
0 %
6 %
94 %
Trade Limit 27 cm
L–maturity 29 cm
L–optimum 39 cm
L–infinity 58 cm
L–max 64 cm
L–median 47 cm
Lx–codrs 64 cm
SPR 49 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
Frequency
0
2000
4000
6000
8000
10000
20
30
40
50
60
70
80
Total Length (cm)


Trends in relative abundance by size group for Pomadasys kaakan (ID #91, Haemulidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
0
20
40
60
80
100
2015
2017
2019
2021
2023
2025
Time (years)

The percentages of Pomadasys kaakan (ID #91, Haemulidae) in most recent 365 days.
N (Catch) =115,664, n (Sample) = 4,522
Immature (< 29cm): 0%
Small mature (>= 29cm, < 39cm): 6%
Large mature (>= 39cm): 94%
Mega spawner (>= 42.9cm): 83% (subset of large mature fish)
Spawning Potential Ratio: 49 %

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

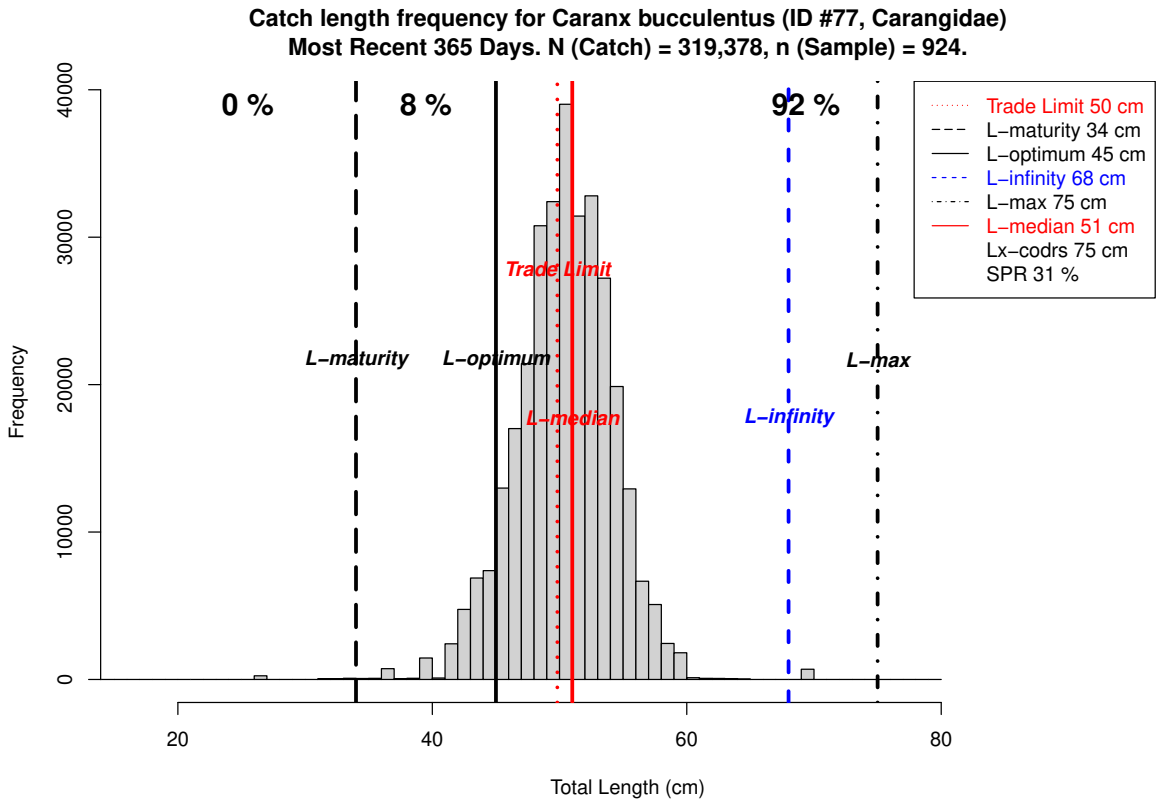
At least 90% of the fish in the catch are mature specimens that have spawned at least once before they were caught. The fishery does not depend on immature size classes for this species and is considered safe for this indicator. This fishery will not be causing overfishing through over harvesting of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

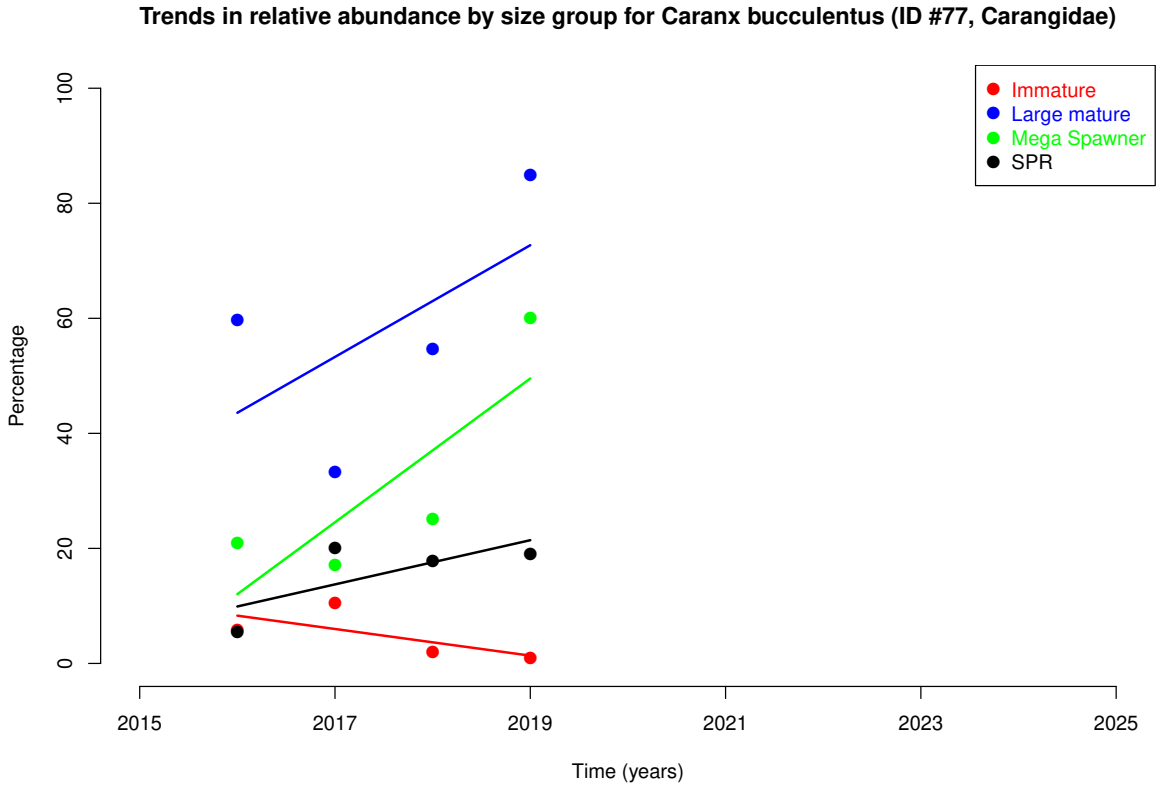
The majority of the catch consists of size classes around or above the optimum harvest size. This means that the impact of the fishery is minimized for this species. Potentially higher yields of this species could be achieved by catching them at somewhat smaller size, although capture of smaller specimen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

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

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

Trends in relative abundance by size group for Pomadasys kaakan (ID #91, Haemulidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature no trend over recent years, situation stable. P: 0.542
% Large Mature rising over recent years, situation improving. P: 0.028
% Mega Spawner rising over recent years, situation improving. P: 0.030
% SPR falling over recent years, situation deteriorating. P: 0.775


Catch length frequency for Caranx bucculentus (ID #77, Carangidae)
Most Recent 365 Days. N (Catch) = 319,378, n (Sample) = 924.
0 %
8 %
92 %
Trade Limit 50 cm
L–maturity 34 cm
L–optimum 45 cm
L–infinity 68 cm
L–max 75 cm
L–median 51 cm
Lx–codrs 75 cm
SPR 31 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
Frequency
0
10000
20000
30000
40000
20
40
60
80
Total Length (cm)


Trends in relative abundance by size group for Caranx bucculentus (ID #77, Carangidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
0
20
40
60
80
100
2015
2017
2019
2021
2023
2025
Time (years)

The percentages of Caranx bucculentus (ID #77, Carangidae) in most recent 365 days.
N (Catch) =319,378, n (Sample) = 924
Immature (< 34cm): 0%
Small mature (>= 34cm, < 45cm): 8%
Large mature (>= 45cm): 92%
Mega spawner (>= 49.5cm): 67% (subset of large mature fish)
Spawning Potential Ratio: 31 %

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.

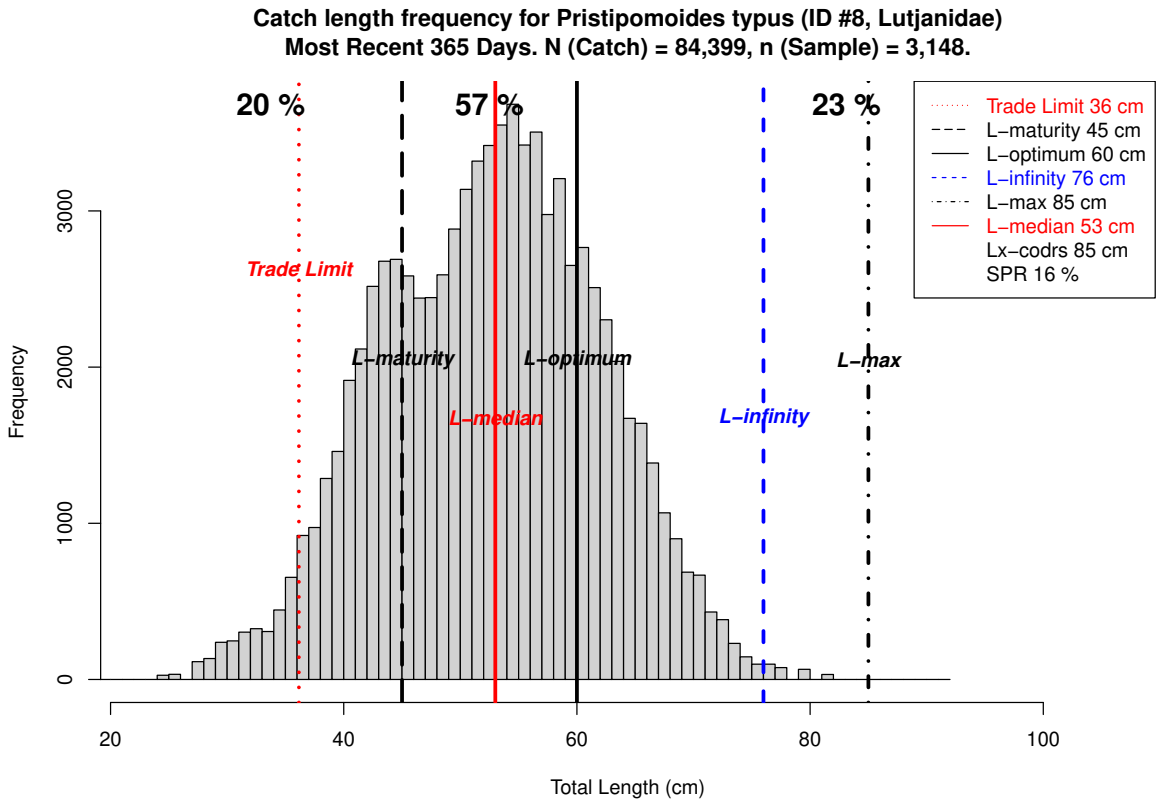
At least 90% of the fish in the catch are mature specimens that have spawned at least once before they were caught. The fishery does not depend on immature size classes for this species and is considered safe for this indicator. This fishery will not be causing overfishing through over harvesting of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

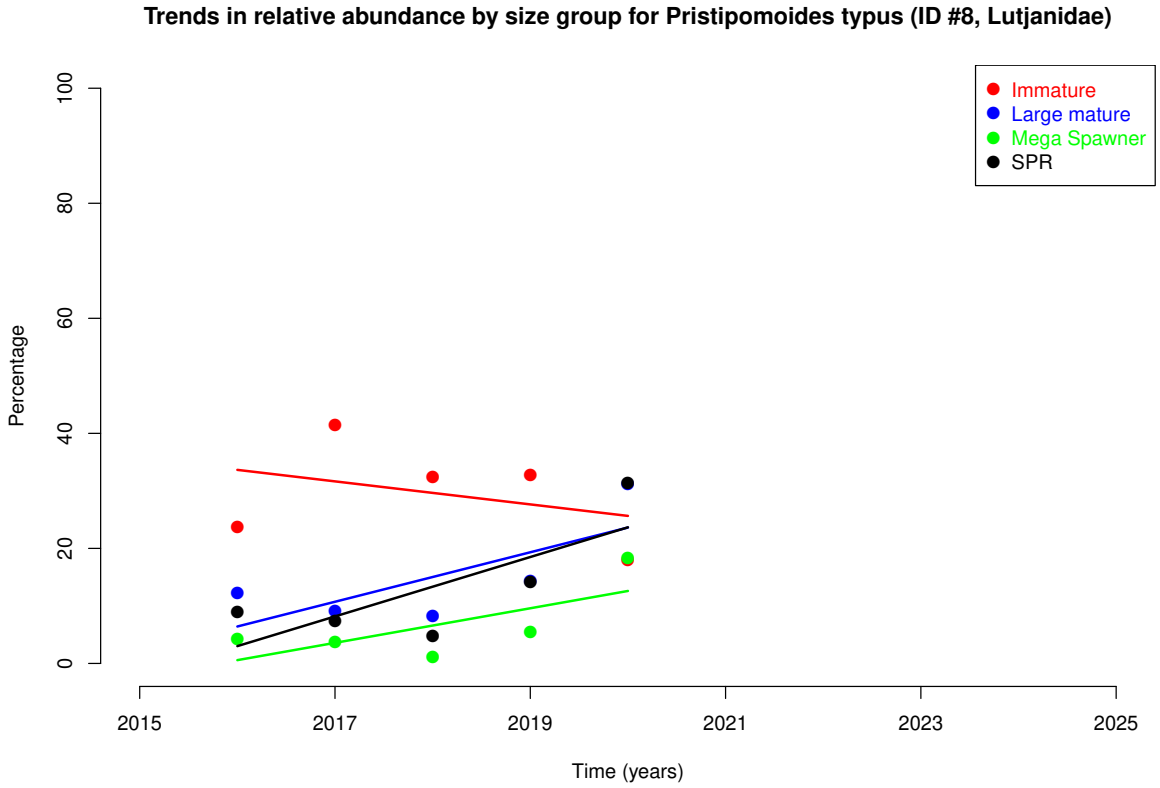
The majority of the catch consists of size classes around or above the optimum harvest size. This means that the impact of the fishery is minimized for this species. Potentially higher yields of this species could be achieved by catching them at somewhat smaller size, although capture of smaller specimen 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 Caranx bucculentus (ID #77, Carangidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature falling over recent years, situation improving. P: 0.314
% Large Mature rising over recent years, situation improving. P: 0.409
% Mega Spawner rising over recent years, situation improving. P: 0.182
% SPR rising over recent years, situation improving. P: 0.273


Catch length frequency for Pristipomoides typus (ID #8, Lutjanidae)
Most Recent 365 Days. N (Catch) = 84,399, n (Sample) = 3,148.
20 %
57 %
23 %
Trade Limit 36 cm
L–maturity 45 cm
L–optimum 60 cm
L–infinity 76 cm
L–max 85 cm
L–median 53 cm
Lx–codrs 85 cm
SPR 16 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
Frequency
0
1000
2000
3000
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) =84,399, n (Sample) = 3,148
Immature (< 45cm): 20%
Small mature (>= 45cm, < 60cm): 57%
Large mature (>= 60cm): 23%
Mega spawner (>= 66cm): 9% (subset of large mature fish)
Spawning Potential Ratio: 16 %

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.

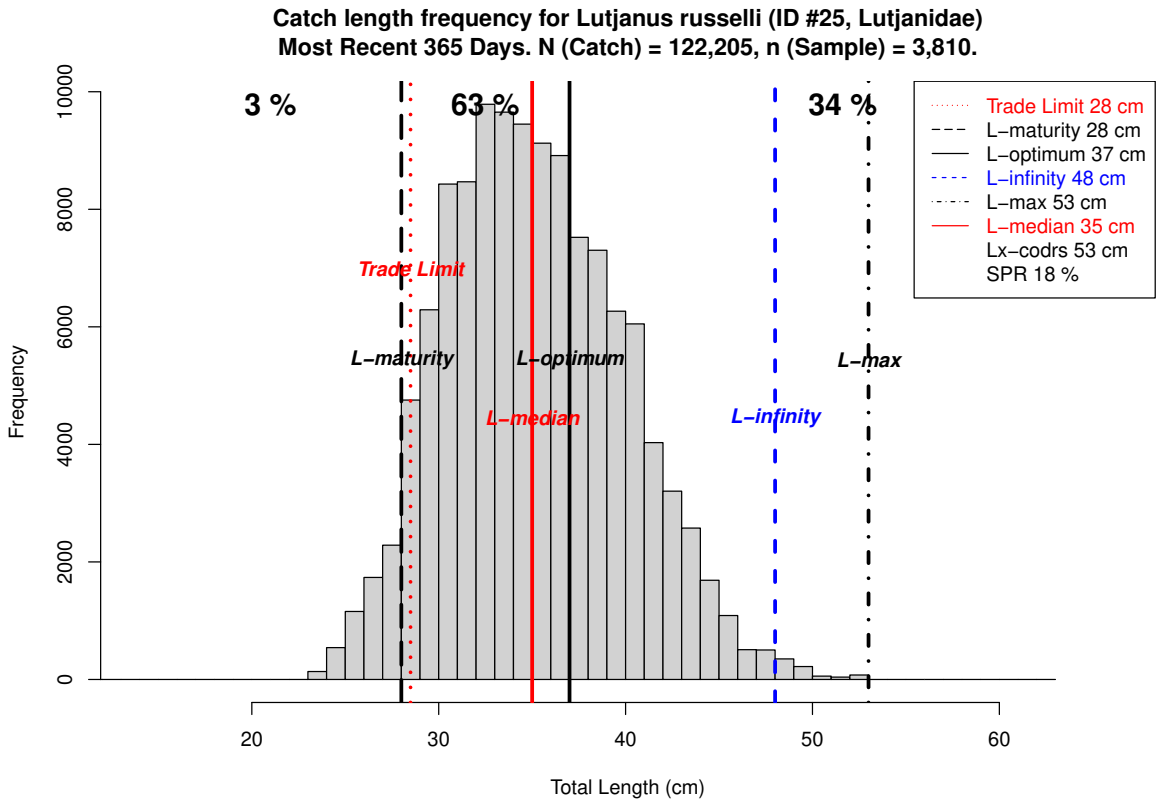
Between 10% and 20% of the fish in the catch are juveniles that have not yet reproduced. There is no immediate concern in terms of overfishing through over harvesting of juveniles, but the fishery needs to be monitored closely for any further increase in this indicator and incentives need to be geared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

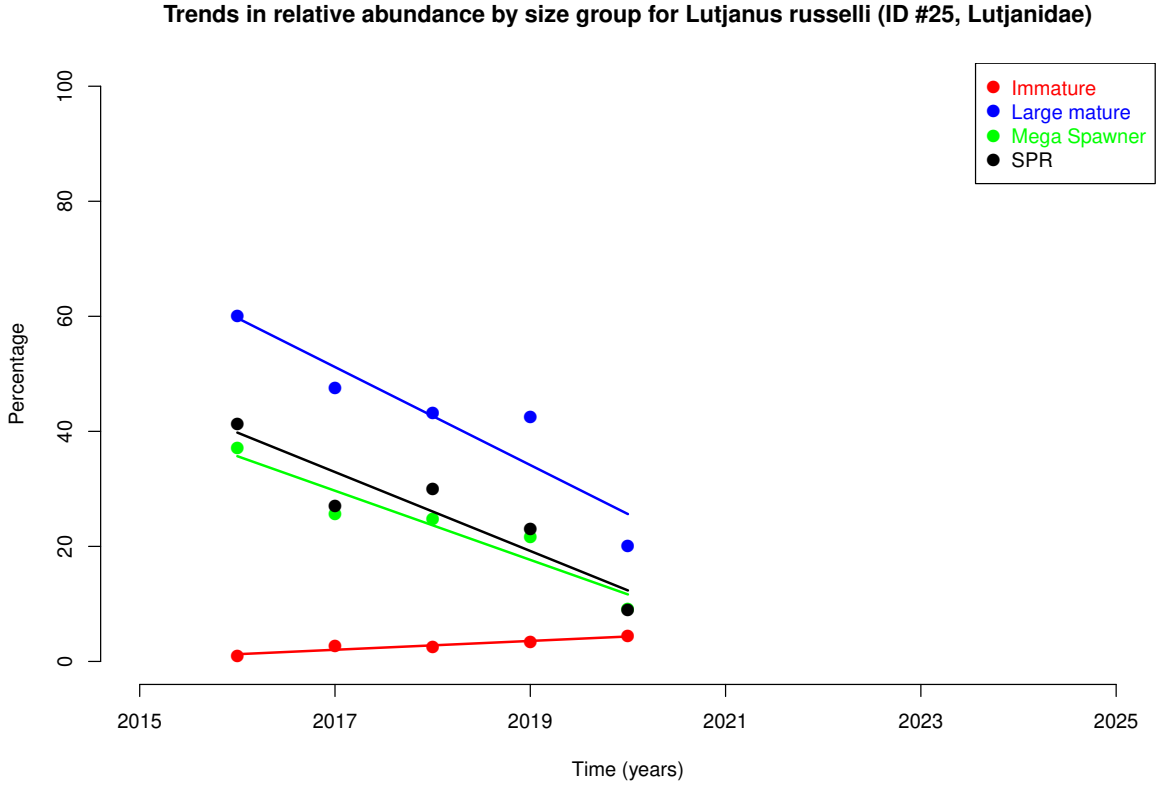
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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 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 falling over recent years, situation improving. P: 0.565
% Large Mature rising over recent years, situation improving. P: 0.162
% Mega Spawner rising over recent years, situation improving. P: 0.186
% SPR rising over recent years, situation improving. P: 0.132


Catch length frequency for Lutjanus russelli (ID #25, Lutjanidae)
Most Recent 365 Days. N (Catch) = 122,205, n (Sample) = 3,810.
3 %
63 %
34 %
Trade Limit 28 cm
L–maturity 28 cm
L–optimum 37 cm
L–infinity 48 cm
L–max 53 cm
L–median 35 cm
Lx–codrs 53 cm
SPR 18 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
Frequency
0
2000
4000
6000
8000
10000
20
30
40
50
60
Total Length (cm)


Trends in relative abundance by size group for Lutjanus russelli (ID #25, Lutjanidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
0
20
40
60
80
100
2015
2017
2019
2021
2023
2025
Time (years)

The percentages of Lutjanus russelli (ID #25, Lutjanidae) in most recent 365 days.
N (Catch) =122,205, n (Sample) = 3,810
Immature (< 28cm): 3%
Small mature (>= 28cm, < 37cm): 63%
Large mature (>= 37cm): 34%
Mega spawner (>= 40.7cm): 17% (subset of large mature fish)
Spawning Potential Ratio: 18 %

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

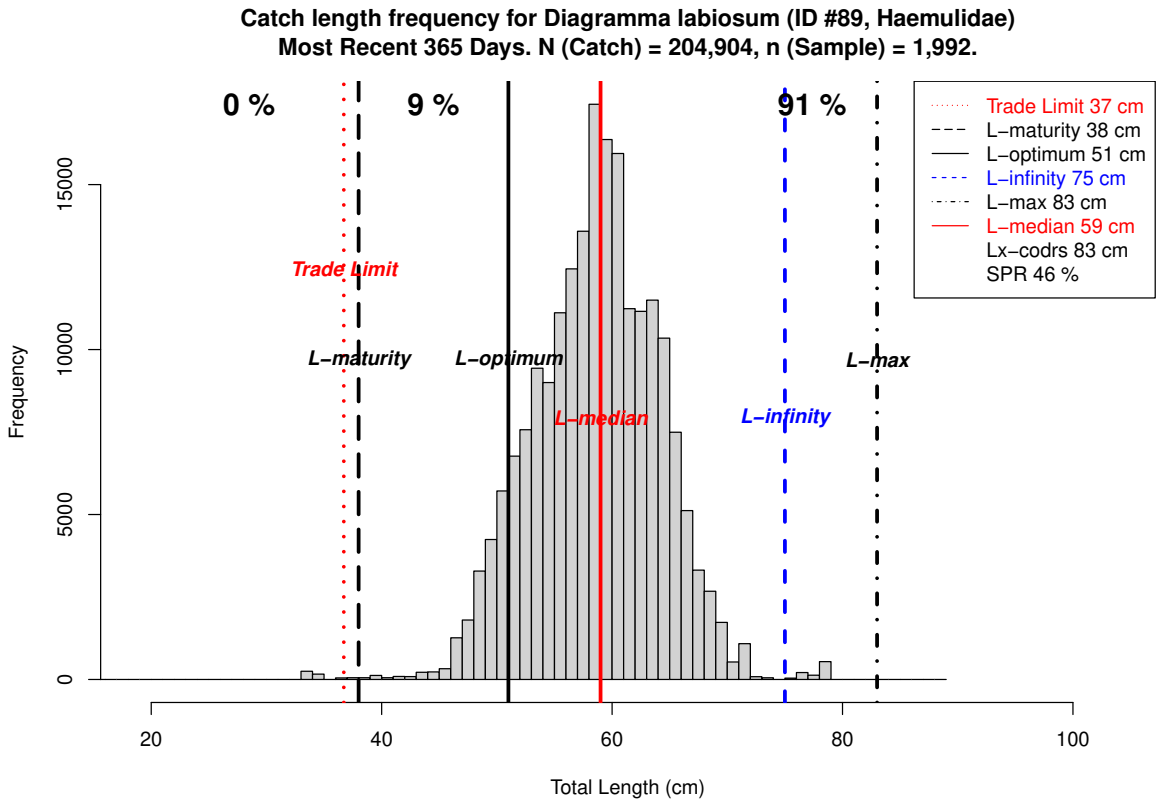
At least 90% of the fish in the catch are mature specimens that have spawned at least once before they were caught. The fishery does not depend on immature size classes for this species and is considered safe for this indicator. This fishery will not be causing overfishing through over harvesting of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

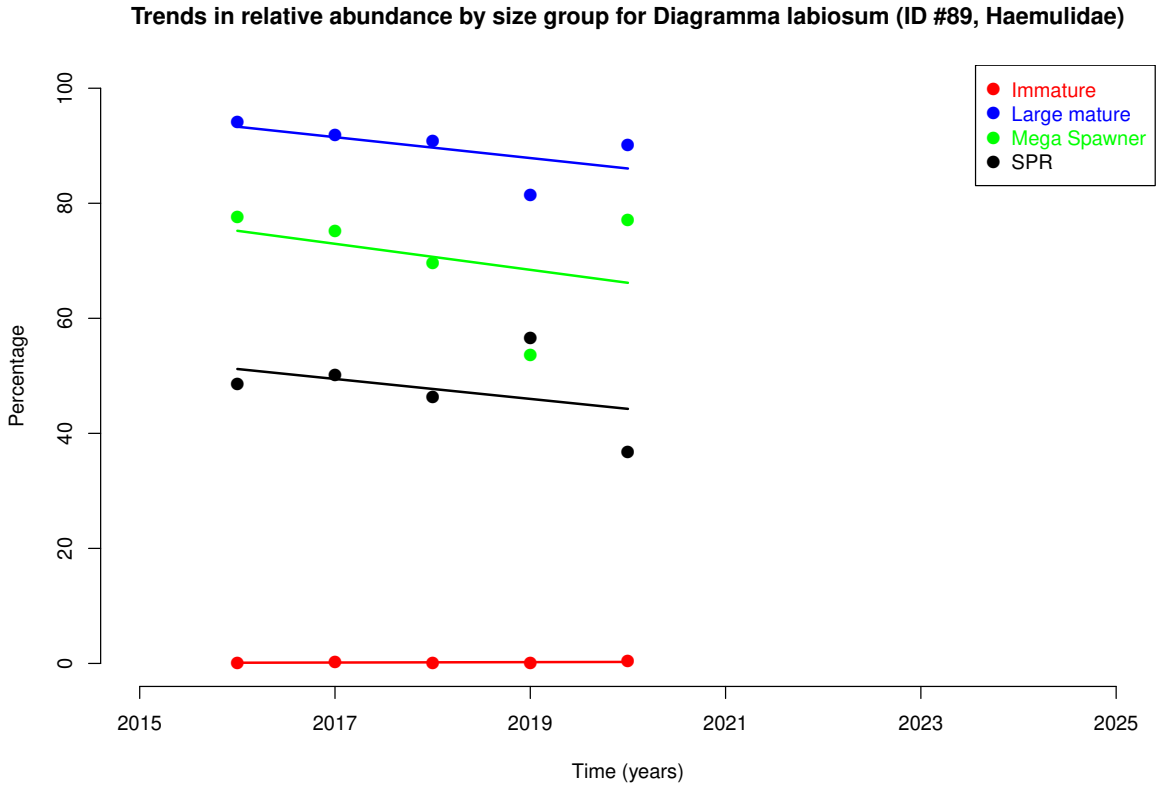
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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

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

Trends in relative abundance by size group for Lutjanus russelli (ID #25, Lutjanidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature rising over recent years, situation deteriorating. P: 0.011
% Large Mature falling over recent years, situation deteriorating. P: 0.022
% Mega Spawner falling over recent years, situation deteriorating. P: 0.015
% SPR falling over recent years, situation deteriorating. P: 0.024


Catch length frequency for Diagramma labiosum (ID #89, Haemulidae)
Most Recent 365 Days. N (Catch) = 204,904, n (Sample) = 1,992.
0 %
9 %
91 %
Trade Limit 37 cm
L–maturity 38 cm
L–optimum 51 cm
L–infinity 75 cm
L–max 83 cm
L–median 59 cm
Lx–codrs 83 cm
SPR 46 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
Frequency
0
5000
10000
15000
20
40
60
80
100
Total Length (cm)


Trends in relative abundance by size group for Diagramma labiosum (ID #89, Haemulidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
0
20
40
60
80
100
2015
2017
2019
2021
2023
2025
Time (years)

The percentages of Diagramma labiosum (ID #89, Haemulidae) in most recent 365 days.
N (Catch) =204,904, n (Sample) = 1,992
Immature (< 38cm): 0%
Small mature (>= 38cm, < 51cm): 9%
Large mature (>= 51cm): 91%
Mega spawner (>= 56.1cm): 70% (subset of large mature fish)
Spawning Potential Ratio: 46 %

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

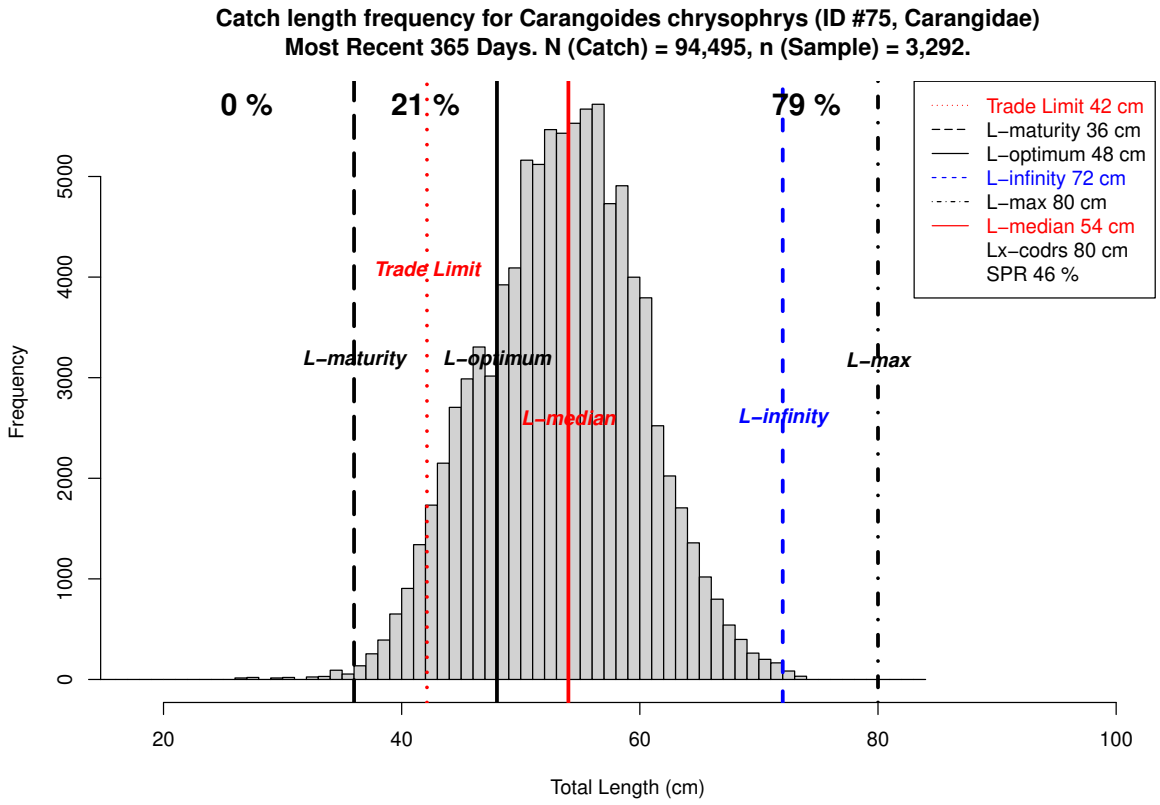
At least 90% of the fish in the catch are mature specimens that have spawned at least once before they were caught. The fishery does not depend on immature size classes for this species and is considered safe for this indicator. This fishery will not be causing overfishing through over harvesting of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

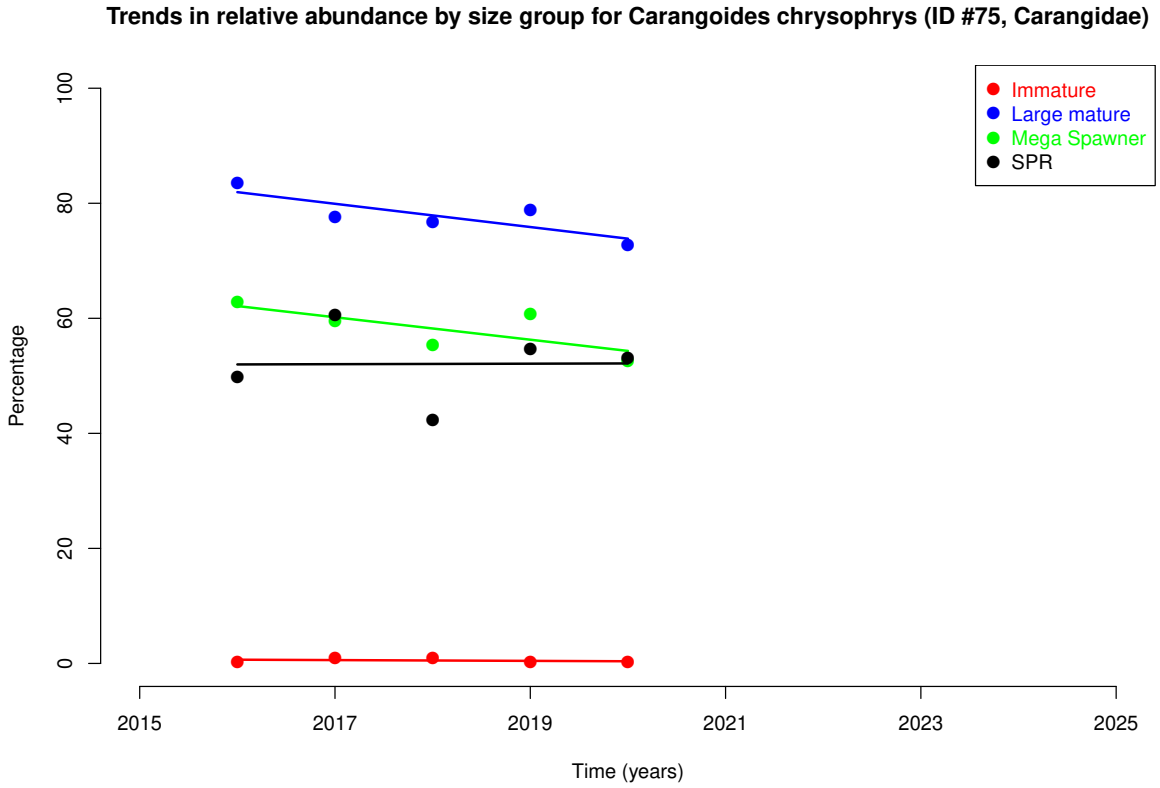
The majority of the catch consists of size classes around or above the optimum harvest size. This means that the impact of the fishery is minimized for this species. Potentially higher yields of this species could be achieved by catching them at somewhat smaller size, although capture of smaller specimen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

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

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

Trends in relative abundance by size group for Diagramma labiosum (ID #89, Haemulidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature no trend over recent years, situation stable. P: 0.529
% Large Mature falling over recent years, situation deteriorating. P: 0.286
% Mega Spawner falling over recent years, situation deteriorating. P: 0.556
% SPR falling over recent years, situation deteriorating. P: 0.528


Catch length frequency for Carangoides chrysophrys (ID #75, Carangidae)
Most Recent 365 Days. N (Catch) = 94,495, n (Sample) = 3,292.
0 %
21 %
79 %
Trade Limit 42 cm
L–maturity 36 cm
L–optimum 48 cm
L–infinity 72 cm
L–max 80 cm
L–median 54 cm
Lx–codrs 80 cm
SPR 46 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
Frequency
0
1000
2000
3000
4000
5000
20
40
60
80
100
Total Length (cm)


Trends in relative abundance by size group for Carangoides chrysophrys (ID #75, Carangidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
0
20
40
60
80
100
2015
2017
2019
2021
2023
2025
Time (years)

The percentages of Carangoides chrysophrys (ID #75, Carangidae) in most recent 365 days.
N (Catch) =94,495, n (Sample) = 3,292
Immature (< 36cm): 0%
Small mature (>= 36cm, < 48cm): 21%
Large mature (>= 48cm): 79%
Mega spawner (>= 52.8cm): 60% (subset of large mature fish)
Spawning Potential Ratio: 46 %

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.

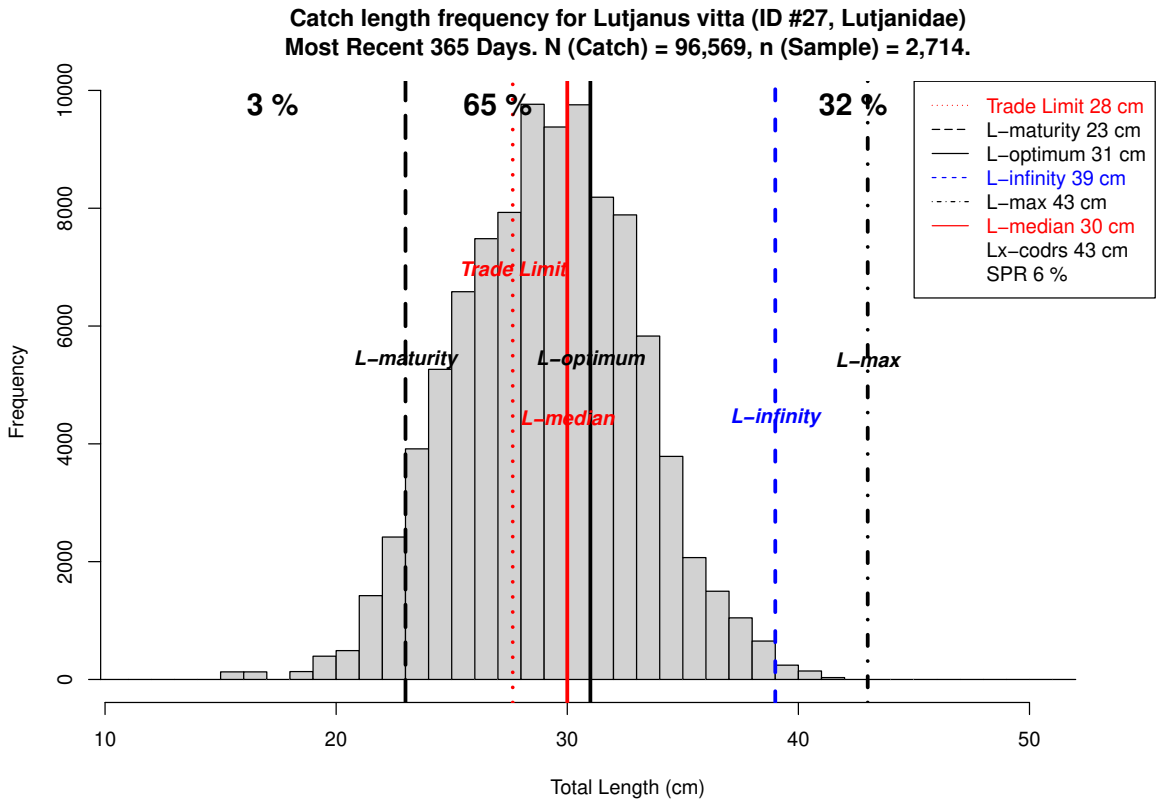
At least 90% of the fish in the catch are mature specimens that have spawned at least once before they were caught. The fishery does not depend on immature size classes for this species and is considered safe for this indicator. This fishery will not be causing overfishing through over harvesting of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

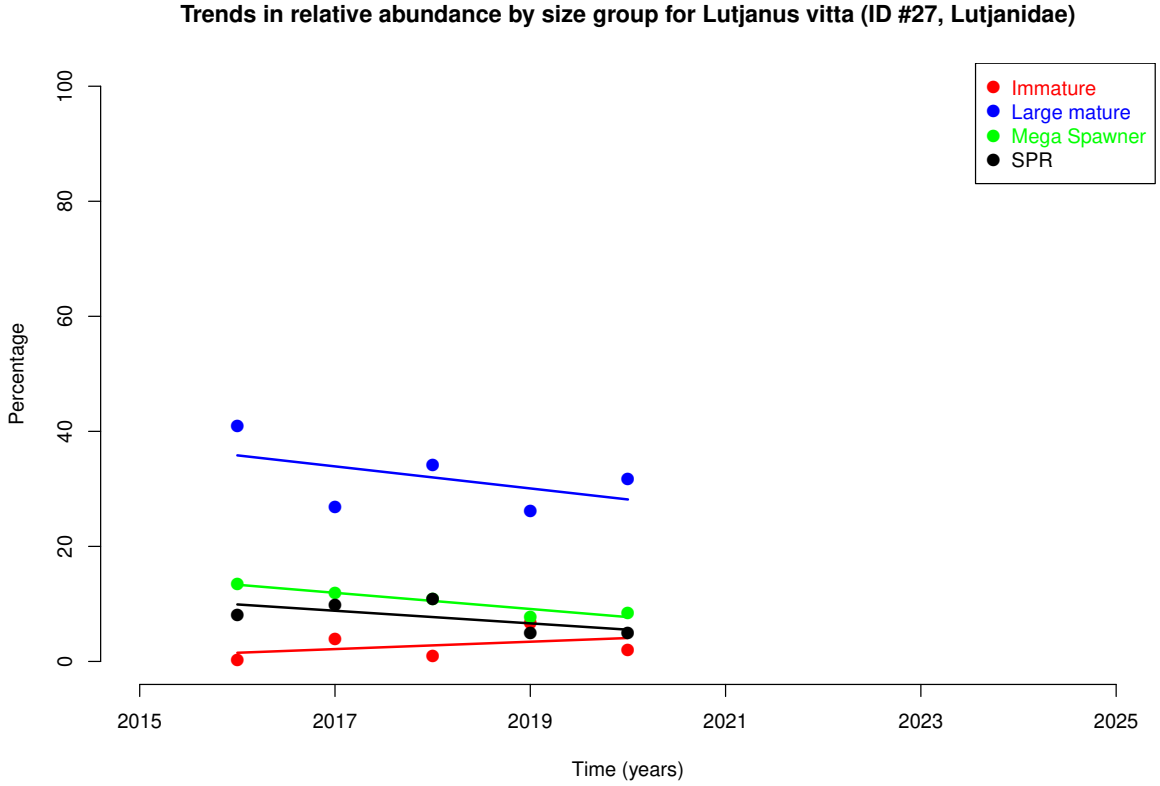
The majority of the catch consists of size classes around or above the optimum harvest size. This means that the impact of the fishery is minimized for this species. Potentially higher yields of this species could be achieved by catching them at somewhat smaller size, although capture of smaller specimen 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 Carangoides chrysophrys (ID #75, Carangidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature no trend over recent years, situation stable. P: 0.646
% Large Mature falling over recent years, situation deteriorating. P: 0.087
% Mega Spawner falling over recent years, situation deteriorating. P: 0.160
% SPR no trend over recent years, situation stable. P: 0.987


Catch length frequency for Lutjanus vitta (ID #27, Lutjanidae)
Most Recent 365 Days. N (Catch) = 96,569, n (Sample) = 2,714.
3 %
65 %
32 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
Trade Limit 28 cm
L–maturity 23 cm
L–optimum 31 cm
L–infinity 39 cm
L–max 43 cm
L–median 30 cm
Lx–codrs 43 cm
SPR 6 %
Frequency
0
2000
4000
6000
8000
10000
10
20
30
40
50
Total Length (cm)


Trends in relative abundance by size group for Lutjanus vitta (ID #27, Lutjanidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
0
20
40
60
80
100
2015
2017
2019
2021
2023
2025
Time (years)

The percentages of Lutjanus vitta (ID #27, Lutjanidae) in most recent 365 days.
N (Catch) =96,569, n (Sample) = 2,714
Immature (< 23cm): 3%
Small mature (>= 23cm, < 31cm): 65%
Large mature (>= 31cm): 32%
Mega spawner (>= 34.1cm): 10% (subset of large mature fish)
Spawning Potential Ratio: 6 %

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

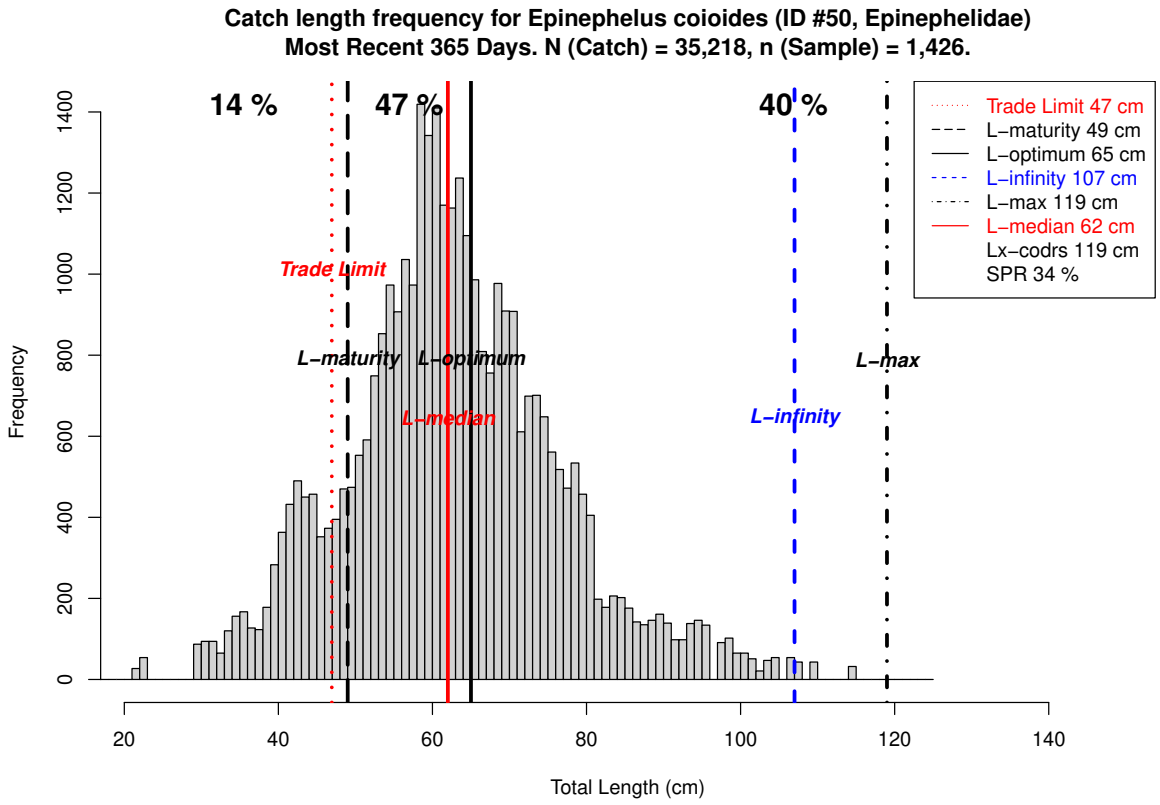
At least 90% of the fish in the catch are mature specimens that have spawned at least once before they were caught. The fishery does not depend on immature size classes for this species and is considered safe for this indicator. This fishery will not be causing overfishing through over harvesting of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

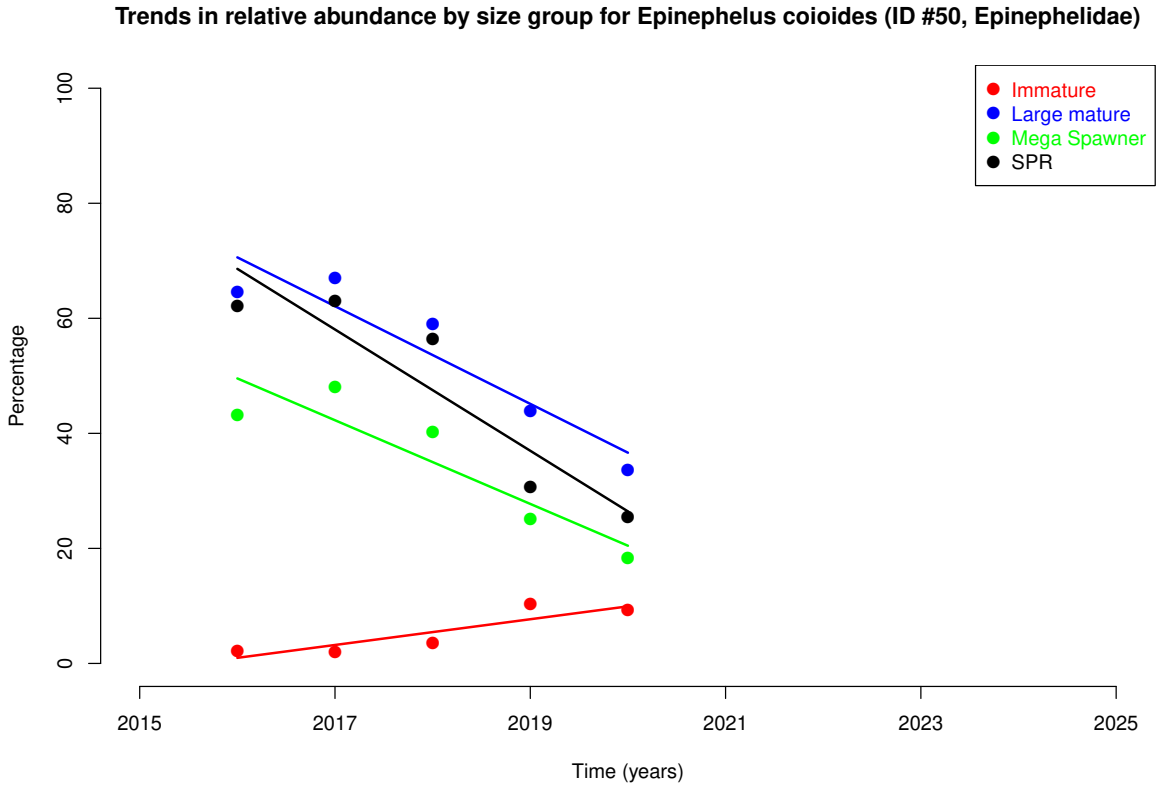
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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

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

Trends in relative abundance by size group for Lutjanus vitta (ID #27, Lutjanidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature rising over recent years, situation deteriorating. P: 0.520
% Large Mature falling over recent years, situation deteriorating. P: 0.385
% Mega Spawner falling over recent years, situation deteriorating. P: 0.018
% SPR falling over recent years, situation deteriorating. P: 0.246


Catch length frequency for Epinephelus coioides (ID #50, Epinephelidae)
Most Recent 365 Days. N (Catch) = 35,218, n (Sample) = 1,426.
14 %
47 %
40 %
Trade Limit 47 cm
L–maturity 49 cm
L–optimum 65 cm
L–infinity 107 cm
L–max 119 cm
L–median 62 cm
Lx–codrs 119 cm
SPR 34 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
Frequency
0
200
400
600
800
1000
1200
1400
20
40
60
80
100
120
140
Total Length (cm)


Trends in relative abundance by size group for Epinephelus coioides (ID #50, Epinephelidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
0
20
40
60
80
100
2015
2017
2019
2021
2023
2025
Time (years)

The percentages of Epinephelus coioides (ID #50, Epinephelidae) in most recent 365 days.
N (Catch) =35,218, n (Sample) = 1,426
Immature (< 49cm): 14%
Small mature (>= 49cm, < 65cm): 47%
Large mature (>= 65cm): 40%
Mega spawner (>= 71.5cm): 24% (subset of large mature fish)
Spawning Potential Ratio: 34 %

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

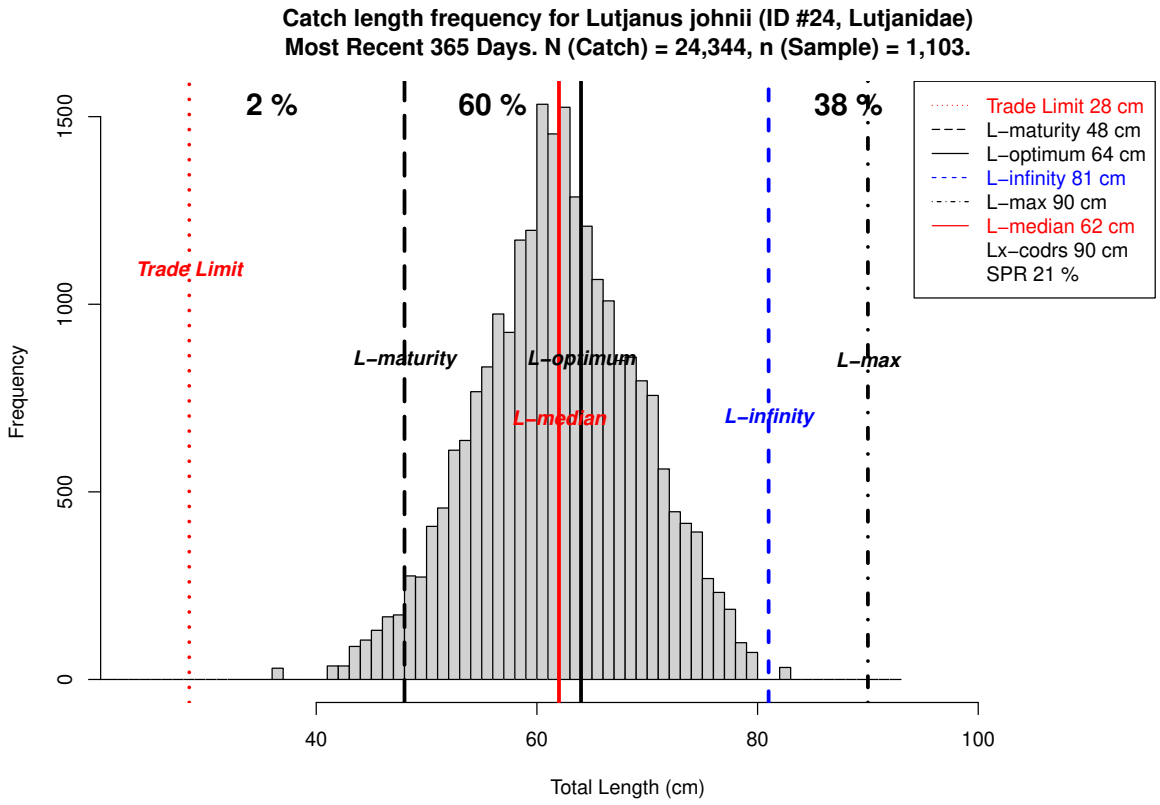
Between 10% and 20% of the fish in the catch are juveniles that have not yet reproduced. There is no immediate concern in terms of overfishing through over harvesting of juveniles, but the fishery needs to be monitored closely for any further increase in this indicator and incentives need to be geared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

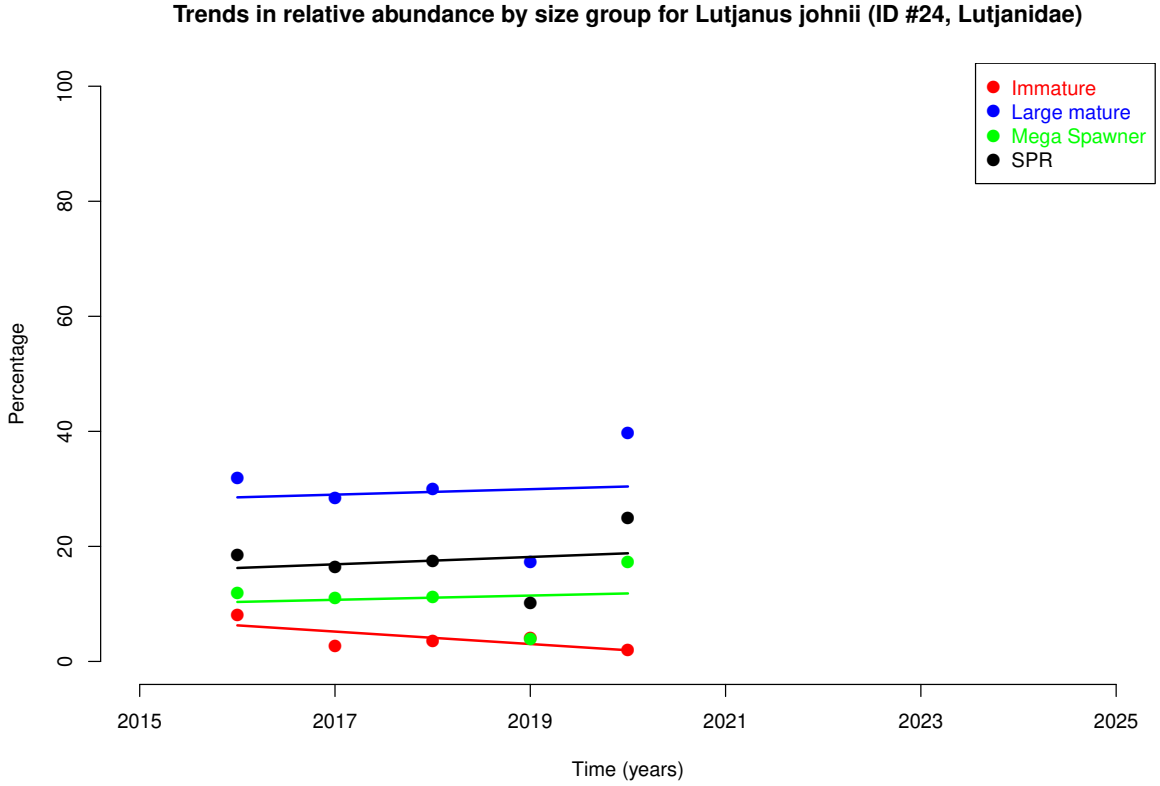
The bulk of the catch includes age groups that have just matured and are about to achieve their full growth potential. This indicates that the fishery is probably at least being fully exploited. Risk level is medium.

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

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

Trends in relative abundance by size group for Epinephelus coioides (ID #50, Epinephelidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature rising over recent years, situation deteriorating. P: 0.045
% Large Mature falling over recent years, situation deteriorating. P: 0.019
% Mega Spawner falling over recent years, situation deteriorating. P: 0.033
% SPR falling over recent years, situation deteriorating. P: 0.024


Catch length frequency for Lutjanus johnii (ID #24, Lutjanidae)
Most Recent 365 Days. N (Catch) = 24,344, n (Sample) = 1,103.
2 %
60 %
38 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
Trade Limit 28 cm
L–maturity 48 cm
L–optimum 64 cm
L–infinity 81 cm
L–max 90 cm
L–median 62 cm
Lx–codrs 90 cm
SPR 21 %
Frequency
0
500
1000
1500
40
60
80
100
Total Length (cm)


Trends in relative abundance by size group for Lutjanus johnii (ID #24, Lutjanidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
0
20
40
60
80
100
2015
2017
2019
2021
2023
2025
Time (years)

The percentages of Lutjanus johnii (ID #24, Lutjanidae) in most recent 365 days.
N (Catch) =24,344, n (Sample) = 1,103
Immature (< 48cm): 2%
Small mature (>= 48cm, < 64cm): 60%
Large mature (>= 64cm): 38%
Mega spawner (>= 70.4cm): 14% (subset of large mature fish)
Spawning Potential Ratio: 21 %

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.

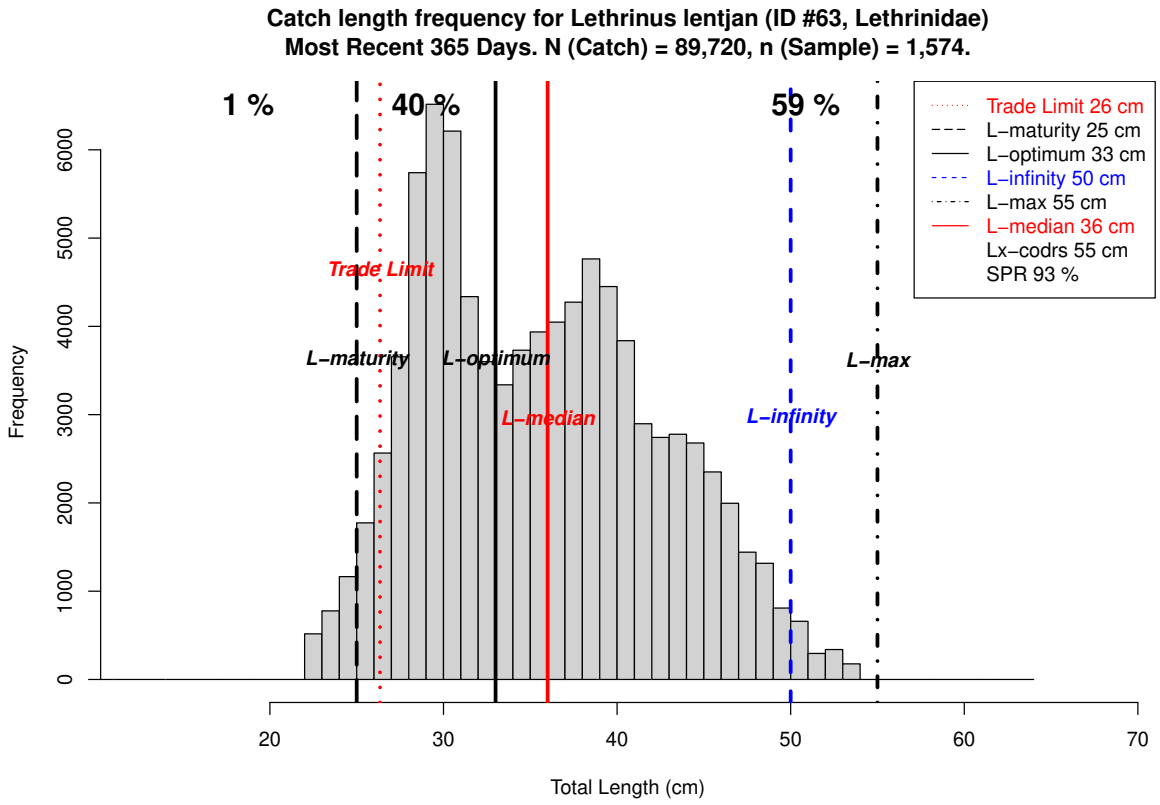
At least 90% of the fish in the catch are mature specimens that have spawned at least once before they were caught. The fishery does not depend on immature size classes for this species and is considered safe for this indicator. This fishery will not be causing overfishing through over harvesting of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

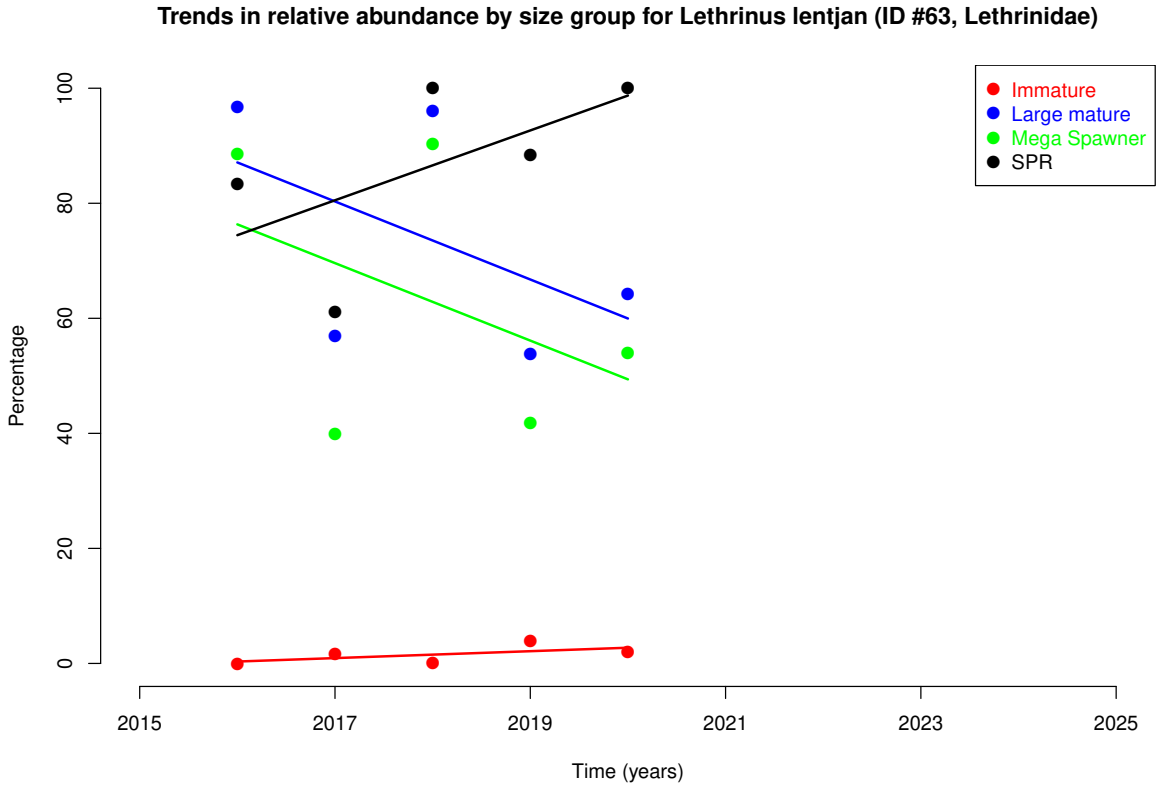
The bulk of the catch includes age groups that have just matured and are about to achieve their full growth potential. This indicates that the fishery is probably at least being fully exploited. Risk level is medium.

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

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

Trends in relative abundance by size group for Lutjanus johnii (ID #24, Lutjanidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature falling over recent years, situation improving. P: 0.168
% Large Mature rising over recent years, situation improving. P: 0.883
% Mega Spawner rising over recent years, situation improving. P: 0.845
% SPR rising over recent years, situation improving. P: 0.758


Catch length frequency for Lethrinus lentjan (ID #63, Lethrinidae)
Most Recent 365 Days. N (Catch) = 89,720, n (Sample) = 1,574.
1 %
40 %
59 %
Trade Limit 26 cm
L–maturity 25 cm
L–optimum 33 cm
L–infinity 50 cm
L–max 55 cm
L–median 36 cm
Lx–codrs 55 cm
SPR 93 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
Frequency
0
1000
2000
3000
4000
5000
6000
20
30
40
50
60
70
Total Length (cm)


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

The percentages of Lethrinus lentjan (ID #63, Lethrinidae) in most recent 365 days.
N (Catch) =89,720, n (Sample) = 1,574
Immature (< 25cm): 1%
Small mature (>= 25cm, < 33cm): 40%
Large mature (>= 33cm): 59%
Mega spawner (>= 36.3cm): 47% (subset of large mature fish)
Spawning Potential Ratio: 93 %

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

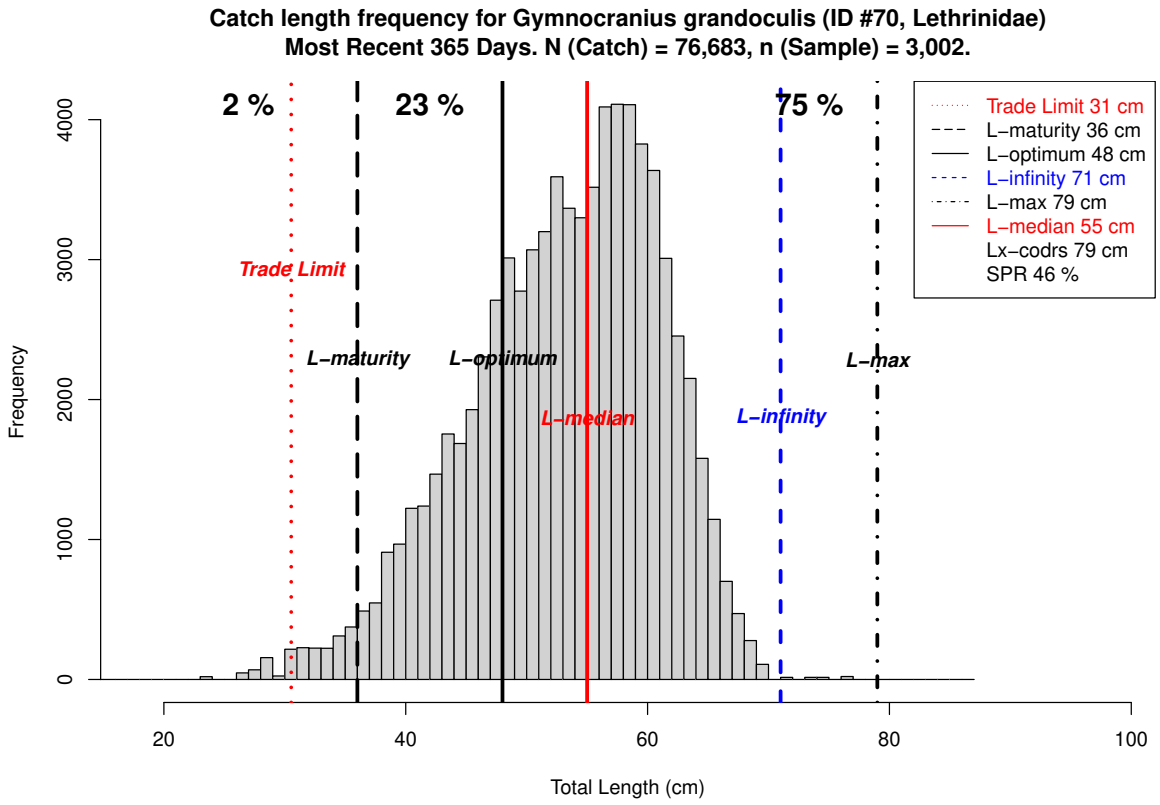
At least 90% of the fish in the catch are mature specimens that have spawned at least once before they were caught. The fishery does not depend on immature size classes for this species and is considered safe for this indicator. This fishery will not be causing overfishing through over harvesting of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

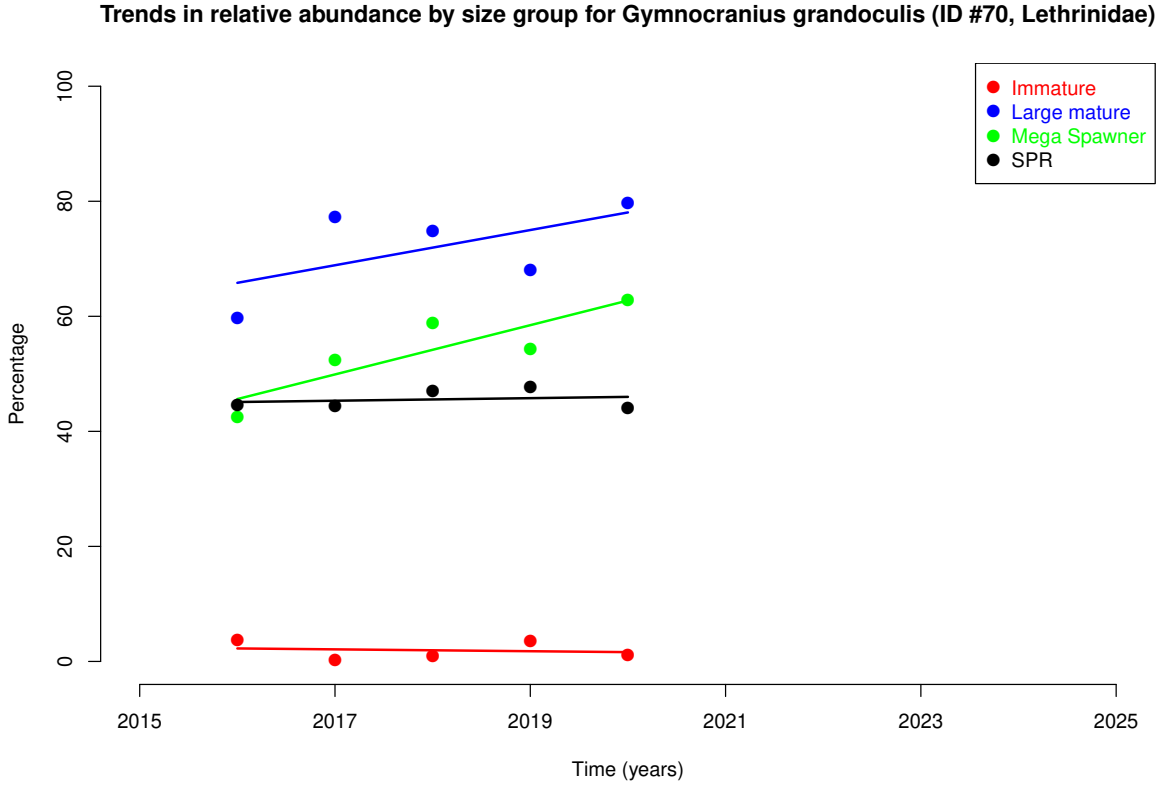
The majority of the catch consists of size classes around or above the optimum harvest size. This means that the impact of the fishery is minimized for this species. Potentially higher yields of this species could be achieved by catching them at somewhat smaller size, although capture of smaller specimen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

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

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

Trends in relative abundance by size group for Lethrinus lentjan (ID #63, Lethrinidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature rising over recent years, situation deteriorating. P: 0.282
% Large Mature falling over recent years, situation deteriorating. P: 0.384
% Mega Spawner falling over recent years, situation deteriorating. P: 0.471
% SPR rising over recent years, situation improving. P: 0.284


Catch length frequency for Gymnocranius grandoculis (ID #70, Lethrinidae)
Most Recent 365 Days. N (Catch) = 76,683, n (Sample) = 3,002.
2 %
23 %
75 %
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 55 cm
Lx–codrs 79 cm
SPR 46 %
Frequency
0
1000
2000
3000
4000
20
40
60
80
100
Total Length (cm)


Trends in relative abundance by size group for Gymnocranius grandoculis (ID #70, Lethrinidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
0
20
40
60
80
100
2015
2017
2019
2021
2023
2025
Time (years)

The percentages of Gymnocranius grandoculis (ID #70, Lethrinidae) in most recent 365 days.
N (Catch) =76,683, n (Sample) = 3,002
Immature (< 36cm): 2%
Small mature (>= 36cm, < 48cm): 23%
Large mature (>= 48cm): 75%
Mega spawner (>= 52.8cm): 59% (subset of large mature fish)
Spawning Potential Ratio: 46 %

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

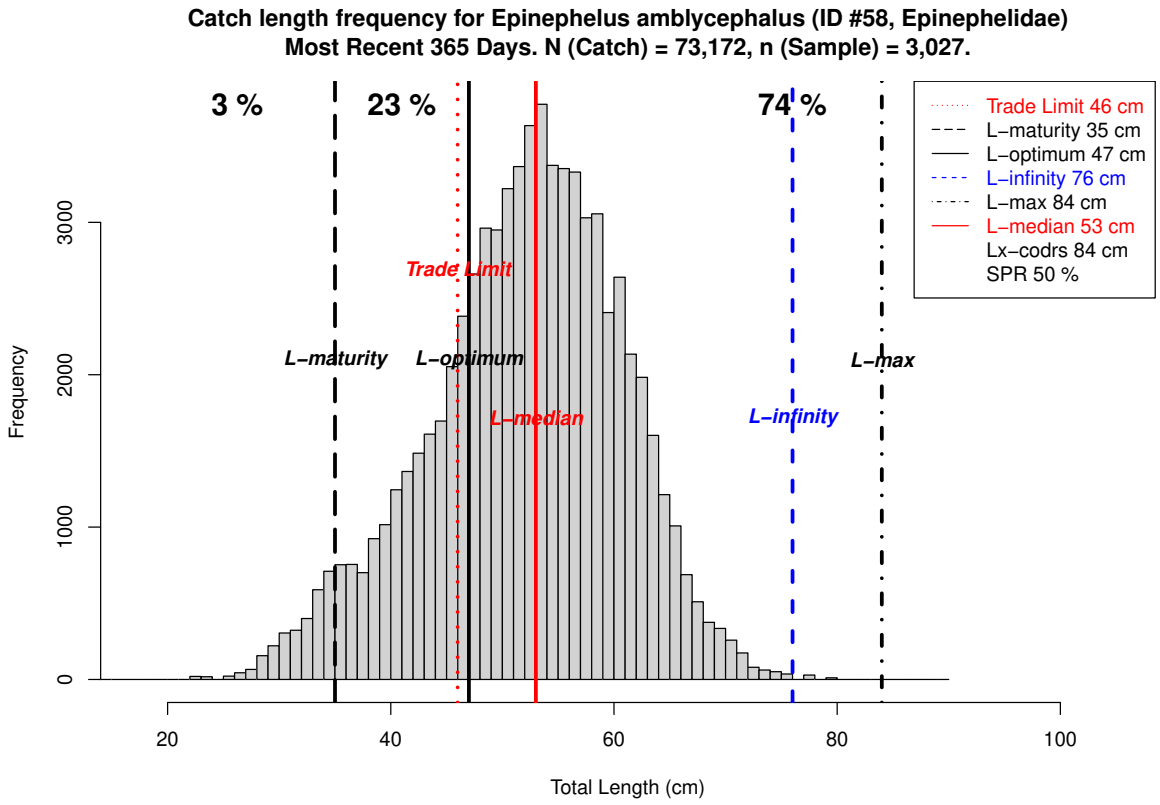
At least 90% of the fish in the catch are mature specimens that have spawned at least once before they were caught. The fishery does not depend on immature size classes for this species and is considered safe for this indicator. This fishery will not be causing overfishing through over harvesting of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

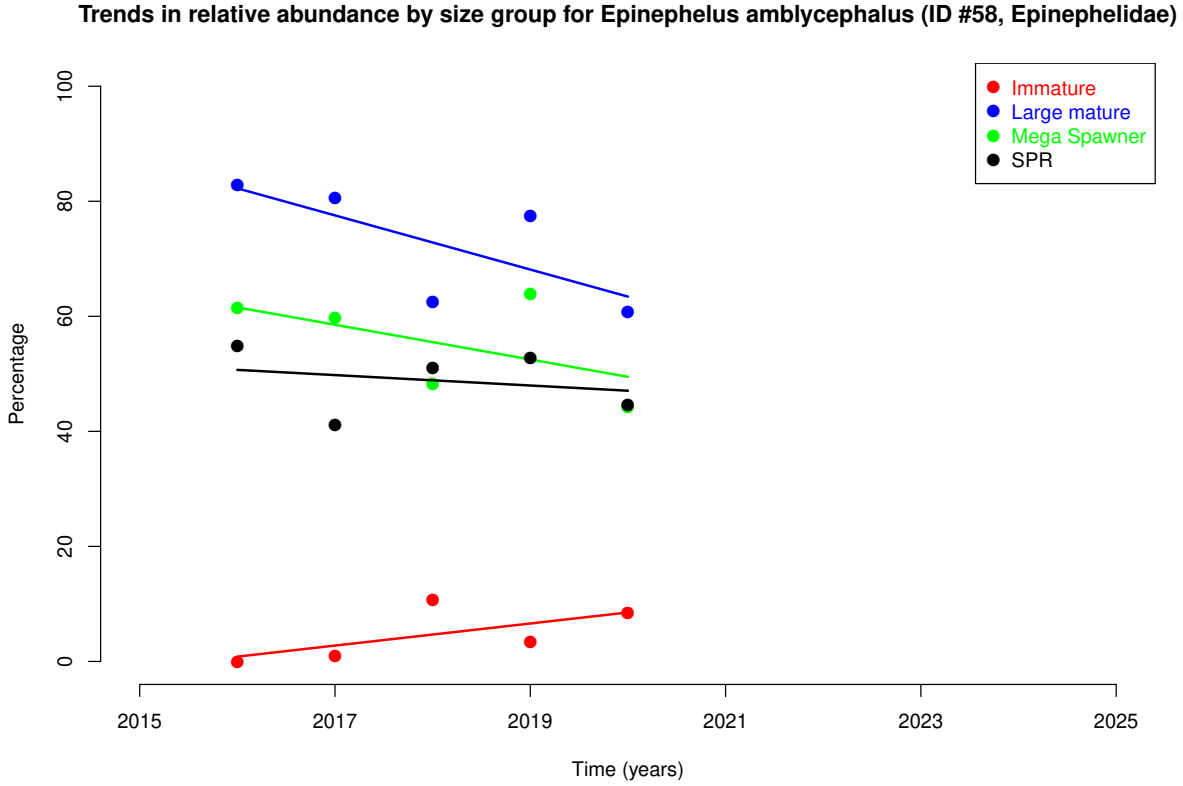
The majority of the catch consists of size classes around or above the optimum harvest size. This means that the impact of the fishery is minimized for this species. Potentially higher yields of this species could be achieved by catching them at somewhat smaller size, although capture of smaller specimen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

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

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

Trends in relative abundance by size group for 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 falling over recent years, situation improving. P: 0.797
% Large Mature rising over recent years, situation improving. P: 0.287
% Mega Spawner rising over recent years, situation improving. P: 0.050
% SPR rising over recent years, situation improving. P: 0.734


Catch length frequency for Epinephelus amblycephalus (ID #58, Epinephelidae)
Most Recent 365 Days. N (Catch) = 73,172, n (Sample) = 3,027.
3 %
23 %
74 %
Trade Limit 46 cm
L–maturity 35 cm
L–optimum 47 cm
L–infinity 76 cm
L–max 84 cm
L–median 53 cm
Lx–codrs 84 cm
SPR 50 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
Frequency
0
1000
2000
3000
20
40
60
80
100
Total Length (cm)


Trends in relative abundance by size group for Epinephelus amblycephalus (ID #58, 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 amblycephalus (ID #58, Epinephelidae) in most recent 365 days.
N (Catch) =73,172, n (Sample) = 3,027
Immature (< 35cm): 3%
Small mature (>= 35cm, < 47cm): 23%
Large mature (>= 47cm): 74%
Mega spawner (>= 51.7cm): 58% (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.

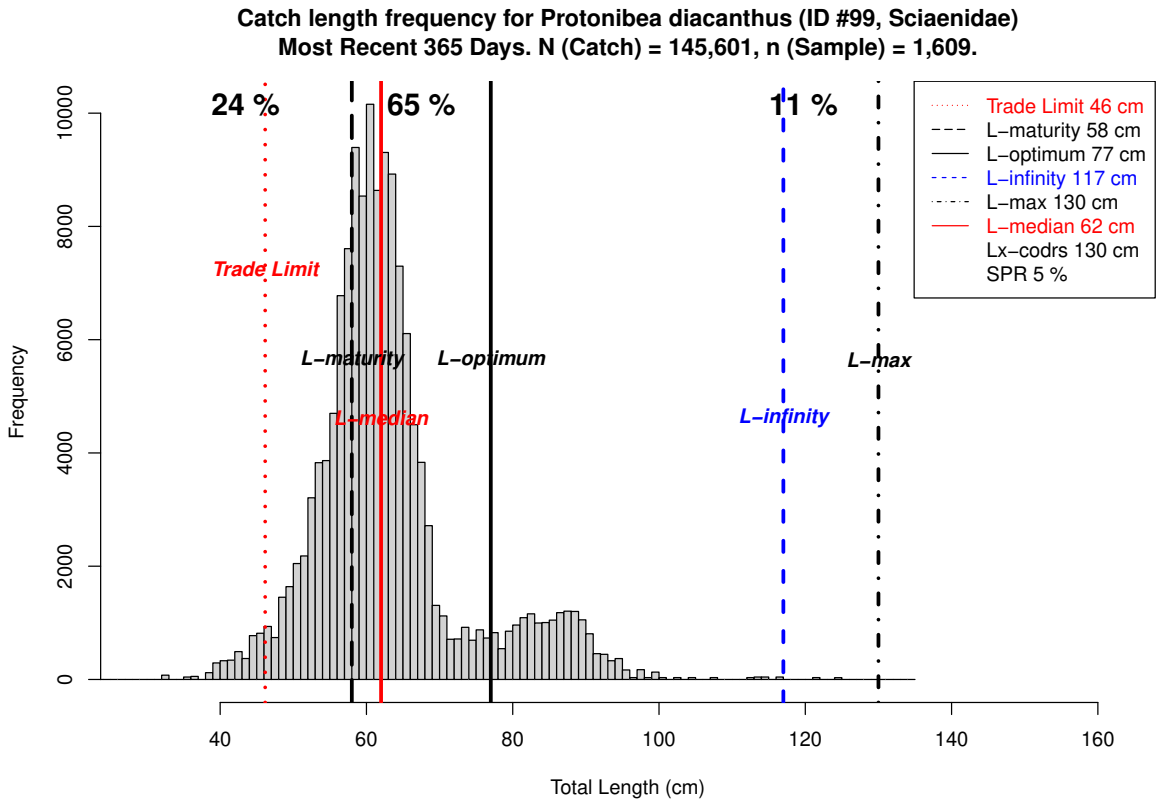
At least 90% of the fish in the catch are mature specimens that have spawned at least once before they were caught. The fishery does not depend on immature size classes for this species and is considered safe for this indicator. This fishery will not be causing overfishing through over harvesting of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

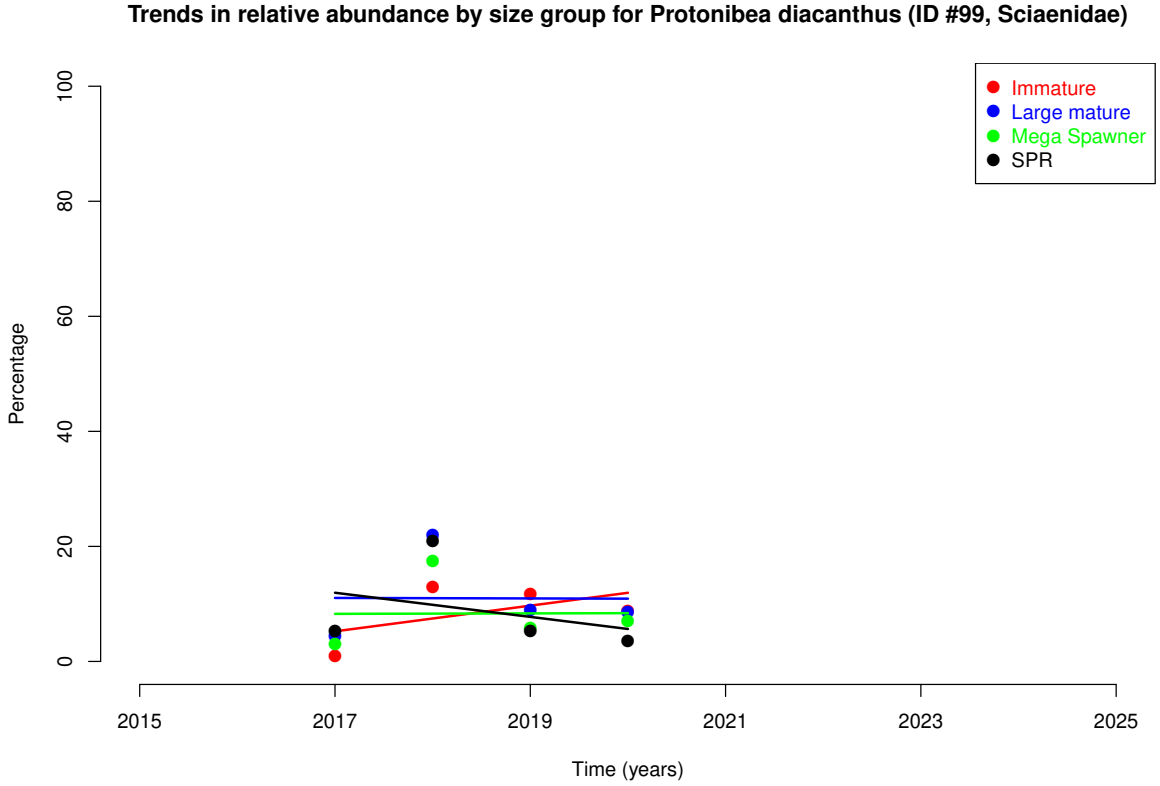
The majority of the catch consists of size classes around or above the optimum harvest size. This means that the impact of the fishery is minimized for this species. Potentially higher yields of this species could be achieved by catching them at somewhat smaller size, although capture of smaller specimen 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 Epinephelus amblycephalus (ID #58, 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: 0.239
% Large Mature falling over recent years, situation deteriorating. P: 0.173
% Mega Spawner falling over recent years, situation deteriorating. P: 0.339
% SPR falling over recent years, situation deteriorating. P: 0.688


Catch length frequency for Protonibea diacanthus (ID #99, Sciaenidae)
Most Recent 365 Days. N (Catch) = 145,601, n (Sample) = 1,609.
24 %
65 %
11 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
Trade Limit 46 cm
L–maturity 58 cm
L–optimum 77 cm
L–infinity 117 cm
L–max 130 cm
L–median 62 cm
Lx–codrs 130 cm
SPR 5 %
Frequency
0
2000
4000
6000
8000
10000
40
60
80
100
120
140
160
Total Length (cm)


Trends in relative abundance by size group for Protonibea diacanthus (ID #99, Sciaenidae)
Immature
Large mature
Mega Spawner
SPR
Percentage
0
20
40
60
80
100
2015
2017
2019
2021
2023
2025
Time (years)

The percentages of Protonibea diacanthus (ID #99, Sciaenidae) in most recent 365 days.
N (Catch) =145,601, n (Sample) = 1,609
Immature (< 58cm): 24%
Small mature (>= 58cm, < 77cm): 65%
Large mature (>= 77cm): 11%
Mega spawner (>= 84.7cm): 7% (subset of large mature fish)
Spawning Potential Ratio: 5 %

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.

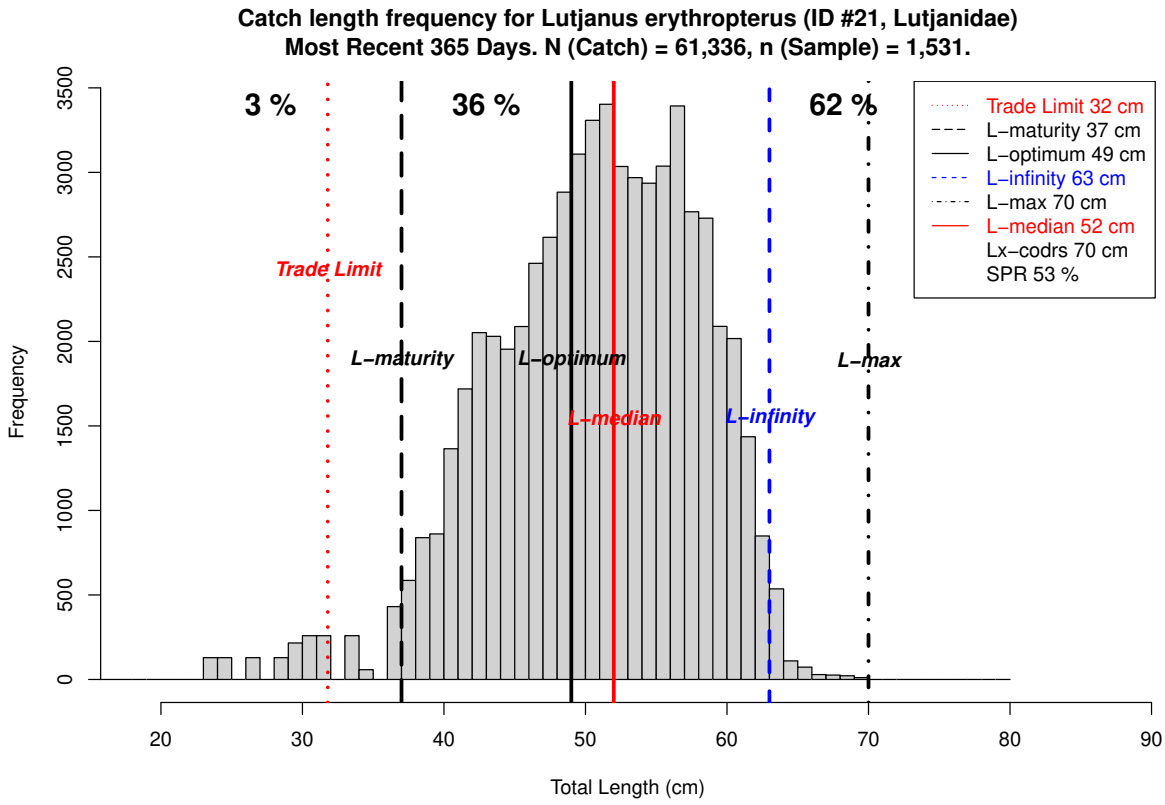
Between 20% and 30% of the fish in the catch are specimens that have not yet reproduced. This is reason for concern in terms of potential overfishing through overharvesting of juveniles, if fishing pressure is high and percentages immature fish would further rise. Targeting larger fish and avoiding small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

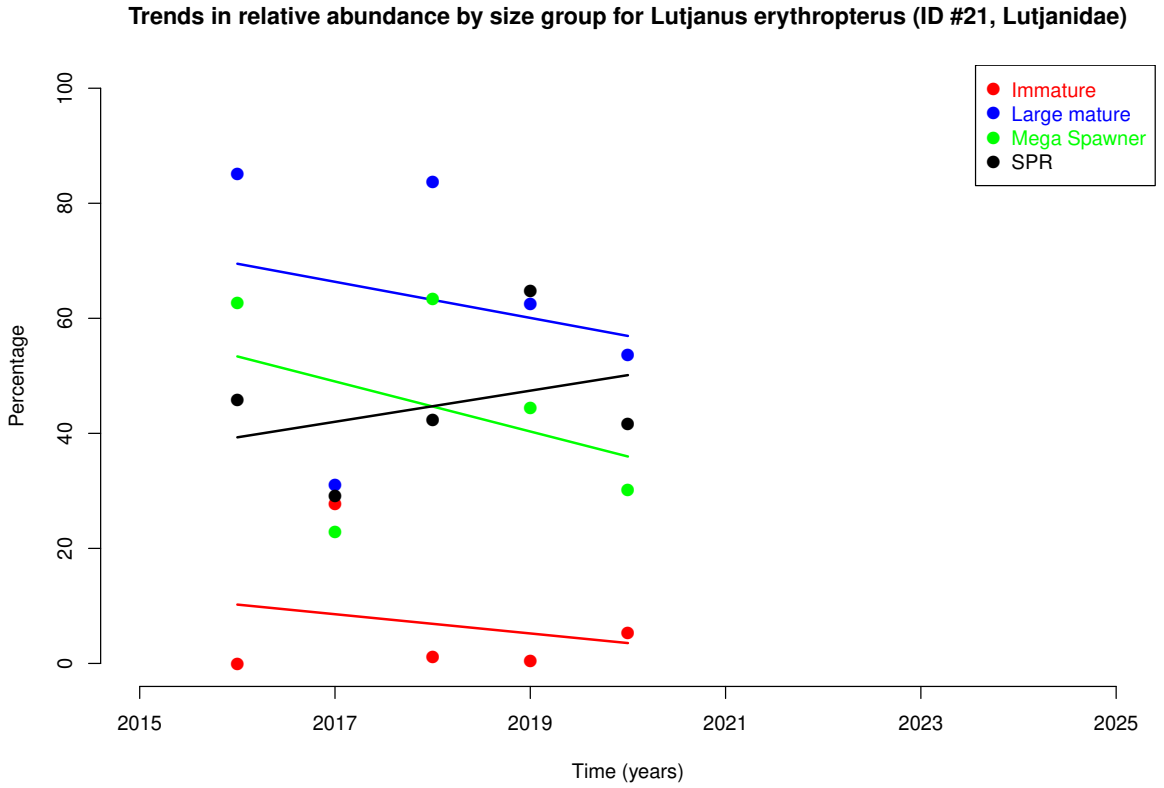
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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 Protonibea diacanthus (ID #99, Sciaenidae), 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: 0.469
% Large Mature no trend over recent years, situation stable. P: 0.993
% Mega Spawner no trend over recent years, situation stable. P: 0.992
% SPR falling over recent years, situation deteriorating. P: 0.665


Catch length frequency for Lutjanus erythropterus (ID #21, Lutjanidae)
Most Recent 365 Days. N (Catch) = 61,336, n (Sample) = 1,531.
3 %
36 %
62 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
Trade Limit 32 cm
L–maturity 37 cm
L–optimum 49 cm
L–infinity 63 cm
L–max 70 cm
L–median 52 cm
Lx–codrs 70 cm
SPR 53 %
Frequency
0
500
1000
1500
2000
2500
3000
3500
20
30
40
50
60
70
80
90
Total Length (cm)


Trends in relative abundance by size group for Lutjanus erythropterus (ID #21, 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 erythropterus (ID #21, Lutjanidae) in most recent 365 days.
N (Catch) =61,336, n (Sample) = 1,531
Immature (< 37cm): 3%
Small mature (>= 37cm, < 49cm): 36%
Large mature (>= 49cm): 62%
Mega spawner (>= 53.9cm): 41% (subset of large mature fish)
Spawning Potential Ratio: 53 %

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

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

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

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

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

Trends in relative abundance by size group for Lutjanus erythropterus (ID #21, Lutjanidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature falling over recent years, situation improving. P: 0.717
% Large Mature falling over recent years, situation deteriorating. P: 0.722
% Mega Spawner falling over recent years, situation deteriorating. P: 0.536
% SPR rising over recent years, situation improving. P: 0.584

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 718.

Rank	#ID	Species	Trade Limit Prop. Lmat	Immature %	Exploitation %	Mega Spawn %	SPR %
1	100	Atrobucca brevis	1.36	17	86	5	4
2	17	Lutjanus malabaricus	0.66	16	92	3	2
3	7	Pristipomoides multidens	0.73	33	82	5	18
4	64	Lethrinus laticaudis	0.94	0	6	89	near 100
5	45	Epinephelus areolatus	1.31	0	23	61	34
6	18	Lutjanus sebae	0.61	24	96	1	3
7	91	Pomadasys kaakan	0.92	0	6	83	49
8	77	Caranx bucculentus	1.47	0	8	67	31
9	8	Pristipomoides typus	0.80	20	77	9	16
10	25	Lutjanus russelli	1.02	3	66	17	18
11	89	Diagramma labiosum	0.97	0	9	70	46
12	75	Carangoides chrysophrys	1.17	0	21	60	46
13	27	Lutjanus vitta	1.20	3	68	10	6
14	50	Epinephelus coioides	0.96	14	60	24	34
15	24	Lutjanus johnii	0.59	2	62	14	21
16	63	Lethrinus lentjan	1.05	1	41	47	93
17	70	Gymnocranius grandoculis	0.85	2	25	59	46
18	58	Epinephelus amblycephalus	1.31	3	26	58	50
19	99	Protonibea diacanthus	0.80	24	89	7	5
20	21	Lutjanus erythropterus	0.86	3	38	41	53
21	46	Epinephelus bleekeri	0.85	1	17	74	near 100
22	15	Lutjanus argentimaculatus	0.62	23	80	7	15
23	88	Glaucosoma buergeri	0.95	1	26	51	51
24	41	Epinephelus latifasciatus	1.00	8	60	24	28
25	65	Lethrinus nebulosus	0.95	1	7	85	near 100
26	78	Caranx ignobilis	0.89	9	97	1	3
27	9	Pristipomoides filamentosus	0.69	49	74	11	27
28	86	Argyrops spinifer	1.16	0	21	50	48
29	4	Etelis sp.		unknown	unknown	unknown	unknown
30	72	Carangoides coeruleopinnatus	1.29	1	5	86	near 100
31	39	Cephalopholis sonnerati	1.03	1	12	75	53
32	66	Lethrinus olivaceus	0.62	6	29	56	51
34	14	Lutjanus bitaeniatus	1.42	0	15	56	near 100
35	19	Lutjanus timorensis	0.98	8	72	9	9
36	98	Rachycentron canadum	0.96	8	79	7	14
37	20	Lutjanus gibbus	1.07	21	94	3	1
38	1	Aphareus rutilans		unknown	unknown	unknown	unknown
39	81	Caranx tille	1.30	0	3	80	36
40	80	Caranx sexfasciatus	1.24	0	21	53	72
41	26	Lutjanus lemniscatus	0.84	1	34	41	43
42	56	Epinephelus multinotatus	1.23	0	2	93	96
43	76	Carangoides gymnostethus	1.09	0	16	72	near 100
44	60	Plectropomus maculatus	0.91	2	4	92	near 100
45	54	Epinephelus stictus	1.28	0	5	91	66
46	69	Wattsia mossambica	1.09	3	45	38	43
50	49	Epinephelus malabaricus	0.82	4	68	16	21

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 718.

Rank	#ID	Species	Trade Limit	Immature	Exploitation	Mega Spawn	SPR
1	100	Atrobucca brevis	low	medium	high	high	high
2	17	Lutjanus malabaricus	high	medium	high	high	high
3	7	Pristipomoides multidens	high	high	high	high	high
4	64	Lethrinus laticaudis	medium	low	low	low	low
5	45	Epinephelus areolatus	low	low	low	low	medium
6	18	Lutjanus sebae	high	medium	high	high	high
7	91	Pomadasys kaakan	medium	low	low	low	low
8	77	Caranx bucculentus	low	low	low	low	medium
9	8	Pristipomoides typus	high	medium	high	high	high
10	25	Lutjanus russelli	medium	low	high	high	high
11	89	Diagramma labiosum	medium	low	low	low	low
12	75	Carangoides chrysophrys	low	low	low	low	low
13	27	Lutjanus vitta	low	low	high	high	high
14	50	Epinephelus coioides	medium	medium	medium	medium	medium
15	24	Lutjanus johnii	high	low	medium	high	high
16	63	Lethrinus lentjan	medium	low	low	low	low
17	70	Gymnocranius grandoculis	high	low	low	low	low
18	58	Epinephelus amblycephalus	low	low	low	low	low
19	99	Protonibea diacanthus	high	medium	high	high	high
20	21	Lutjanus erythropterus	high	low	low	low	low
21	46	Epinephelus bleekeri	high	low	low	low	low
22	15	Lutjanus argentimaculatus	high	medium	high	high	high
23	88	Glaucosoma buergeri	medium	low	low	low	low
24	41	Epinephelus latifasciatus	medium	low	medium	medium	medium
25	65	Lethrinus nebulosus	medium	low	low	low	low
26	78	Caranx ignobilis	high	low	high	high	high
27	9	Pristipomoides filamentosus	high	high	high	high	medium
28	86	Argyrops spinifer	low	low	low	low	low
29	4	Etelis sp.	unknown	unknown	unknown	unknown	unknown
30	72	Carangoides coeruleopinnatus	low	low	low	low	low
31	39	Cephalopholis sonnerati	medium	low	low	low	low
32	66	Lethrinus olivaceus	high	low	low	low	low
34	14	Lutjanus bitaeniatus	low	low	low	low	low
35	19	Lutjanus timorensis	medium	low	high	high	high
36	98	Rachycentron canadum	medium	low	high	high	high
37	20	Lutjanus gibbus	medium	medium	high	high	high
38	1	Aphareus rutilans	unknown	unknown	unknown	unknown	unknown
39	81	Caranx tille	low	low	low	low	medium
40	80	Caranx sexfasciatus	low	low	low	low	low
41	26	Lutjanus lemniscatus	high	low	low	low	low
42	56	Epinephelus multinotatus	low	low	low	low	low
43	76	Carangoides gymnostethus	medium	low	low	low	low
44	60	Plectropomus maculatus	medium	low	low	low	low
45	54	Epinephelus stictus	low	low	low	low	low
46	69	Wattsia mossambica	medium	low	low	low	low
50	49	Epinephelus malabaricus	high	low	high	high	high

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 718.

Rank	#ID	Species	% Immature	% Large Mature	% Mega Spawner	% SPR
1	100	Atrobucca brevis	deteriorating	deteriorating	deteriorating	deteriorating
2	17	Lutjanus malabaricus	deteriorating	deteriorating	deteriorating	deteriorating
3	7	Pristipomoides multidens	deteriorating	stable	deteriorating	improving
4	64	Lethrinus laticaudis	stable	improving	improving	stable
5	45	Epinephelus areolatus	stable	deteriorating	deteriorating	deteriorating
6	18	Lutjanus sebae	improving	stable	deteriorating	deteriorating
7	91	Pomadasys kaakan	stable	improving	improving	deteriorating
8	77	Caranx bucculentus	improving	improving	improving	improving
9	8	Pristipomoides typus	improving	improving	improving	improving
10	25	Lutjanus russelli	deteriorating	deteriorating	deteriorating	deteriorating
11	89	Diagramma labiosum	stable	deteriorating	deteriorating	deteriorating
12	75	Carangoides chrysophrys	stable	deteriorating	deteriorating	stable
13	27	Lutjanus vitta	deteriorating	deteriorating	deteriorating	deteriorating
14	50	Epinephelus coioides	deteriorating	deteriorating	deteriorating	deteriorating
15	24	Lutjanus johnii	improving	improving	improving	improving
16	63	Lethrinus lentjan	deteriorating	deteriorating	deteriorating	improving
17	70	Gymnocranius grandoculis	improving	improving	improving	improving
18	58	Epinephelus amblycephalus	deteriorating	deteriorating	deteriorating	deteriorating
19	99	Protonibea diacanthus	deteriorating	stable	stable	deteriorating
20	21	Lutjanus erythropterus	improving	deteriorating	deteriorating	improving
21	46	Epinephelus bleekeri	stable	deteriorating	deteriorating	deteriorating
22	15	Lutjanus argentimaculatus	deteriorating	improving	improving	deteriorating
23	88	Glaucosoma buergeri	improving	improving	improving	deteriorating
24	41	Epinephelus latifasciatus	deteriorating	deteriorating	deteriorating	improving
25	65	Lethrinus nebulosus	improving	improving	improving	stable
26	78	Caranx ignobilis	unknown	unknown	unknown	unknown
27	9	Pristipomoides filamentosus	deteriorating	deteriorating	deteriorating	deteriorating
28	86	Argyrops spinifer	improving	improving	improving	improving
29	4	Etelis sp.	improving	deteriorating	deteriorating	deteriorating
30	72	Carangoides coeruleopinnatus	deteriorating	deteriorating	deteriorating	improving
31	39	Cephalopholis sonnerati	unknown	unknown	unknown	unknown
32	66	Lethrinus olivaceus	unknown	unknown	unknown	unknown
34	14	Lutjanus bitaeniatus	stable	deteriorating	deteriorating	deteriorating
35	19	Lutjanus timorensis	improving	deteriorating	deteriorating	deteriorating
36	98	Rachycentron canadum	deteriorating	deteriorating	deteriorating	deteriorating
37	20	Lutjanus gibbus	unknown	unknown	unknown	unknown
38	1	Aphareus rutilans	unknown	unknown	unknown	unknown
39	81	Caranx tille	unknown	unknown	unknown	unknown
40	80	Caranx sexfasciatus	unknown	unknown	unknown	unknown
41	26	Lutjanus lemniscatus	unknown	unknown	unknown	unknown
42	56	Epinephelus multinotatus	unknown	unknown	unknown	unknown
43	76	Carangoides gymnostethus	unknown	unknown	unknown	unknown
44	60	Plectropomus maculatus	unknown	unknown	unknown	unknown
45	54	Epinephelus stictus	unknown	unknown	unknown	unknown
46	69	Wattsia mossambica	unknown	unknown	unknown	unknown
50	49	Epinephelus malabaricus	unknown	unknown	unknown	unknown

5 Discussion and conclusions

Deepwater drop line fishing occurs in WPP 718 on deep slopes bordering the Banda Sea and in the Timor Trough, at depths between 50 and 500 meters. Bottom long line and gillnet fishing in WPP 718 occurs on the shelf areas and tops of slopes, mainly in the Arafura Sea with a relatively flat bottom profile at depths ranging from 50 to 150 meters. Bottom long line fishing grounds overlap with those previously heavily fished by bottom trawlers, a practice which is now prohibited throughout Indonesia. It is unclear though how much bottom trawling still continues illegally, in remote areas, or with dragging gear that is given different names. 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 and gillnets. Nowhere near the habitat impact from destructive dragging gears is evident from either one of the two deep hook and line fisheries especially.

The deep water drop line fishery for croakers, snappers, groupers and emperors is a fairly "clean" fishery when it comes to the species spectrum in the catch (Table 5.7 and Table 5.8), even though it is much more species-rich then sometimes assumed, also within the "snapper" category, which forms one of the main target groups. Recent focus on "croakers" has occurred to supply the demand for swimming bladders which fetch very high prices on Chinese markets. The bottom long line fishery has seen croakers rise to become a major target species in recent years. Grunts and trevallies are also becoming more important, perhaps as a result of shifts to different habitats where croakers are targeted. By-catch species in the long line fisheries, like sharks, cobia and trevallies, are often sun-dried by the crew and sold separately, outside of the catch of snappers, croakers, grunts, groupers and emperors.

Due to predictable locations of fish concentrations, combined with a very high fishing effort on the best known fishing grounds in WPP 718, there is a high potential for overfishing here. Risks of overfishing are high for all the larger snappers and croakers which are common in the Arafura Sea (Table 4.1 and Table 4.2), and SPR is dangerously low (Table 5.1) especially for those species which complete their life cycle in the habitats covered by the fishing grounds and which at the same time are easily caught with drop line, bottom long line, gillnets and other gears. Especially the snapper feeding aggregations on the deep slopes are predictable, at well-known locations, and the deep water snappers here are therefore among the most vulnerable species in these fisheries. Fishing mortality in all major target snapper and croaker species seems to be unacceptably high while the catches of some of these species include large percentages of relatively small and immature specimen. For several species of snappers and croakers, sizes are consistently targeted and landed well below the size where these fish reach maturity. Bigger specimen of the largest species are already becoming extremely rare in this region.

Fishing effort and fishing mortality have been far too high for quite some years in WPP 718. Bottom trawlers have been major contributors to overfishing until recently, but dragging gear is being removed now from the spectrum now. Unfortunately though, the overall effort is still extremely high and the status of the stocks is currently not yet improving. Time trends for most of the 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 may be masking the direct effect on CpUE. We do see that for many

fleet segments the CpUE is still higher in WPP 718 than in some of the Western fisheries management areas, which may be part of the reason that more and more vessels from Western Indonesia are moving their operations to the Arafura Sea in WPP 718.

Possibly one of the contributing reasons that the demersal fisheries in the Arafura Sea are still profitable is the huge amount of shelf habitat across the Australian border, which is well-managed and experiences low fishing pressure. Indonesian boats are "fishing the line" here in the most literal sense, and profiting from a spillover effect from that Australian shelf area where fish stocks of at least some of the target species are doing well. The differences in stock densities and fish sizes on either side of the border are stark and very well known by fishing boat captains. This has led to IUU incidences and arrests of Indonesian boats in Australian waters.

Overall we are currently looking mainly at a high risk of overfishing for all major snapper and croaker species in WPP 718, combined with a worrisome trend of continued deterioration in these stocks, based on size based stock assessments. Interestingly though, the groupers seem to be less vulnerable to the hook and line fisheries than the snappers are. Impact by the deep slope drop line and shelf longline 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 longline 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.

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

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

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

Besides size selectivity, fishing effort is a very important factor in resulting overall catch and size frequency of the catch. All major target snapper and croaker species 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 demersal fisheries in WPP 718, judging from a number of indicators as presented in this report.

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 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.

Recommendations for specific regulations may include:

- Make mandatory correct display of scientific name (labeling) of all traded fish.
- 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 718, 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	Atrobucca brevis	100	100	9	4	2	NA	NA	NA	NA
2	Lutjanus malabaricus	7	6	6	3	3	NA	NA	NA	NA
3	Pristipomoides multidens	14	12	13	19	19	NA	NA	NA	NA
4	Lethrinus laticaudis	100	100	85	100	100	NA	NA	NA	NA
5	Epinephelus areolatus	44	38	33	38	22	NA	NA	NA	NA
6	Lutjanus sebae	2	3	1	2	2	NA	NA	NA	NA
7	Pomadasys kaakan	54	86	58	80	47	NA	NA	NA	NA
8	Caranx bucculentus	6	20	18	19	NA	NA	NA	NA	NA
9	Pristipomoides typus	9	7	5	14	31	NA	NA	NA	NA
10	Lutjanus russelli	41	27	30	23	9	NA	NA	NA	NA
11	Diagramma labiosum	49	50	46	57	37	NA	NA	NA	NA
12	Carangoides chrysophrys	50	61	42	55	53	NA	NA	NA	NA
13	Lutjanus vitta	8	10	11	5	5	NA	NA	NA	NA
14	Epinephelus coioides	62	63	56	31	26	NA	NA	NA	NA
15	Lutjanus johnii	19	16	17	10	25	NA	NA	NA	NA
16	Lethrinus lentjan	83	61	100	88	100	NA	NA	NA	NA
17	Gymnocranius grandoculis	45	44	47	48	44	NA	NA	NA	NA
18	Epinephelus amblycephalus	55	41	51	53	45	NA	NA	NA	NA
19	Protonibea diacanthus	NA	5	21	5	4	NA	NA	NA	NA
20	Lutjanus erythropterus	46	29	42	65	42	NA	NA	NA	NA

Table 5.2: CpUE (kg/GT/day) trends by fleet segment for Lutjanus malabaricus in WPP 718

CpUE	2016	2017	2018	2019	2020	2021	2022	2023	2024
Nano Dropline	2.1	1.7	1.9	2.4	2.5	NA	NA	NA	NA
Nano Longline	2.1	NA	2.3	17.0	4.0	NA	NA	NA	NA
Small Dropline	2.1	0.4	0.2	5.5	16.5	NA	NA	NA	NA
Small Longline	2.1	2.5	0.9	1.7	2.5	NA	NA	NA	NA
Medium Dropline	0.5	0.3	1.0	1.7	3.9	NA	NA	NA	NA
Medium Longline	3.3	6.2	6.3	3.2	5.6	NA	NA	NA	NA
Large Dropline	NA	0.3	NA	1.1	2.7	NA	NA	NA	NA
Large Longline	2.3	2.7	2.3	1.1	2.1	NA	NA	NA	NA

Table 5.3: CpUE (kg/GT/day) trends by fleet segment for Atrobucca brevis in WPP 718

CpUE	2016	2017	2018	2019	2020	2021	2022	2023	2024
Nano Dropline	0.0	NA	NA	NA	0.6	NA	NA	NA	NA
Nano Longline	0.0	NA	0.7	NA	NA	NA	NA	NA	NA
Small Dropline	0.0	0.1	0.0	NA	NA	NA	NA	NA	NA
Small Longline	0.0	0.0	NA	0.8	0.6	NA	NA	NA	NA
Medium Dropline	NA	NA	NA	0.2	0.0	NA	NA	NA	NA
Medium Longline	NA	0.1	0.6	1.3	0.0	NA	NA	NA	NA
Large Dropline	NA	NA	NA	NA	NA	NA	NA	NA	NA
Large Longline	0.0	0.0	0.8	1.2	0.7	NA	NA	NA	NA

Table 5.4: CpUE (kg/GT/day) trends by fleet segment for Pristipomoides multidens in WPP 718

CpUE	2016	2017	2018	2019	2020	2021	2022	2023	2024
Nano Dropline	0.7	NA	3.8	3.1	0.7	NA	NA	NA	NA
Nano Longline	0.7	1.3	0.5	NA	2.7	NA	NA	NA	NA
Small Dropline	0.7	NA	NA	4.3	3.3	NA	NA	NA	NA
Small Longline	0.7	0.7	NA	0.4	0.7	NA	NA	NA	NA
Medium Dropline	2.1	1.0	0.7	0.4	0.1	NA	NA	NA	NA
Medium Longline	2.4	1.9	0.5	1.7	0.4	NA	NA	NA	NA
Large Dropline	0.5	0.8	2.0	1.8	1.0	NA	NA	NA	NA
Large Longline	0.5	0.6	0.4	0.5	0.7	NA	NA	NA	NA

Table 5.5: CpUE (kg/GT/day) trends by fleet segment for Lethrinus laticaudis in WPP 718

CpUE	2016	2017	2018	2019	2020	2021	2022	2023	2024
Nano Dropline	0.5	0.0	NA	NA	0.8	NA	NA	NA	NA
Nano Longline	0.5	NA	0.6	NA	NA	NA	NA	NA	NA
Small Dropline	0.5	10.0	20.8	4.1	7.2	NA	NA	NA	NA
Small Longline	0.5	0.5	1.3	0.3	0.8	NA	NA	NA	NA
Medium Dropline	0.0	1.6	2.5	1.1	1.9	NA	NA	NA	NA
Medium Longline	0.2	0.9	1.3	0.6	1.7	NA	NA	NA	NA
Large Dropline	NA	NA	0.1	0.6	1.7	NA	NA	NA	NA
Large Longline	0.6	0.4	0.4	0.2	0.6	NA	NA	NA	NA

Table 5.6: CpUE (kg/GT/day) trends by fleet segment for all species in WPP 718

CpUE	2016	2017	2018	2019	2020	2021	2022	2023	2024
Nano Dropline	5.2	38.6	25.4	39.2	6.0	NA	NA	NA	NA
Nano Longline	5.2	5.6	6.3	46.9	17.9	NA	NA	NA	NA
Small Dropline	5.2	51.0	30.9	32.1	46.7	NA	NA	NA	NA
Small Longline	5.2	6.5	50.7	5.1	6.0	NA	NA	NA	NA
Medium Dropline	8.1	7.2	9.8	10.0	9.0	NA	NA	NA	NA
Medium Longline	10.3	16.2	11.4	10.8	10.1	NA	NA	NA	NA
Large Dropline	10.2	23.4	13.3	11.9	7.1	NA	NA	NA	NA
Large Longline	4.5	4.7	4.8	3.9	5.3	NA	NA	NA	NA

Table 5.7: Sample sizes over the period 2016 to 2024 for the others species in WPP 718 Dropline

Family Name	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total	%Catch
Acanthuridae	0	0	0	2	0	0	0	0	0	2	0.000
Ariidae	0	12	12	10	122	0	0	0	0	156	0.015
Balistidae	0	0	0	41	6	0	0	0	0	47	0.005
Bramidae	0	0	0	0	0	0	0	0	0	0	0.000
Caesionidae	0	0	0	1	0	0	0	0	0	1	0.000
Carangidae	11	29	49	190	304	0	0	0	0	583	0.058
Centropomidae	0	0	0	0	0	0	0	0	0	0	0.000
Chirocentridae	0	0	0	0	0	0	0	0	0	0	0.000
Clupeidae	0	0	0	0	0	0	0	0	0	0	0.000
Coryphaenidae	2	0	0	2	0	0	0	0	0	4	0.000
Ephippidae	10	0	0	30	2	0	0	0	0	42	0.004
Epinephelidae	6	7	9	81	18	0	0	0	0	121	0.012
Gempylidae	5	0	0	0	0	0	0	0	0	5	0.000
Glaucosomatidae	0	0	0	4	0	0	0	0	0	4	0.000
Haemulidae	0	1	0	8	1	0	0	0	0	10	0.001
Harpodontidae	0	0	0	0	0	0	0	0	0	0	0.000
Holocentridae	1	0	1	14	0	0	0	0	0	16	0.002
Istiophoridae	0	0	0	0	0	0	0	0	0	0	0.000
Labridae	0	0	0	4	5	0	0	0	0	9	0.001
Lethrinidae	1	29	15	298	31	0	0	0	0	374	0.037
Lutjanidae	5	17	55	216	41	0	0	0	0	334	0.033
Malacanthidae	1	0	0	0	0	0	0	0	0	1	0.000
Mullidae	0	0	0	0	0	0	0	0	0	0	0.000
Muraenesocidae	0	0	0	0	0	0	0	0	0	0	0.000
Nemipteridae	0	0	0	110	47	0	0	0	0	157	0.016
Other	14	102	88	85	41	0	0	0	0	330	0.033
Polynemidae	0	0	0	0	0	0	0	0	0	0	0.000
Pomacanthidae	0	0	0	1	0	0	0	0	0	1	0.000
Priacanthidae	1	0	3	9	1	0	0	0	0	14	0.001
Psettodidae	0	0	0	0	0	0	0	0	0	0	0.000
Rays	1	0	0	0	0	0	0	0	0	1	0.000
Scaridae	0	0	0	40	2	0	0	0	0	42	0.004
Sciaenidae	0	0	0	0	0	0	0	0	0	0	0.000
Scombridae	22	251	115	10	2	0	0	0	0	400	0.040
Scorpaenidae	0	0	0	0	0	0	0	0	0	0	0.000
Serranidae	0	1	0	0	0	0	0	0	0	1	0.000
Sharks	1	6	2	13	7	0	0	0	0	29	0.003
Sillaginidae	0	0	0	2	0	0	0	0	0	2	0.000
Sparidae	0	0	1	0	0	0	0	0	0	1	0.000
Sphyraenidae	1	0	3	0	0	0	0	0	0	4	0.000
Tetraodontidae	0	0	0	0	0	0	0	0	0	0	0.000
Trichiuridae	10	0	1	0	5	0	0	0	0	16	0.002
Total	92	455	354	1171	635	0	0	0	0	2707	0.268

Table 5.8: Sample sizes over the period 2016 to 2024 for the others species in WPP 718 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	9	229	1067	6878	1645	0	0	0	0	9828	0.974
Balistidae	0	6	1	51	3	0	0	0	0	61	0.006
Bramidae	0	0	0	0	0	0	0	0	0	0	0.000
Caesionidae	0	0	0	0	0	0	0	0	0	0	0.000
Carangidae	101	388	187	2005	440	0	0	0	0	3121	0.309
Centropomidae	0	0	0	1	0	0	0	0	0	1	0.000
Chirocentridae	0	0	0	3	0	0	0	0	0	3	0.000
Clupeidae	0	0	0	1	0	0	0	0	0	1	0.000
Coryphaenidae	0	0	0	7	1	0	0	0	0	8	0.001
Ephippidae	0	0	2	5	1	0	0	0	0	8	0.001
Epinephelidae	9	33	84	164	36	0	0	0	0	326	0.032
Gempylidae	0	0	0	117	53	0	0	0	0	170	0.017
Glaucosomatidae	0	0	0	0	0	0	0	0	0	0	0.000
Haemulidae	6	3	9	249	10	0	0	0	0	277	0.027
Harpodontidae	0	0	0	3	0	0	0	0	0	3	0.000
Holocentridae	0	4	1	4	0	0	0	0	0	9	0.001
Istiophoridae	0	0	0	1	0	0	0	0	0	1	0.000
Labridae	0	0	0	21	5	0	0	0	0	26	0.003
Lethrinidae	4	2	11	193	17	0	0	0	0	227	0.022
Lutjanidae	2	24	60	122	12	0	0	0	0	220	0.022
Malacanthidae	0	0	4	3	0	0	0	0	0	7	0.001
Mullidae	0	0	0	2	0	0	0	0	0	2	0.000
Muraenesocidae	0	0	122	1770	223	0	0	0	0	2115	0.210
Nemipteridae	2	2	135	587	18	0	0	0	0	744	0.074
Other	37	433	497	588	33	0	0	0	0	1588	0.157
Polynemidae	0	0	0	40	0	0	0	0	0	40	0.004
Pomacanthidae	0	0	0	0	0	0	0	0	0	0	0.000
Priacanthidae	1	1	0	21	2	0	0	0	0	25	0.002
Psettodidae	0	0	0	1	0	0	0	0	0	1	0.000
Rays	0	12	9	31	2	0	0	0	0	54	0.005
Scaridae	0	0	4	42	0	0	0	0	0	46	0.005
Sciaenidae	0	0	0	5	0	0	0	0	0	5	0.000
Scombridae	6	13	25	51	0	0	0	0	0	95	0.009
Scorpaenidae	0	0	0	2	0	0	0	0	0	2	0.000
Serranidae	0	0	0	1	0	0	0	0	0	1	0.000
Sharks	0	1	131	171	33	0	0	0	0	336	0.033
Sillaginidae	0	0	0	0	0	0	0	0	0	0	0.000
Sparidae	0	0	0	0	0	0	0	0	0	0	0.000
Sphyraenidae	0	8	9	28	0	0	0	0	0	45	0.004
Tetraodontidae	0	0	129	127	0	0	0	0	0	256	0.025
Trichiuridae	0	0	594	4957	182	0	0	0	0	5733	0.568
Total	177	1159	3081	18252	2716	0	0	0	0	25385	2.516

Table 5.9: Sample sizes over the period 2016 to 2024 for the others species in WPP 718 Gillnet

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	0	0	357	0	0	0	0	0	357	0.035
Balistidae	0	0	0	0	0	0	0	0	0	0	0.000
Bramidae	0	0	0	1	0	0	0	0	0	1	0.000
Caesionidae	0	0	0	0	0	0	0	0	0	0	0.000
Carangidae	0	0	0	9	0	0	0	0	0	9	0.001
Centropomidae	0	0	0	0	0	0	0	0	0	0	0.000
Chirocentridae	0	0	0	0	0	0	0	0	0	0	0.000
Clupeidae	0	0	0	0	0	0	0	0	0	0	0.000
Coryphaenidae	0	0	0	0	0	0	0	0	0	0	0.000
Ephippidae	0	0	0	0	0	0	0	0	0	0	0.000
Epinephelidae	0	0	0	0	0	0	0	0	0	0	0.000
Gempylidae	0	0	0	0	0	0	0	0	0	0	0.000
Glaucosomatidae	0	0	0	0	0	0	0	0	0	0	0.000
Haemulidae	0	0	0	4	0	0	0	0	0	4	0.000
Harpodontidae	0	0	0	0	0	0	0	0	0	0	0.000
Holocentridae	0	0	0	0	0	0	0	0	0	0	0.000
Istiophoridae	0	0	0	0	0	0	0	0	0	0	0.000
Labridae	0	0	0	0	0	0	0	0	0	0	0.000
Lethrinidae	0	0	0	0	0	0	0	0	0	0	0.000
Lutjanidae	0	0	0	0	0	0	0	0	0	0	0.000
Malacanthidae	0	0	0	0	0	0	0	0	0	0	0.000
Mullidae	0	0	0	0	0	0	0	0	0	0	0.000
Muraenesocidae	0	0	0	0	0	0	0	0	0	0	0.000
Nemipteridae	0	0	0	0	0	0	0	0	0	0	0.000
Other	0	0	0	3	0	0	0	0	0	3	0.000
Polynemidae	0	0	0	0	0	0	0	0	0	0	0.000
Pomacanthidae	0	0	0	0	0	0	0	0	0	0	0.000
Priacanthidae	0	0	0	0	0	0	0	0	0	0	0.000
Psettodidae	0	0	0	1604	0	0	0	0	0	1604	0.159
Rays	0	0	0	0	0	0	0	0	0	0	0.000
Scaridae	0	0	0	0	0	0	0	0	0	0	0.000
Sciaenidae	0	0	0	0	0	0	0	0	0	0	0.000
Scombridae	0	0	0	113	0	0	0	0	0	113	0.011
Scorpaenidae	0	0	0	0	0	0	0	0	0	0	0.000
Serranidae	0	0	0	0	0	0	0	0	0	0	0.000
Sharks	0	0	0	3	0	0	0	0	0	3	0.000
Sillaginidae	0	0	0	0	0	0	0	0	0	0	0.000
Sparidae	0	0	0	0	0	0	0	0	0	0	0.000
Sphyraenidae	0	0	0	0	0	0	0	0	0	0	0.000
Tetraodontidae	0	0	0	0	0	0	0	0	0	0	0.000
Trichiuridae	0	0	0	0	0	0	0	0	0	0	0.000
Total	0	0	0	2094	0	0	0	0	0	2094	0.208

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