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Length-Based Assessment of the Fisheries Targeting Snappers, Groupers and Emperors in Indonesia, Fishery Management Area 714

YKAN Technical Paper

Peter J. Mous, Wawan B. IGede, Jos S. Pet

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Abstract

This document provides an overview of fleet characteristics and catch composition of the demersal fishery targeting snappers in Indonesia Fishery Management Area 714. It also presents trends in length-based stock health indicators of the top-20 species in this FMA. The report presents overfishing risk levels of the top 50 species, both in terms of current status and trend. Finally, the report presents a table with the contribution of other species to the total catch. The findings are based on YKAN's Crew-Operated Data Recording System, an initiative that involves fishers in data collection using digital imagery.

Yayasan Konservasi Alam Nusantara
Ikat Plaza Building - Blok L
Jalan By Pass Ngurah Rai No.505, Pemogan, Denpasar Selatan
Kota Denpasar 80221
Bali, Indonesia
Ph. +62-361-244524

People and Nature Consulting International
Jalan Tukad Pancoran 15X, Panjer, Denpasar Selatan
Kota Denpasar 80225
Bali, Indonesia

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1 Introduction

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

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

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

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

The Indonesian deep demersal fisheries catches a large number of species, and stocks of 100 of the most common species are monitored on a continuous basis through a Crew Operated Data Recording System (CODRS). The current report presents the top 50 most abundant species of fish in CODRS samples (Tables 1.1 and 1.2) in WPP 714, and analyses length frequencies of the 50 most important species in the combined deep demersal catches in this fisheries management area. For a complete overview of the species composition with images of all 100 target species, please refer to the ID guide prepared for these fisheries[1]. For further background on species life history characteristics, and data-poor length based assessment methods, as applied in this report, please refer to the assessment guide that was separately prepared for these fisheries[2].

Data in this report represent catches realized within WPP 714 boundaries by fishing boats from the above described fleets. Captured fish were photographed on measuring boards by fishing crew participating in our Crew Operated Data Recording System. Images were analysed by project staff to generate the species specific length frequency distributions of the catches which served as the input for our length based assessment. Fishing grounds were recorded with SPOT tracers placed on contracted vessels.

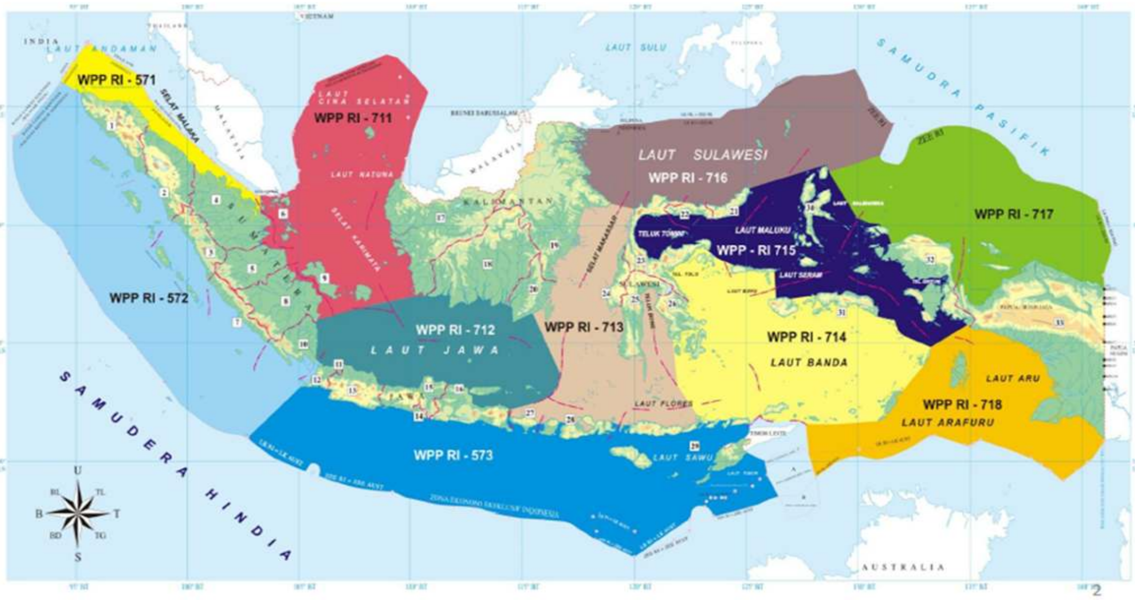


Figure 1.1: Fisheries Management Areas (*Wilayah Pengelolaan Perikanan* or WPP) in Indonesian marine waters.

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

Table 1.1: Length-weight relationships, trading limits and total sample sizes (including all years) for the 50 most abundant species in CODRS samples from deep water demersal fisheries in 714

Rank	#ID	Species	Reported Trade Limit Weight (g)	W = a L^b a	b	Length Type for a & b TL-FL-SL	Converted Trade Limit L(cm)	Plotted Trade Limit TL(cm)	Sample Sizes
1	1	Aphareus rutilans	1000	0.015	2.961	FL	42.20	49.61	9313
2	7	Pristipomoides multidens	500	0.020	2.944	FL	31.18	34.92	8475
3	4	Etelis boweni	500	0.022	2.950	FL	30.16	32.84	6537
4	20	Lutjanus gibbus	500	0.015	3.091	FL	28.87	31.09	5947
5	9	Pristipomoides filamentosus	500	0.038	2.796	FL	29.70	33.27	5251
6	22	Pinjalo lewisi	300	0.014	2.970	FL	28.42	29.64	4803
7	45	Epinephelus areolatus	300	0.011	3.048	FL	28.18	28.77	4418
8	34	Paracaesio kusakarii	500	0.011	3.135	FL	30.96	34.80	4238
9	66	Lethrinus olivaceus	300	0.029	2.851	FL	25.49	27.50	3473
10	6	Etelis coruscans	500	0.041	2.758	FL	30.28	37.85	3398
11	19	Lutjanus timorensis	500	0.009	3.137	FL	33.11	33.34	3352
12	70	Gymnocranius grandoculis	500	0.032	2.885	FL	28.43	30.53	3185
13	16	Lutjanus bohar	500	0.016	3.059	FL	29.70	31.31	3072
14	2	Aprion virescens	1000	0.023	2.886	FL	40.49	45.90	3062
15	17	Lutjanus malabaricus	500	0.009	3.137	FL	33.11	33.11	2605
16	8	Pristipomoides typus	500	0.014	2.916	TL	36.16	36.16	2526
17	27	Lutjanus vitta	300	0.017	2.978	FL	26.72	27.64	2264
18	5	Etelis radiosus	1000	0.056	2.689	FL	38.05	43.15	2218
19	33	Paracaesio xanthura	300	0.023	3.000	SL	23.64	27.39	2199
20	80	Caranx sexfasciatus	2000	0.032	2.930	FL	43.43	49.51	2172
21	37	Cephalopholis miniata	300	0.026	2.864	TL	26.35	26.35	2029
22	15	Lutjanus argentimaculatus	500	0.034	2.792	FL	31.22	31.78	1909
23	63	Lethrinus lentjan	300	0.020	2.986	FL	25.16	26.35	1663
24	85	Erythrocles schlegelii	1500	0.011	3.040	FL	48.55	53.60	1657
25	38	Cephalopholis sexmaculata	300	0.027	3.000	SL	22.37	28.24	1638
26	67	Lethrinus amboinensis	300	0.029	2.851	FL	25.49	28.06	1627
27	39	Cephalopholis sonnerati	300	0.015	3.058	TL	25.78	25.78	1551
28	28	Lutjanus boutton	300	0.034	3.000	FL	20.75	21.56	1542
29	62	Variola albimarginata	300	0.012	3.079	FL	26.68	30.44	1484
30	61	Plectropomus leopardus	500	0.012	3.060	FL	32.56	33.38	1421
31	81	Caranx tille	2000	0.032	2.930	FL	43.43	49.51	1384
32	35	Paracaesio stonei	500	0.024	2.960	FL	28.78	32.35	1310
33	78	Caranx ignobilis	2000	0.027	2.913	FL	46.78	54.36	1266
34	10	Pristipomoides sieboldii	300	0.022	2.942	FL	25.52	29.21	1175
35	50	Epinephelus coioides	1500	0.011	3.084	TL	46.94	46.94	1130
36	90	Diagramma pictum	500	0.014	2.988	FL	33.08	36.71	993
37	69	Wattsia mossambica	500	0.040	2.824	FL	28.21	29.34	992
38	60	Plectropomus maculatus	500	0.016	3.000	FL	31.76	31.76	954
39	84	Seriola rivoliana	2000	0.006	3.170	FL	54.23	60.03	863
40	94	Sphyraena forsteri	500	0.005	3.034	FL	43.51	49.16	852
41	18	Lutjanus sebae	500	0.009	3.208	FL	29.97	31.26	841
42	65	Lethrinus nebulosus	500	0.019	2.996	FL	30.03	32.14	839
43	31	Symphorus nematophorus	1000	0.015	3.046	FL	38.63	40.18	763
44	58	Epinephelus amblycephalus	1500	0.012	3.057	TL	45.99	45.99	725
45	82	Elagatis bipinnulata	1000	0.013	2.920	FL	46.53	55.37	615
46	48	Epinephelus bilobatus	300	0.014	2.990	TL	27.82	27.82	609
47	79	Caranx lugubris	2000	0.020	3.001	FL	46.51	55.35	606
48	43	Epinephelus morrhua	300	0.061	2.624	FL	25.59	25.59	572
49	46	Epinephelus bleekeri	300	0.009	3.126	TL	28.09	28.09	521
50	93	Sphyraena barracuda	1500	0.006	3.011	FL	61.48	69.47	508

Table 1.2: Sample sizes over the period 2016 to 2024 for the 50 most abundant species in CODRS samples of deepwater demersal fisheries in WPP 714

Rank	Species	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total
1	Aphareus rutilans	19	197	329	2261	3025	3482	0	0	0	9313
2	Pristipomoides multidens	65	1145	763	2113	3134	1255	0	0	0	8475
3	Etelis boweni	31	195	230	1441	4255	385	0	0	0	6537
4	Lutjanus gibbus	4	48	282	2839	2122	652	0	0	0	5947
5	Pristipomoides filamentosus	79	280	544	1191	2237	920	0	0	0	5251
6	Pinjalo lewisi	1	36	76	300	2297	2093	0	0	0	4803
7	Epinephelus areolatus	44	509	290	1019	1790	766	0	0	0	4418
8	Paracaesio kusakarii	35	249	349	689	1810	1106	0	0	0	4238
9	Lethrinus olivaceus	47	402	504	1132	1063	325	0	0	0	3473
10	Etelis coruscans	10	47	321	670	2279	71	0	0	0	3398
11	Lutjanus timorensis	1	122	195	1081	1447	506	0	0	0	3352
12	Gymnocranius grandoculis	135	1065	452	474	626	433	0	0	0	3185
13	Lutjanus bohar	4	369	249	1256	949	245	0	0	0	3072
14	Aprion virescens	99	843	438	756	719	207	0	0	0	3062
15	Lutjanus malabaricus	34	540	353	408	921	349	0	0	0	2605
16	Pristipomoides typus	9	167	206	522	1032	590	0	0	0	2526
17	Lutjanus vitta	11	78	124	827	858	366	0	0	0	2264
18	Etelis radiosus	17	67	93	346	1323	372	0	0	0	2218
19	Paracaesio xanthura	2	9	13	265	933	977	0	0	0	2199
20	Caranx sexfasciatus	12	71	62	1042	360	625	0	0	0	2172
21	Cephalopholis miniata	1	3	20	1030	805	170	0	0	0	2029
22	Lutjanus argentimaculatus	35	223	258	530	594	269	0	0	0	1909
23	Lethrinus lentjan	2	49	74	547	689	302	0	0	0	1663
24	Erythrocles schlegelii	0	33	41	163	1418	2	0	0	0	1657
25	Cephalopholis sexmaculata	1	1	2	994	527	113	0	0	0	1638
26	Lethrinus amboinensis	4	132	147	300	839	205	0	0	0	1627
27	Cephalopholis sonnerati	33	309	95	318	533	263	0	0	0	1551
28	Lutjanus boutton	0	43	39	524	708	228	0	0	0	1542
29	Variola albimarginata	22	77	52	566	529	238	0	0	0	1484
30	Plectropomus leopardus	0	7	42	271	616	485	0	0	0	1421
31	Caranx tille	2	13	49	779	449	92	0	0	0	1384
32	Paracaesio stonei	0	68	97	277	737	131	0	0	0	1310
33	Caranx ignobilis	38	251	146	419	314	98	0	0	0	1266
34	Pristipomoides sieboldii	6	3	64	406	668	28	0	0	0	1175
35	Epinephelus coioides	23	140	84	223	454	206	0	0	0	1130
36	Diagramma pictum	23	298	95	153	346	78	0	0	0	993
37	Wattsia mossambica	2	46	67	439	329	109	0	0	0	992
38	Plectropomus maculatus	3	23	13	124	399	392	0	0	0	954
39	Seriola rivoliana	13	34	36	161	363	256	0	0	0	863
40	Sphyraena forsteri	0	41	55	339	331	86	0	0	0	852
41	Lutjanus sebae	26	326	88	186	169	46	0	0	0	841
42	Lethrinus nebulosus	3	151	101	188	282	114	0	0	0	839
43	Symphorus nematophorus	23	361	121	94	111	53	0	0	0	763
44	Epinephelus amblycephalus	88	382	78	110	52	15	0	0	0	725
45	Elagatis bipinnulata	0	10	9	290	179	127	0	0	0	615
46	Epinephelus bilobatus	20	132	75	230	130	22	0	0	0	609
47	Caranx lugubris	0	0	2	424	149	31	0	0	0	606
48	Epinephelus morrhua	1	39	57	197	169	109	0	0	0	572
49	Epinephelus bleekeri	3	86	63	70	209	90	0	0	0	521
50	Sphyraena barracuda	21	124	59	129	117	58	0	0	0	508

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 2020, most (over 90%) of the Indonesian coastline had been surveyed and the vast 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 are 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 are not further processed and not included in the dataset. Body weight at length is 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 is verified against sales records of landings. These sales receipts or ledgers represent a fairly 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 verify that individual catches are fully represented by CODRS images and we flag catches when they are incomplete, judging from comparison with the weight converted catch size frequencies. When estimated weights from CODRS are above 90% of landed weights from receipts, they are 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 are 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 are rejected and are not used in any analysis.

2.4 Length-Frequency Distributions, CpUE, and Total Catch

By the end of 2020, 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 iss 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 is 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 are 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 are 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 is combined with fleet activity to establish a measure of effort. With this information, CpUE is 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 are 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) is 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), is derived from SPOT data looking at movement patterns. Fleet size by gear type and boat size category (Table 2.5) is obtained from field surveys, where each vessel is 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, are 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 are used for further calculations. Numbers per size class for each species in the catch are 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), and catch by species for each gear type separately (Tables 2.9 through 2.13).

As the CODRS program is still in final stage of 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 apply the following approach to estimate annual catch. First, within each WPP, we estimate the total catch and the total effort for all fleet segments where we have representation by CODRS. We express annual effort as "tonnage-days", i.e. the GT of each vessel times the annual number of fishing days. Then, we calculate the average catch-per-unit-effort, over all fleet segments that have CODRS representation within each WPP (in metric tons per tonnage-day). This results in one catch-per-unit-effort estimate for each WPP (CPUE-estimate-per-WPP). Then, we calculate the effort, in tonnage-days, for the fleet segments where we do not have CODRS representation, and we multiply 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.

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

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

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

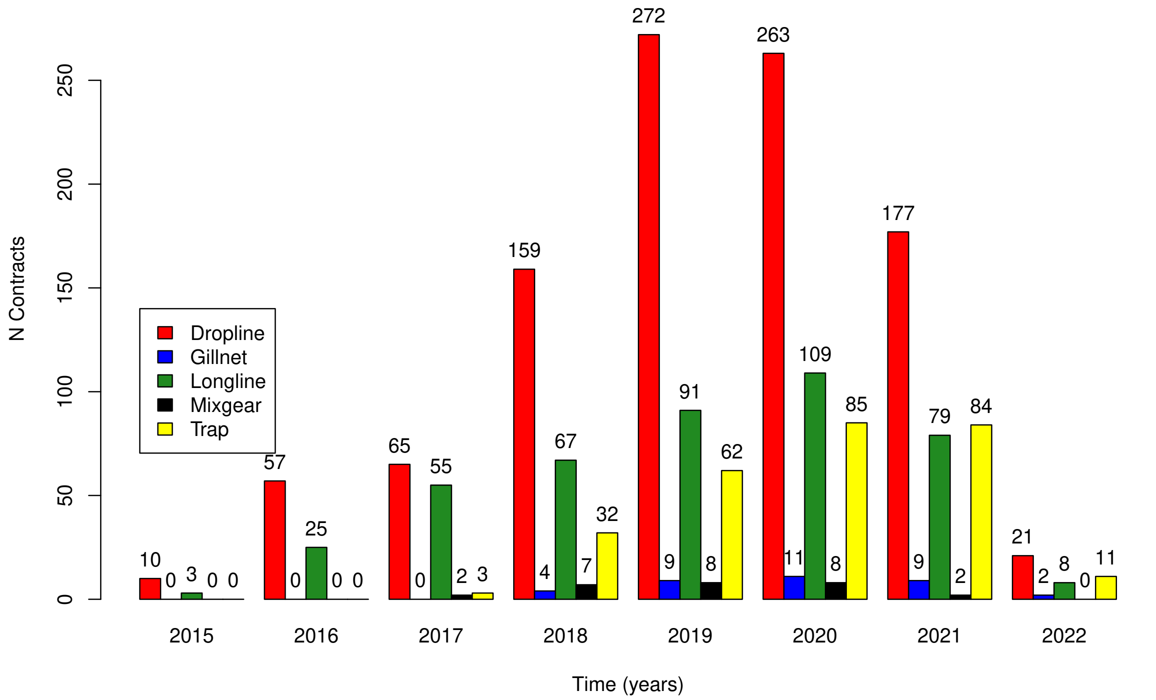


Figure 2.3: Number of CODRS contractors by gear type actively fishing in Indonesian waters.

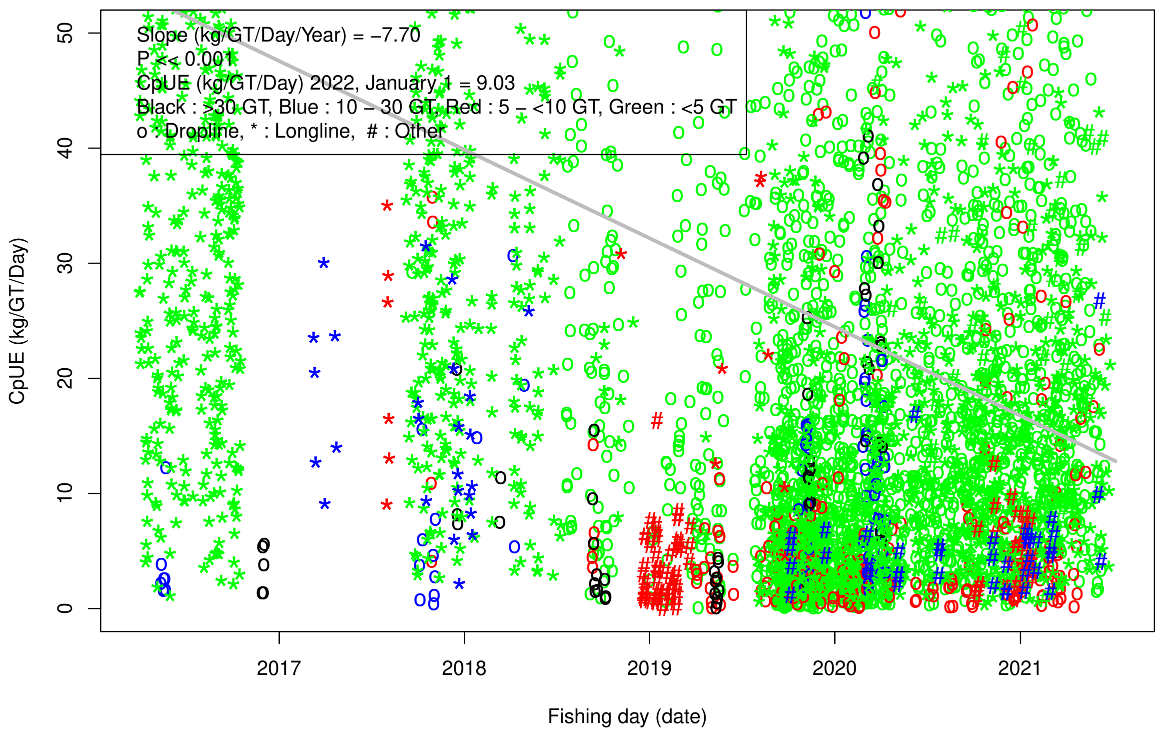


Figure 2.4: Catch per Unit of Effort in WPP 714.

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

N	Dropline	Longline	Gillnet	Trap	Mix Gear	Total
Nano	0	0	NA	0	NA	0
Small	0	NA	NA	NA	NA	0
Medium	0	NA	NA	0	NA	0
Large	0	NA	NA	NA	NA	0
Total	0	0	0	0	0	0

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

Table 2.2: CpUE by fishing gear and boat size category in WPP 714 in 2020

kg/GT/Day	Dropline	Longline	Gillnet	Trap	Mix Gear
Nano	22.09	18.85	22.43	22.81	NA
Small	25.76	NA	NA	NA	NA
Medium	20.73	NA	NA	4.50	NA
Large	33.24	NA	NA	NA	NA

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

Table 2.3: Number of CODRS observations that contribute to CpUE value in WPP 714 in 2020

N	Dropline	Longline	Gillnet	Trap	Mix Gear
Nano	848	485	1538	23	NA
Small	97	NA	NA	NA	14
Medium	38	NA	NA	17	NA
Large	16	NA	NA	NA	NA

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

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

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

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

Table 2.5: Current number of boats in the fleet by fishing gear and boat size category in WPP 714

Number of Boat	Dropline	Longline	Gillnet	Trap	Mix Gear	Total
Nano Dedicated	262	68	4	1	0	335
Nano Seasonal	191	35	0	0	0	226
Small Dedicated	8	0	0	0	0	8
Small Seasonal	6	0	0	0	0	6
Medium Dedicated	1	0	0	1	0	2
Medium Seasonal	1	0	0	0	0	1
Large Dedicated	2	0	0	0	0	2
Large Seasonal	0	0	0	0	0	0
Total	471	103	4	2	0	580

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

Table 2.6: Current total gross tonnage of all boats in the fleet by fishing gear and boat size category in WPP 714

Total GT	Dropline	Longline	Gillnet	Trap	Mix Gear	Total
Nano Dedicated	335	78	4	1	0	418
Nano Seasonal	245	29	0	0	0	274
Small Dedicated	53	0	0	0	0	53
Small Seasonal	38	0	0	0	0	38
Medium Dedicated	28	0	0	12	0	40
Medium Seasonal	13	0	0	0	0	13
Large Dedicated	65	0	0	0	0	65
Large Seasonal	0	0	0	0	0	0
Total	777	107	4	13	0	900

Table 2.7: Total catch in metric tons per year by fishing gear and boat size category in WPP 714 in 2020

Total Catch	Dropline	Longline	Gillnet	Trap	Mix Gear	Total
Nano Dedicated	1486	346	21	4	0	1857
Nano Seasonal	542	64	0	0	0	606
Small Dedicated	289	0	0	0	0	289
Small Seasonal	105	0	0	0	0	105
Medium Dedicated	118	0	0	12	0	129
Medium Seasonal	28	0	0	0	0	28
Large Dedicated	358	0	0	0	0	358
Large Seasonal	0	0	0	0	0	0
Total	2925	410	21	16	0	3372

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

Table 2.8: Top 20 species by volume in deepwater demersal fisheries with % immature fish in the catch in WPP 714 in 2020.

Species	Weight MT	Weight %	Cumulative % Weight	Immature % Number	Immature % Weight	Risk Immature
Aphareus rutilans	403	12	12	55	29	High
Etelis boweni	380	11	23	42	21	High
Lethrinus olivaceus	240	7	30	7	1	Low
Pristipomoides multidens	213	6	37	41	19	High
Etelis coruscans	129	4	40	51	32	High
Aprion virescens	126	4	44	35	14	High
Lutjanus malabaricus	97	3	47	41	13	High
Lutjanus bohar	96	3	50	61	16	High
Caranx ignobilis	94	3	53	23	10	Med
Lutjanus argentimaculatus	90	3	55	12	5	Med
Paracaesio kusakarii	88	3	58	32	17	High
Pristipomoides filamentosus	84	3	61	71	38	High
Epinephelus coioides	78	2	63	5	1	Low
Caranx tille	77	2	65	5	1	Low
Caranx sexfasciatus	72	2	67	16	4	Med
Lutjanus gibbus	65	2	69	26	11	Med
Pinjalo lewisi	64	2	71	1	1	Low
Erythrocles schlegelii	62	2	73	1	0	Low
Gymnocranius grandoculis	57	2	75	7	2	Low
Lutjanus timorensis	57	2	76	15	7	Med
Total Top 20 Species	2572	76	76	32	16	High
Total Top 100 Species	3372	100	100	24	14	Medium

Table 2.9: Top 20 species by volume in Dropline fisheries with % immature fish in the catch in WPP 714 in 2020.

Species	Weight MT	Weight %	Cumulative % Weight	Immature % Number	Immature % Weight	Risk Immature
Etelis boweni	360	12	12	40	20	High
Aphareus rutilans	348	12	24	55	29	High
Lethrinus olivaceus	228	8	32	7	1	Low
Pristipomoides multidens	193	7	39	42	20	High
Etelis coruscans	126	4	43	51	32	High
Aprion virescens	98	3	46	34	15	High
Lutjanus bohar	85	3	49	63	18	High
Lutjanus malabaricus	79	3	52	44	14	High
Lutjanus argentimaculatus	76	3	54	13	6	Med
Caranx tille	75	3	57	5	1	Low
Paracaesio kusakarii	74	3	60	31	16	High
Caranx ignobilis	74	3	62	27	13	Med
Pristipomoides filamentosus	68	2	64	73	40	High
Erythrocles schlegelii	62	2	66	1	0	Low
Lutjanus gibbus	58	2	68	27	11	Med
Caranx sexfasciatus	57	2	70	17	4	Med
Epinephelus coioides	55	2	72	5	1	Low
Etelis radiosus	53	2	74	75	51	High
Lutjanus timorensis	52	2	76	14	7	Med
Gymnocranius grandoculis	50	2	78	7	2	Low
Total Top 20 Species	2269	78	78	36	17	High
Total Top 100 Species	2925	100	100	25	15	Medium

Table 2.10: Top 20 species by volume in Longline fisheries with % immature fish in the catch in WPP 714 in 2020.

Species	Weight MT	Weight %	Cumulative % Weight	Immature % Number	Immature % Weight	Risk Immature
Aphareus rutilans	53	13	13	57	30	High
Pinjalo lewisi	30	7	20	2	1	Low
Aprion virescens	28	7	27	39	13	High
Diagramma pictum	20	5	32	0	0	Low
Caranx ignobilis	20	5	37	3	1	Low
Pristipomoides multidens	19	5	41	36	15	High
Epinephelus coioides	18	4	46	3	1	Low
Etelis boweni	18	4	50	61	41	High
Lutjanus malabaricus	16	4	54	16	6	Med
Pristipomoides filamentosus	16	4	58	58	33	High
Lutjanus sebae	15	4	62	20	6	Med
Caranx sexfasciatus	15	4	65	9	2	Low
Paracaesio kusakarii	14	3	69	39	24	High
Lutjanus argentimaculatus	13	3	72	7	3	Low
Lethrinus olivaceus	11	3	75	3	1	Low
Lethrinus amboinensis	10	3	77	0	0	Low
Lutjanus bohar	10	2	79	24	5	Med
Gymnocranius grandoculis	7	2	81	4	1	Low
Lutjanus gibbus	6	2	83	8	3	Low
Lethrinus lentjan	6	1	84	4	1	Low
Total Top 20 Species	345	84	84	20	12	Medium
Total Top 100 Species	410	100	100	18	12	Medium

Table 2.11: Top 20 species by volume in Gillnet fisheries with % immature fish in the catch in WPP 714 in 2020.

Species	Weight MT	Weight %	Cumulative % Weight	Immature % Number	Immature % Weight	Risk Immature
Aphareus rutilans	2	12	12	NA	NA	
Etelis boweni	2	11	23	NA	NA	
Lethrinus olivaceus	1	7	30	NA	NA	
Pristipomoides multidens	1	6	37	NA	NA	
Etelis coruscans	1	4	40	NA	NA	
Aprion virescens	1	4	44	NA	NA	
Lutjanus malabaricus	1	3	47	NA	NA	
Lutjanus bohar	1	3	50	NA	NA	
Caranx ignobilis	1	3	53	NA	NA	
Lutjanus argentimaculatus	1	3	55	NA	NA	
Paracaesio kusakarii	1	3	58	NA	NA	
Pristipomoides filamentosus	1	3	61	NA	NA	
Epinephelus coioides	0	2	63	NA	NA	
Caranx tille	0	2	65	NA	NA	
Caranx sexfasciatus	0	2	67	NA	NA	
Lutjanus gibbus	0	2	69	NA	NA	
Pinjalo lewisi	0	2	71	NA	NA	
Erythrocles schlegelii	0	2	73	NA	NA	
Gymnocranius grandoculis	0	2	75	NA	NA	
Lutjanus timorensis	0	2	76	NA	NA	
Total Top 20 Species	16	76	76	NA	NA	NA
Total Top 100 Species	21	100	100	NA	NA	NA

Table 2.12: Top 20 species by volume in Trap fisheries with % immature fish in the catch in WPP 714 in 2020.

Species	Weight MT	Weight %	Cumulative % Weight	Immature % Number	Immature % Weight	Risk Immature
Plectropomus maculatus	7	46	46	0	0	Low
Epinephelus coioides	4	26	72	15	6	Med
Plectropomus leopardus	2	14	85	9	4	Low
Lutjanus malabaricus	1	7	92	93	82	High
Lethrinus olivaceus	0	2	94	NA	NA	
Epinephelus bleekeri	0	1	95	NA	NA	
Diagramma pictum	0	1	96	NA	NA	
Lethrinus lentjan	0	1	97	NA	NA	
Lutjanus vitta	0	1	98	NA	NA	
Lutjanus argentimaculatus	0	1	98	NA	NA	
Cephalopholis sonnerati	0	1	99	NA	NA	
Epinephelus malabaricus	0	0	99	NA	NA	
Lutjanus sebae	0	0	99	NA	NA	
Lutjanus russelli	0	0	99	NA	NA	
Variola albimarginata	0	0	100	NA	NA	
Caranx ignobilis	0	0	100	NA	NA	
Lutjanus gibbus	0	0	100	NA	NA	
Epinephelus areolatus	0	0	100	NA	NA	
Cephalopholis miniata	0	0	100	NA	NA	
Lethrinus rubrioperculatus	0	0	100	NA	NA	
Total Top 20 Species	16	100	100	15	7	Medium
Total Top 100 Species	16	100	100	15	7	Medium

Table 2.13: Top 20 species by volume in Mixgears fisheries with % immature fish in the catch in WPP 714 in 2020.

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

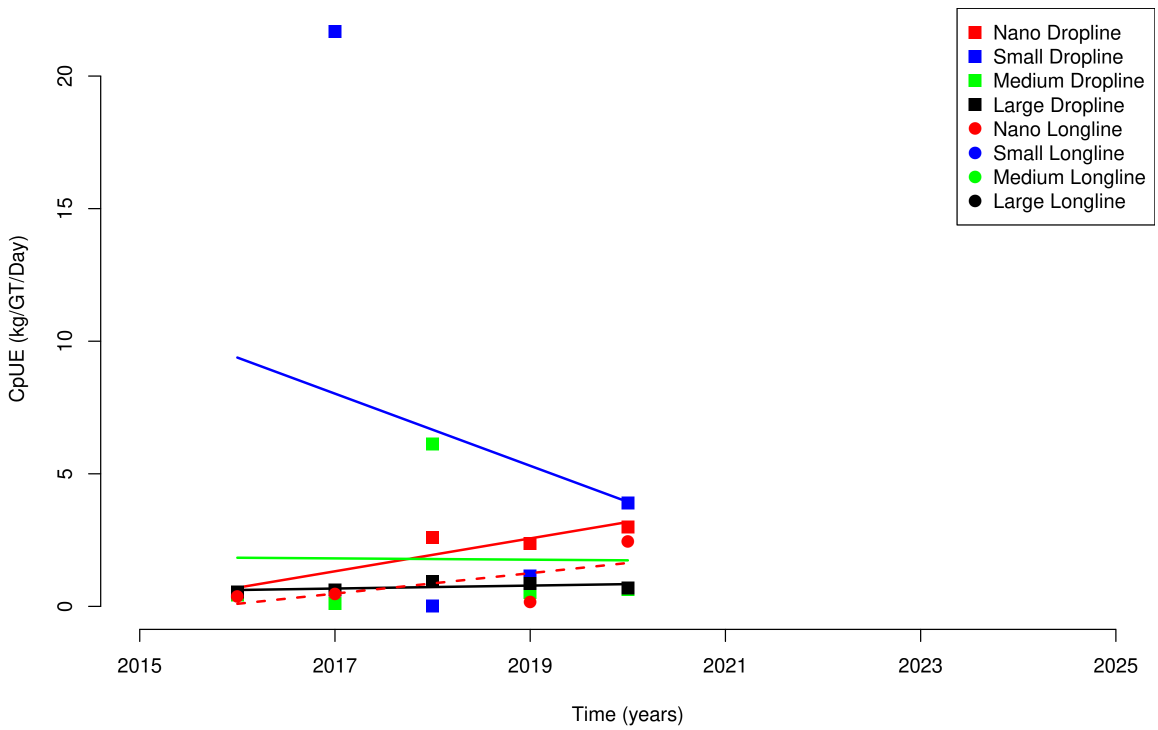


Figure 2.5: Catch per Unit of Effort per calendar year for Aphareus rutilans in WPP 714 for Dropline and Longline catches by fleet segment. Solid lines and dashed lines for trends in Dropline CpUE and Longline CpUE respectively.

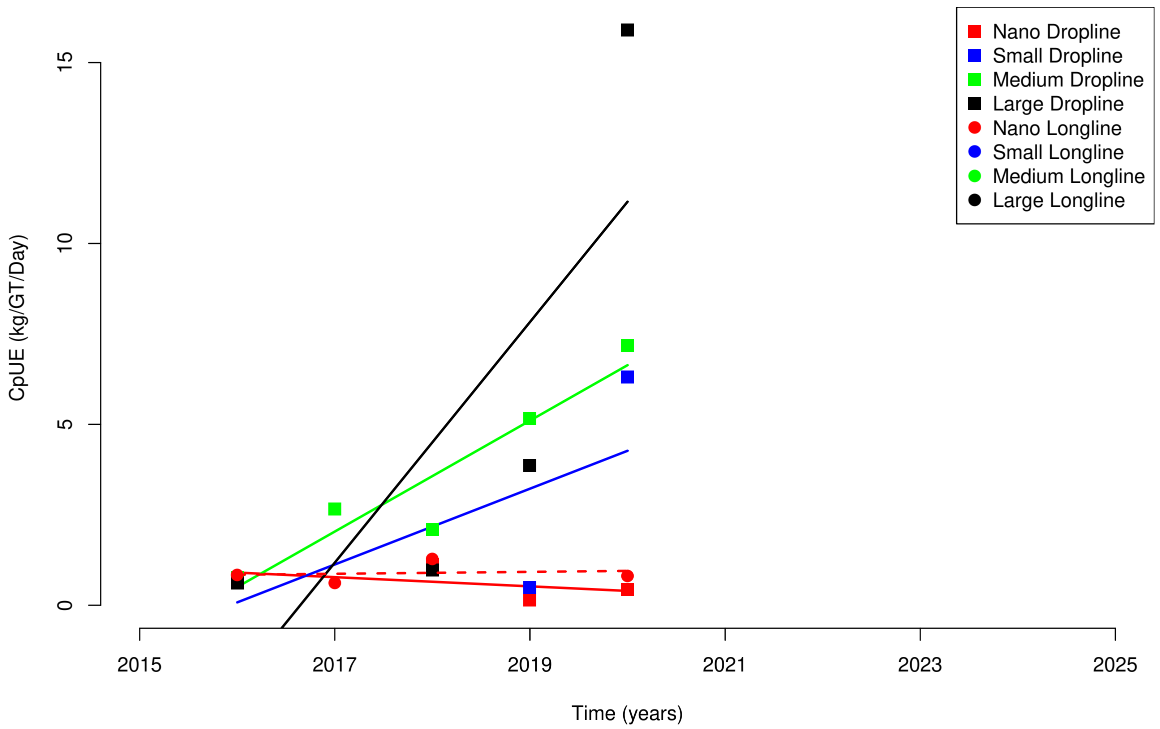


Figure 2.6: Catch per Unit of Effort per calendar year for Etelis boweni
in WPP 714 for Dropline and Longline catches by fleet segment.
Solid lines and dashed lines for trends in Dropline CpUE and Longline CpUE respectively.

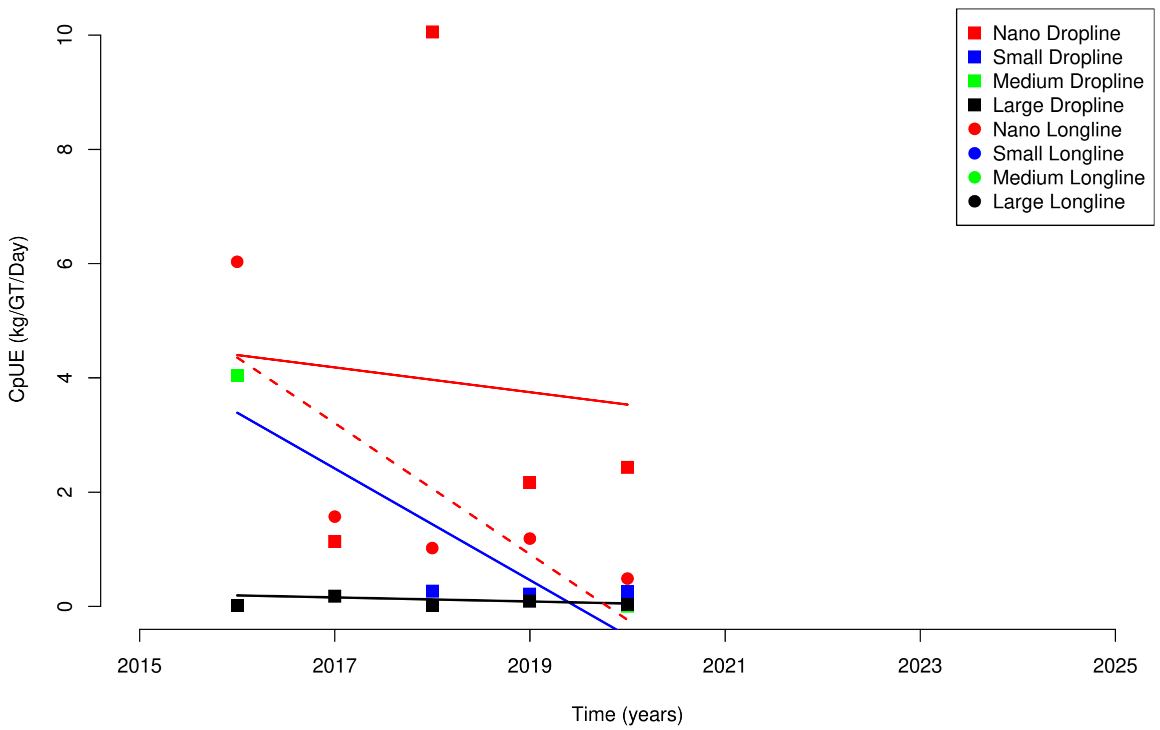


Figure 2.7: Catch per Unit of Effort per calendar year for Lethrinus olivaceus
in WPP 714 for Dropline and Longline catches by fleet segment.
Solid lines and dashed lines for trends in Dropline CpUE and Longline CpUE respectively.

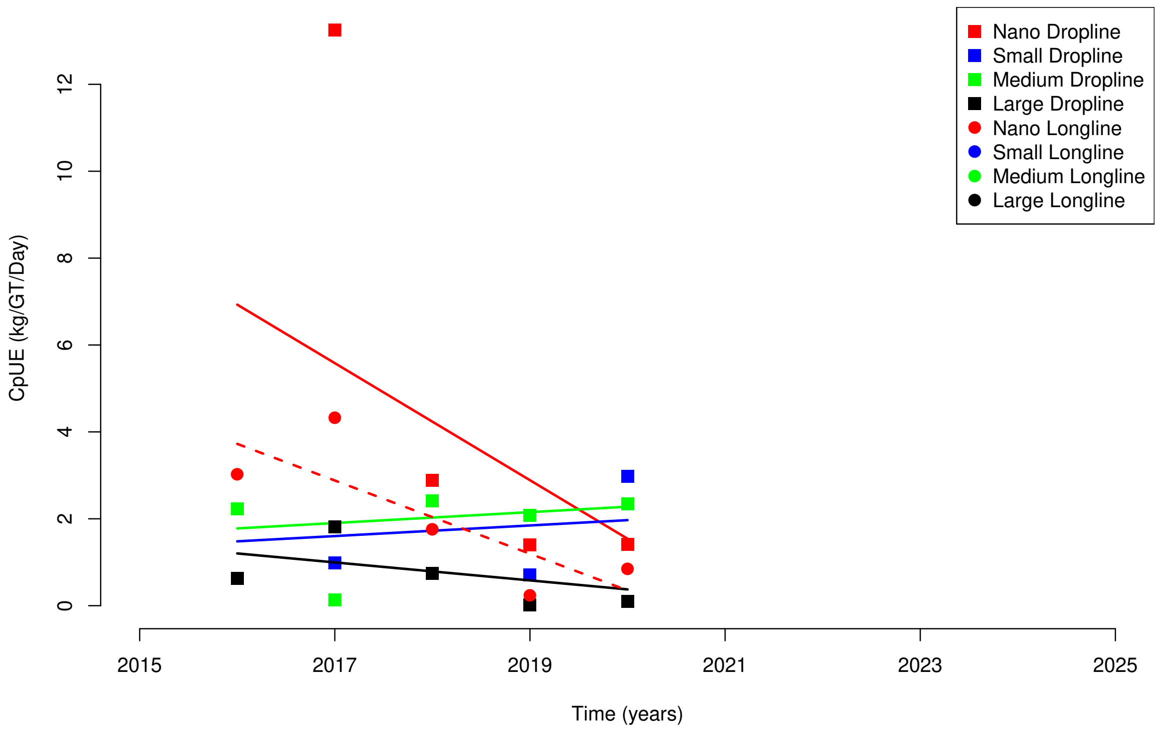


Figure 2.8: Catch per Unit of Effort per calendar year for Pristipomoides multidens in WPP 714 for Dropline and Longline catches by fleet segment. Solid lines and dashed lines for trends in Dropline CpUE and Longline CpUE respectively.

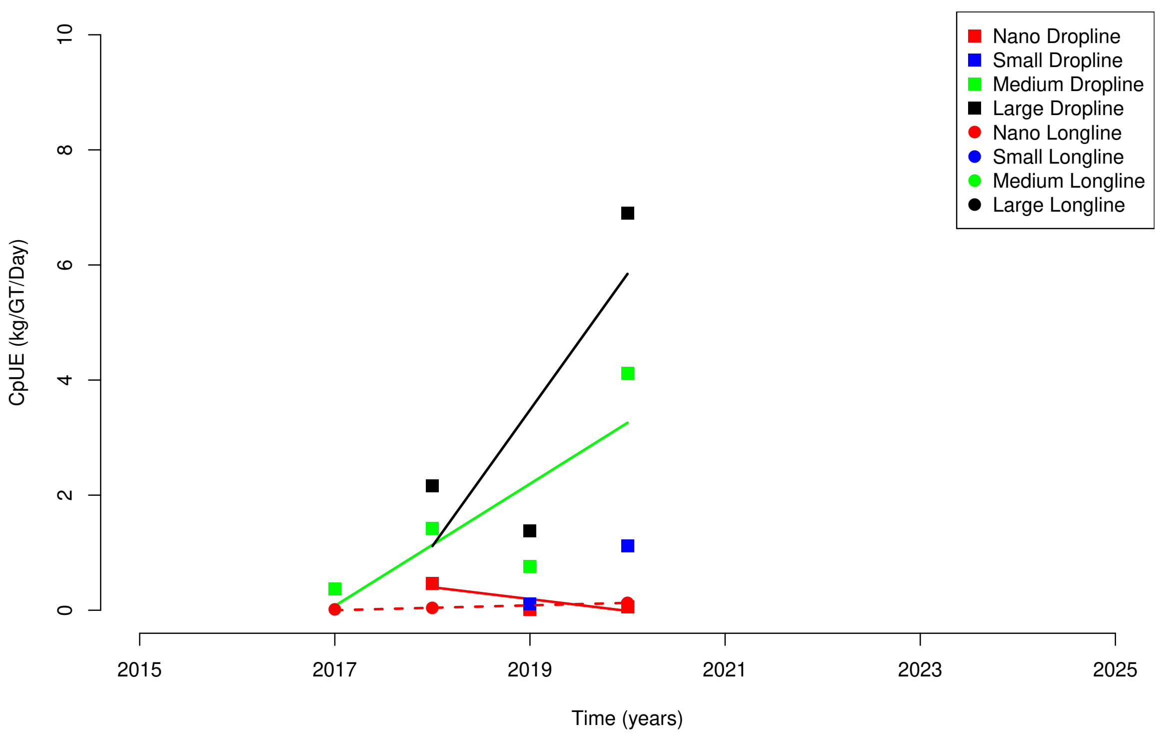


Figure 2.9: Catch per Unit of Effort per calendar year for Etelis coruscans in WPP 714 for Dropline and Longline catches by fleet segment. Solid lines and dashed lines for trends in Dropline CpUE and Longline CpUE respectively.

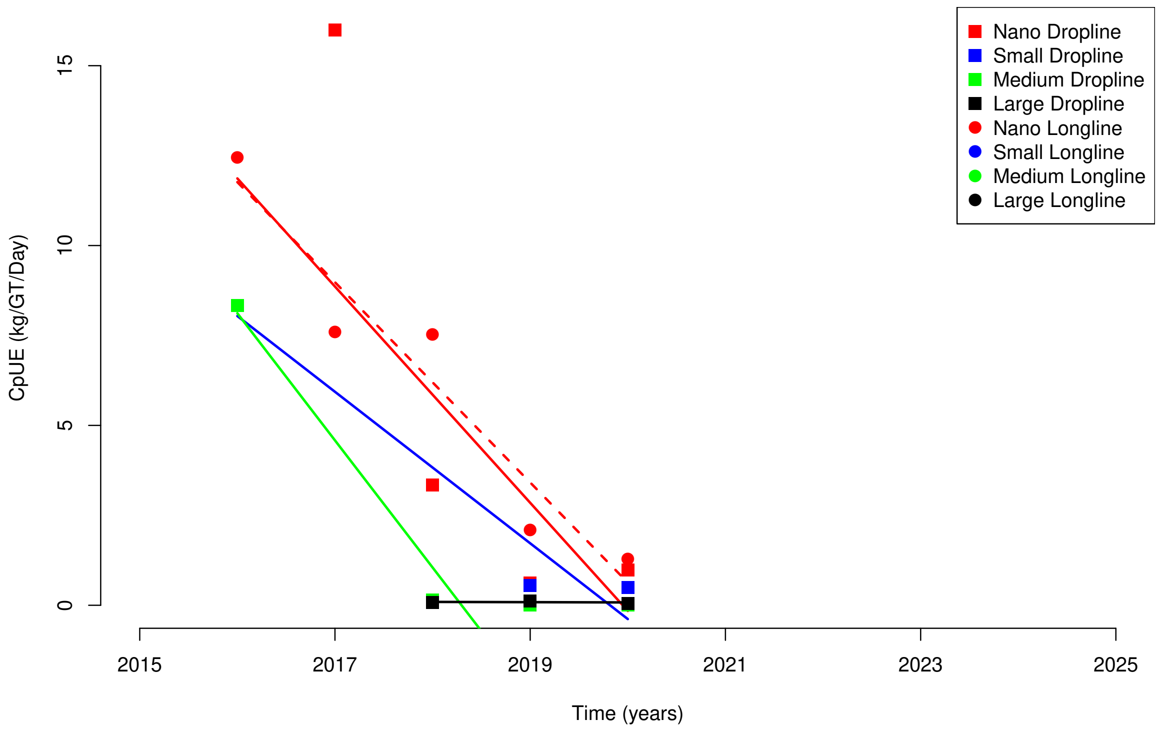


Figure 2.10: Catch per Unit of Effort per calendar year for Aprion virescens in WPP 714 for Dropline and Longline catches by fleet segment. Solid lines and dashed lines for trends in Dropline CpUE and Longline CpUE respectively.

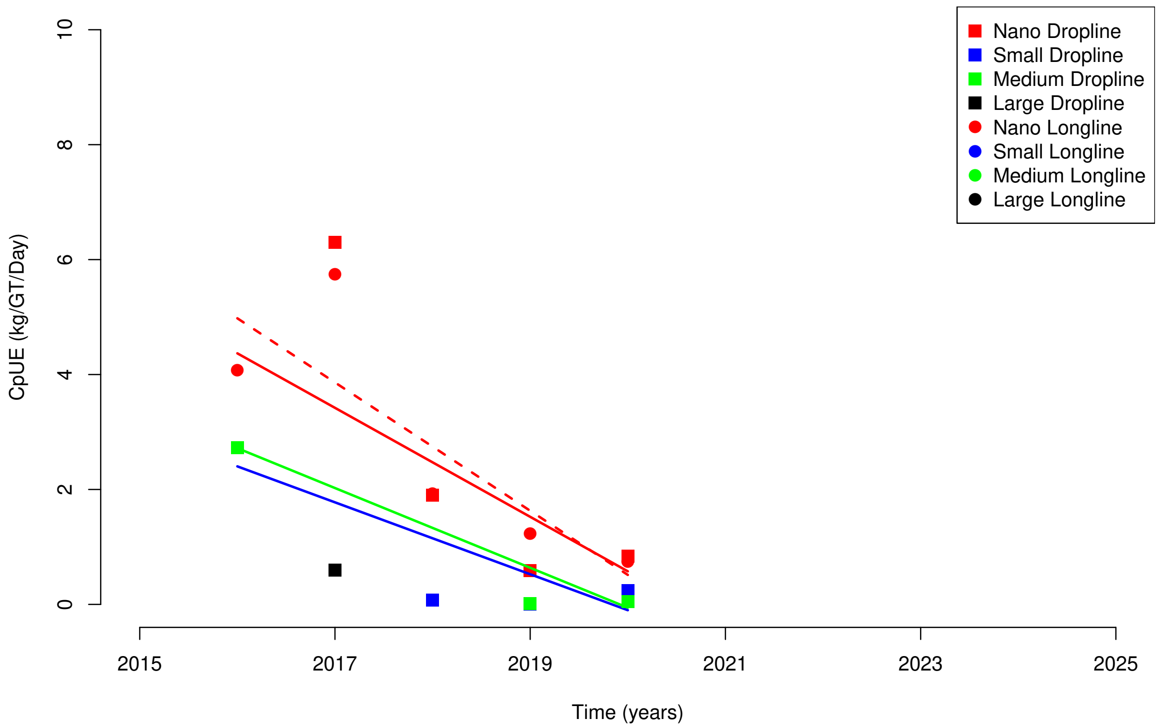


Figure 2.11: Catch per Unit of Effort per calendar year for Lutjanus malabaricus in WPP 714 for Dropline and Longline catches by fleet segment. Solid lines and dashed lines for trends in Dropline CpUE and Longline CpUE respectively.

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

Row	WPP	Registration Port	Home District	Boat Size	Gear	N	Total GT
1	571	Desa Sungai Kuruk III	Aceh Tamiang	Nano	Trap	2	6
2	571	Desa Sungai Kuruk III	Aceh Tamiang	Small	Trap	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	Desa Belawan Lama	Kota Medan	Small	Trap	10	50
6	571	Desa Beurawang	Kota Sabang	Nano	Dropline	1	4
7	571	PP. Pasiran	Kota Sabang	Nano	Dropline	2	3
8	571	PP. Pasiran	Kota Sabang	Small	Dropline	1	8
9	571	Desa Sei Bilah	Langkat	Medium	Trap	2	22
10	571	Desa Sei Bilah	Langkat	Nano	Dropline	1	4
11	571	Desa Sei Bilah	Langkat	Small	Dropline	2	18
12	571	Desa Sei Bilah	Langkat	Small	Trap	2	16
13	571	Desa Ujung Kampung	Langkat	Medium	Trap	1	12
14	571	Desa Ujung Kampung	Langkat	Nano	Trap	6	27
15	571	Desa Ujung Kampung	Langkat	Small	Trap	3	20
16	571	Pangkalan Susu	Langkat	Nano	Trap	38	114
17	571	Pelabuhan Ujung Kampung	Langkat	Medium	Trap	1	13
18	571	PPI. Pangkalan Brandan	Langkat	Nano	Trap	32	131
19	571	PPI. Pangkalan Brandan	Langkat	Small	Trap	2	14
20	571	PP. Ujung Blang	Lhokseumawe	Nano	Longline	7	11
21	571	Desa Sialang Buah	Serdang Bedagai	Medium	Longline	1	13
22	571	Desa Sialang Buah	Serdang Bedagai	Nano	Longline	2	7
23	571	Desa Sialang Buah	Serdang Bedagai	Small	Longline	3	22
24	571	Sialang Buah	Serdang Bedagai	Nano	Longline	11	44
25	571	Sialang Buah	Serdang Bedagai	Small	Longline	4	30
26	571	Teluk Mengkudu	Serdang Bedagai	Small	Longline	5	48
27	572	Kuala Bubon	Aceh Barat	Medium	Trap	2	21
28	572	Kuala Bubon	Aceh Barat	Small	Trap	2	14
29	572	PP. Ujoeng Baroh	Aceh Barat	Nano	Longline	1	4
30	572	PP. Ujoeng Baroh	Aceh Barat	Small	Dropline	1	6
31	572	PP. Ujoeng Baroh	Aceh Barat	Small	Longline	1	5
32	572	PP. Ujong Baroeh	Aceh Barat	Nano	Dropline	8	28
33	572	PP. Ujong Baroeh	Aceh Barat	Nano	Longline	3	12
34	572	PP. Ujong Baroeh	Aceh Barat	Small	Dropline	14	84
35	572	PP. Ujong Baroeh	Aceh Barat	Small	Longline	3	21
36	572	PP. Ujong Baroeh	Aceh Barat	Small	Trap	2	10
37	572	Susoh	Aceh Barat Daya	Medium	Dropline	1	11
38	572	Susoh	Aceh Barat Daya	Small	Dropline	2	12
39	572	Desa Lampuyang	Aceh Besar	Nano	Dropline	15	22
40	572	PP. Lhok Bengkuang	Aceh Selatan	Nano	Dropline	5	6
41	572	PP. Lhok Bengkuang	Aceh Selatan	Nano	Longline	8	26
42	572	PP. Lhok Bengkuang	Aceh Selatan	Small	Dropline	2	12
43	572	PP. Lhok Bengkuang	Aceh Selatan	Small	Longline	27	165
44	572	PP. Meukek	Aceh Selatan	Nano	Longline	1	3
45	572	Desa Pulau Balai	Aceh Singkil	Medium	Gillnet	1	10
46	572	Desa Pulau Balai	Aceh Singkil	Nano	Trap	6	29
47	572	PP. Lampulo	Banda Aceh	Nano	Dropline	1	4
48	572	PP. Lampulo	Banda Aceh	Nano	Longline	2	6
49	572	PP. Lampulo	Banda Aceh	Small	Dropline	8	49
50	572	PP. Lampulo	Banda Aceh	Small	Longline	1	6
51	572	PPS Lampulo	Banda Aceh	Small	Dropline	9	63
52	572	PP. Sikakap	Kepulauan Mentawai	Nano	Dropline	1	3
53	572	PP. Tuapejat	Kepulauan Mentawai	Medium	Dropline	2	24
54	572	PP. Tuapejat	Kepulauan Mentawai	Small	Dropline	2	18
55	572	PP. Pulau Baai	Kota Bengkulu	Large	Trap	1	31
56	572	PP. Pulau Baai	Kota Bengkulu	Medium	Dropline	8	107
57	572	PP. Pulau Baai	Kota Bengkulu	Medium	Gillnet	7	153
58	572	PP. Pulau Baai	Kota Bengkulu	Nano	Dropline	4	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
59	572	PP. Pulau Baai	Kota Bengkulu	Small	Dropline	12	70
60	572	PP. Pulau Baai	Kota Bengkulu	Small	Gillnet	1	6
61	572	Desa Taluak	Kota Pariaman	Nano	Longline	10	16
62	572	Desa Keuneukai	Kota Sabang	Nano	Dropline	2	3
63	572	PP. Sibolga	Kota Sibolga	Medium	Trap	6	87
64	572	PP. Sibolga	Kota Sibolga	Nano	Dropline	4	14
65	572	PP. Sibolga	Kota Sibolga	Nano	Trap	12	47
66	572	PP. Sibolga	Kota Sibolga	Small	Dropline	3	18
67	572	PP. Sibolga	Kota Sibolga	Small	Trap	9	55
68	572	PP. Muara Piluk Bakauheni	Lampung	Nano	Longline	16	43
69	572	PP. Muara Piluk Bakauheni	Lampung	Small	Longline	1	5
70	572	PP. Pasar Bantal	Mukomuko	Small	Dropline	20	100
71	572	Kec. Teluk Dalam	Nias Selatan	Nano	Dropline	5	18
72	572	Desa Botolakha	Nias Utara	Small	Dropline	25	197
73	572	Desa Helera	Nias Utara	Nano	Longline	13	21
74	572	Desa Helera	Nias Utara	Small	Longline	2	11
75	572	Muara Padang	Padang	Medium	Longline	1	11
76	572	Muara Padang	Padang	Small	Dropline	4	21
77	572	PP. Bungus	Padang	Small	Longline	1	8
78	572	PP. Muaro	Padang	Medium	Dropline	4	52
79	572	PP. Muaro	Padang	Medium	Longline	5	61
80	572	PP. Muaro	Padang	Small	Dropline	1	5
81	572	PP. Muaro	Padang	Small	Longline	5	41
82	572	Pantai Ulakan	Padang Pariaman	Nano	Longline	10	17
83	572	PP. Labuan	Pandeglang	Small	Dropline	29	152
84	572	PP. Carocok Tarusan	Pesisir Selatan	Medium	Longline	4	40
85	572	PP. Kambang	Pesisir Selatan	Medium	Longline	3	30
86	572	Desa Pulau Tunda	Serang	Nano	Dropline	5	23
87	572	Desa Pulau Tunda	Serang	Small	Dropline	16	103
88	573	Desa Alor Kecil	Alor	Nano	Dropline	25	17
89	573	PP. Kedonganan	Badung	Nano	Dropline	30	56
90	573	PP. Grajagan	Banyuwangi	Nano	Dropline	452	1446
91	573	PP. Grajagan	Banyuwangi	Small	Dropline	150	780
92	573	PP. Pancer	Banyuwangi	Medium	Dropline	1	15
93	573	PP. Pancer	Banyuwangi	Nano	Dropline	174	348
94	573	PP. Pancer	Banyuwangi	Small	Dropline	125	625
95	573	Atapupu	Belu	Nano	Dropline	2	3
96	573	PP. Atapupu	Belu	Nano	Dropline	3	4
97	573	PP. Rompo	Bima	Nano	Dropline	15	15
98	573	PP. Rompo	Bima	Nano	Longline	57	44
99	573	PP. Sape	Bima	Nano	Dropline	162	553
100	573	PP. Sape	Bima	Small	Dropline	1	6
101	573	PP.Tambakrejo	Blitar	Nano	Longline	15	30
102	573	PP.Tambakrejo	Blitar	Small	Longline	1	6
103	573	Jetis	Cilacap	Nano	Longline	30	26
104	573	Pelabuhan Benoa	Denpasar	Medium	Dropline	11	241
105	573	Pelabuhan Benoa	Denpasar	Medium	Longline	1	27
106	573	PP. Tenau Kupang	Denpasar	Medium	Dropline	1	22
107	573	PP. Hu'u	Dompu	Small	Dropline	38	236
108	573	PP. Puger	Jember	Nano	Longline	50	160
109	573	Desa Yeh Kuning	Jembrana	Nano	Longline	150	126
110	573	PP. Pengambengan	Jembrana	Nano	Longline	20	40
111	573	Desa Tablolong	Kupang	Nano	Dropline	36	97
112	573	Pelabuhan Benoa	Kupang	Medium	Dropline	1	27
113	573	Pelabuhan Sulamu	Kupang	Nano	Dropline	50	87
114	573	PP. Mayangan	Kupang	Medium	Longline	1	29
115	573	PP. Oeba Kupang	Kupang	Nano	Dropline	5	5
116	573	PP. Tenau Kupang	Kupang	Medium	Dropline	21	347

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	573	PP. Tenau Kupang	Kupang	Medium	Longline	3	72
118	573	PP. Tenau Kupang	Kupang	Nano	Dropline	6	22
119	573	PP. Tenau Kupang	Kupang	Small	Dropline	21	166
120	573	Desa Tapolango	Lembata	Nano	Dropline	20	14
121	573	Desa waijarang	Lembata	Nano	Dropline	20	14
122	573	PP. Hadakewa	Lembata	Nano	Dropline	30	26
123	573	PP. Tanjung Luar	Lombok Timur	Medium	Longline	14	141
124	573	PP. Tanjung Luar	Lombok Timur	Nano	Dropline	15	36
125	573	PP. Tanjung Luar	Lombok Timur	Nano	Longline	39	101
126	573	Pulau Maringkik	Lombok Timur	Medium	Longline	1	10
127	573	Pulau Maringkik	Lombok Timur	Small	Longline	3	22
128	573	TPI Kampung Ujung	Manggarai Barat	Nano	Dropline	60	74
129	573	PP. Poumako	Mimika	Medium	Gillnet	1	29
130	573	PP. Watukarung	Pacitan	Nano	Longline	100	222
131	573	PP Cikidang	Pangandaran	Small	Gillnet	8	50
132	573	PP. Cikidang	Pangandaran	Nano	Gillnet	2	9
133	573	Desa Batutua	Rote Ndao	Nano	Dropline	9	11
134	573	Desa Oeseli	Rote Ndao	Nano	Dropline	2	2
135	573	Dusun Papela	Rote Ndao	Nano	Dropline	20	21
136	573	Sukabumi	Sukabumi	Nano	Longline	50	50
137	573	KSOP Kelas III Kupang	Sumba Barat	Nano	Dropline	35	80
138	573	Pelabuhan Waingapu	Sumba Barat	Nano	Dropline	8	14
139	573	Pelabuhan Waingapu	Sumba Barat	Nano	Longline	7	16
140	573	Desa Pulau Bungin	Sumbawa	Nano	Dropline	29	23
141	573	Desa Pulau Bungin	Sumbawa	Nano	Longline	15	12
142	573	Labuhan Mapin	Sumbawa	Nano	Dropline	61	43
143	573	Labuhan Mapin	Sumbawa	Nano	Longline	35	17
144	573	PP Labuhan Lalar	Sumbawa	Nano	Dropline	25	22
145	573	PP. Wini	Timor Tengah Utara	Nano	Dropline	7	12
146	711	PP. Sungailiat	Bangka	Medium	Trap	1	10
147	711	PP. Sungailiat	Bangka	Small	Dropline	1	6
148	711	PP. Sungailiat	Bangka	Small	Trap	17	133
149	711	PP. Kurau	Bangka Tengah	Small	Trap	30	159
150	711	Batam	Batam	Medium	Trap	2	56
151	711	Batam	Batam	Small	Dropline	2	12
152	711	Batam	Batam	Small	Trap	2	13
153	711	PP. Manggar	Belitung	Small	Trap	1	9
154	711	PP. Tanjung Pandan	Belitung	Medium	Trap	9	164
155	711	PP. Tanjung Pandan	Belitung	Nano	Dropline	108	250
156	711	PP. Tanjung Pandan	Belitung	Nano	Trap	63	202
157	711	PP. Tanjung Pandan	Belitung	Small	Dropline	5	27
158	711	PP. Tanjung Pandan	Belitung	Small	Trap	72	450
159	711	Tanjung Binga	Belitung	Small	Trap	20	192
160	711	PP. Manggar Belitung Timur	Belitung Timur	Medium	Trap	3	42
161	711	PP. Manggar Belitung Timur	Belitung Timur	Nano	Dropline	5	21
162	711	PP. Manggar Belitung Timur	Belitung Timur	Nano	Trap	1	4
163	711	PP. Manggar Belitung Timur	Belitung Timur	Small	Dropline	2	10
164	711	PP. Manggar Belitung Timur	Belitung Timur	Small	Trap	87	481
165	711	PP. Kijang	Bintan	Medium	Dropline	2	33
166	711	PP. Kijang	Bintan	Medium	Trap	241	4587
167	711	PP. Kijang	Bintan	Nano	Trap	2	8
168	711	PP. Kijang	Bintan	Small	Dropline	10	66
169	711	PP. Kijang	Bintan	Small	Trap	204	1385
170	711	Moro	Karimun	Small	Trap	1	7
171	711	Tanjung Balai Karimun	Karimun	Medium	Longline	5	111
172	711	PP. Tarempa	Kepulauan Anambas	Nano	Dropline	202	298
173	711	PP. Tarempa	Kepulauan Anambas	Nano	Trap	19	24
174	711	PP. Tarempa	Kepulauan Anambas	Small	Dropline	11	63

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	PPI Ladan	Kepulauan Anambas	Nano	Dropline	73	182
176	711	PPI Ladan	Kepulauan Anambas	Small	Dropline	1	5
177	711	Pangkal Balam	Kota Pangkalpinang	Nano	Dropline	2	7
178	711	Pangkal Balam	Kota Pangkalpinang	Nano	Trap	1	4
179	711	Pangkal Balam	Kota Pangkalpinang	Small	Trap	12	67
180	711	PP. Muara Sungai Baturusa	Kota Pangkalpinang	Nano	Trap	3	12
181	711	PP. Muara Sungai Baturusa	Kota Pangkalpinang	Small	Trap	9	51
182	711	Dermaga Kayu Sededap	Natuna	Nano	Dropline	1	5
183	711	Desa Air Nusa	Natuna	Nano	Dropline	23	43
184	711	Desa Air Ringau	Natuna	Nano	Dropline	12	18
185	711	Desa Batu Ampar	Natuna	Nano	Dropline	5	4
186	711	Desa Batu Brilian	Natuna	Nano	Dropline	21	44
187	711	Desa Batu Brilian	Natuna	Nano	Trap	1	4
188	711	Desa Pakkalung	Natuna	Nano	Dropline	1	2
189	711	Desa Sabang Mawang Barat	Natuna	Small	Dropline	12	72
190	711	Desa Sedanau	Natuna	Nano	Dropline	22	79
191	711	Desa Sepempang	Natuna	Small	Dropline	22	132
192	711	Desa Serantas_ Teluk Lagong	Natuna	Nano	Dropline	23	69
193	711	Desa Subi besar	Natuna	Nano	Dropline	23	69
194	711	Desa Tanjung Belau	Natuna	Nano	Dropline	31	56
195	711	Desa Tanjung Kumbik Utara	Natuna	Small	Dropline	15	90
196	711	Desa Tanjung Setelung	Natuna	Nano	Dropline	9	16
197	711	Desa Tanjung Setelung	Natuna	Nano	Trap	18	39
198	711	Desa Tanjung Setelung	Natuna	Small	Trap	3	18
199	711	Desa Teluk Buton	Natuna	Nano	Dropline	26	78
200	711	Natuna	Natuna	Large	Longline	3	94
201	711	Pelabuhan Harapan Air Putih	Natuna	Nano	Dropline	59	159
202	711	Pelabuhan Harapan Air Putih	Natuna	Small	Dropline	1	6
203	711	Pelabuhan Midai	Natuna	Medium	Dropline	1	12
204	711	Pelabuhan Midai	Natuna	Medium	Trap	2	22
205	711	Pelabuhan Midai	Natuna	Small	Dropline	2	11
206	711	Pelabuhan Pasir Putih	Natuna	Nano	Dropline	1	2
207	711	Pelabuhan Pering	Natuna	Medium	Dropline	2	30
208	711	Pelabuhan Pering	Natuna	Nano	Dropline	21	78
209	711	Pelabuhan Pering	Natuna	Small	Dropline	1	8
210	711	Pelabuhan Sabang Barat-Midai	Natuna	Medium	Trap	1	11
211	711	Pelabuhan Sabang Barat-Midai	Natuna	Small	Dropline	2	11
212	711	Pelabuhan Tanjung	Natuna	Nano	Dropline	30	59
213	711	Pering	Natuna	Nano	Dropline	1	4
214	711	PP. Pering	Natuna	Small	Dropline	1	5
215	711	PP. Tarempa	Natuna	Medium	Longline	1	18
216	711	Pulau Tiga Natuna	Natuna	Small	Dropline	1	8
217	711	Tanjung Balai Karimun	Natuna	Large	Longline	11	350
218	711	Tanjung Balai Karimun	Natuna	Medium	Longline	43	1223
219	711	PP. Bajomulyo	Pati	Large	Longline	1	85
220	711	PP. Kuala Mempawah	Pontianak	Medium	Trap	2	20
221	711	PP. Kuala Mempawah	Pontianak	Small	Trap	3	19
222	712	PP. Tanjung Pandan	Belitung	Nano	Trap	2	7
223	712	PP. Tanjung Pandan	Belitung	Small	Trap	12	63
224	712	Desa Parang	Jepara	Medium	Trap	26	404
225	712	Desa Parang	Jepara	Small	Trap	65	468
226	712	Pelabuhan Kartini, Jepara	Jepara	Nano	Longline	15	21
227	712	PP. Karimun Jawa	Jepara	Medium	Trap	8	104
228	712	PP. Karimun Jawa	Jepara	Small	Trap	4	37
229	712	TPI. Ujungbatu	Jepara	Nano	Longline	3	4
230	712	Kelurahan Pulau Kelapa Dua	Kepulauan Seribu	Small	Dropline	9	62
231	712	Kelurahan Pulau Pari	Kepulauan Seribu	Nano	Trap	2	9
232	712	Kelurahan Pulau Pari	Kepulauan Seribu	Small	Trap	3	17

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	712	Kelurahan Pulau Untung Jawa	Kepulauan Seribu	Nano	Trap	20	36
234	712	Kelurahan Pulau Untung Jawa	Kepulauan Seribu	Small	Trap	8	51
235	712	PP. Brondong	Lamongan	Medium	Dropline	167	2158
236	712	PP. Brondong	Lamongan	Medium	Longline	14	176
237	712	PP. Brondong	Lamongan	Small	Dropline	115	880
238	712	PP. Brondong	Lamongan	Small	Longline	1	9
239	712	PP. Bajomulyo	Pati	Large	Longline	30	1432
240	712	PP. Bajomulyo	Pati	Medium	Longline	13	355
241	712	PP. Asem Doyong	Pemalang	Small	Dropline	10	57
242	712	PP. Mayangan	Probolinggo	Medium	Longline	1	29
243	712	PP. Pondok Mimbo	Situbondo	Nano	Longline	100	156
244	712	Desa Bancamara	Sumenep	Medium	Dropline	2	28
245	712	Desa Bancamara	Sumenep	Nano	Dropline	1	4
246	712	Desa Bancamara	Sumenep	Small	Dropline	102	702
247	712	Desa Masalima	Sumenep	Small	Dropline	12	84
248	712	Pagerungan Besar	Sumenep	Medium	Longline	4	41
249	712	Pagerungan Besar	Sumenep	Nano	Longline	21	28
250	712	Pagerungan Besar	Sumenep	Small	Longline	45	312
251	712	Pagerungan Kecil	Sumenep	Nano	Longline	30	36
252	712	PP. Dungkek	Sumenep	Medium	Dropline	3	32
253	712	PP. Dungkek	Sumenep	Nano	Dropline	2	9
254	712	PP. Dungkek	Sumenep	Small	Dropline	7	43
255	712	Sumenep	Sumenep	Small	Dropline	300	2196
256	712	Pagatan	Tanah Bumbu	Small	Dropline	2	10
257	712	PP. Cituis	Tanggerang	Small	Trap	7	64
258	713	PP. Filial Klandasan	Balikpapan	Nano	Dropline	2	8
259	713	PP. Filial Klandasan	Balikpapan	Small	Dropline	22	126
260	713	PP. Klandasan	Balikpapan	Small	Dropline	3	21
261	713	PP. Manggar Baru	Balikpapan	Medium	Dropline	16	274
262	713	PP. Manggar Baru	Balikpapan	Nano	Longline	1	3
263	713	PP. Manggar Baru	Balikpapan	Small	Dropline	1	6
264	713	PP. Manggar Baru	Balikpapan	Small	Longline	7	39
265	713	PP. Tanjung Pandan	Belitung	Nano	Trap	1	3
266	713	PP. Tanjung Pandan	Belitung	Small	Dropline	1	5
267	713	PP. Tanjung Pandan	Belitung	Small	Trap	4	21
268	713	PP. Kore	Bima	Nano	Dropline	10	33
269	713	Lok Tuan	Bontang	Nano	Dropline	4	13
270	713	PP. Tanjung Limau	Bontang	Nano	Dropline	5	11
271	713	PP. Tanjung Limau	Bontang	Small	Dropline	4	24
272	713	Tanjung Laut	Bontang	Nano	Dropline	1	1
273	713	Desa Sangsit	Buleleng	Nano	Dropline	50	15
274	713	PP. Dannuang	Bulukumba	Nano	Dropline	20	20
275	713	PP. Kalumeme	Bulukumba	Nano	Dropline	20	20
276	713	PP. Kota Bulukumba	Bulukumba	Nano	Dropline	300	300
277	713	PP. Keramat	Dompu	Nano	Longline	10	4
278	713	PP. Malaju	Dompu	Nano	Dropline	1	1
279	713	PP. Malaju	Dompu	Nano	Longline	1	0
280	713	PP. Malaju	Dompu	Small	Dropline	10	52
281	713	PP. Soro Kempo	Dompu	Nano	Longline	32	13
282	713	PP. Soro Kempo	Dompu	Small	Dropline	17	88
283	713	PP. Labean	Donggala	Nano	Dropline	27	24
284	713	Anawoi	Kolaka	Medium	Trap	5	64
285	713	PP. Beba	Kota Makassar	Medium	Dropline	25	349
286	713	PP. Beba	Kota Makassar	Medium	Longline	61	735
287	713	PP. Beba	Kota Makassar	Nano	Longline	1	3
288	713	PP. Beba	Kota Makassar	Small	Dropline	1	8
289	713	PP. Beba	Kota Makassar	Small	Longline	3	24
290	713	Gang Kakap, Muara Jawa	Kutai Kartanegara	Nano	Longline	20	60

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	713	Kampung Terusan	Kutai Kartanegara	Small	Longline	10	85
292	713	Kuala Samboja	Kutai Kartanegara	Small	Longline	3	15
293	713	Pantai Biru Kersik	Kutai Kartanegara	Nano	Dropline	16	48
294	713	Semangkok	Kutai Kartanegara	Nano	Dropline	10	31
295	713	Maloy	Kutai Timur	Small	Dropline	1	5
296	713	Muara Selangkau	Kutai Timur	Nano	Dropline	40	120
297	713	PP. Kenyamukan	Kutai Timur	Medium	Dropline	3	32
298	713	PP. Kenyamukan	Kutai Timur	Nano	Dropline	40	40
299	713	PP. Kenyamukan	Kutai Timur	Small	Dropline	11	75
300	713	PP. Sangatta	Kutai Timur	Medium	Dropline	1	10
301	713	PP. Sangatta	Kutai Timur	Small	Dropline	5	31
302	713	PP. Brondong	Lamongan	Medium	Trap	1	19
303	713	Desa Wangatoa	Lembata	Nano	Dropline	20	23
304	713	Majene	Majene	Nano	Longline	38	114
305	713	Majene	Majene	Small	Dropline	1	7
306	713	Majene	Majene	Small	Longline	12	84
307	713	Pelabuhan Majene	Majene	Nano	Longline	34	96
308	713	PP. Rangas Majene	Majene	Nano	Longline	2	6
309	713	PP. Kasiwa	Mamuju	Nano	Dropline	31	93
310	713	PP. Kasiwa	Mamuju	Small	Dropline	4	20
311	713	PP. Labuhan Bajo	Manggarai Barat	Nano	Dropline	40	15
312	713	PP. Konge	Nagekeo	Nano	Dropline	30	8
313	713	Sumbawa	Pangkep	Nano	Longline	50	50
314	713	Muara Pasir	Paser	Nano	Longline	10	20
315	713	PP. Bajomulyo	Pati	Large	Longline	3	130
316	713	Kampung Pejala	Penajam Paser Utara	Nano	Dropline	2	7
317	713	Kampung Pejala	Penajam Paser Utara	Small	Dropline	17	85
318	713	Nenang	Penajam Paser Utara	Small	Trap	50	253
319	713	PP. Mayangan	Probolinggo	Medium	Longline	1	27
320	713	Desa Labuhan Sangoro	Sumbawa	Nano	Longline	20	37
321	713	Labuhan Sumbawa	Sumbawa	Medium	Dropline	1	17
322	713	Labuhan Sumbawa	Sumbawa	Nano	Dropline	3	12
323	713	Labuhan Sumbawa	Sumbawa	Small	Dropline	4	27
324	713	PP. Labuhan Terata	Sumbawa	Nano	Dropline	4	7
325	713	PP. Beba	Takalar	Medium	Dropline	2	25
326	713	PP. Beba	Takalar	Medium	Gillnet	12	185
327	713	PP. Beba	Takalar	Medium	Longline	19	244
328	713	PP. Beba	Takalar	Small	Dropline	2	17
329	713	PP. Beba	Takalar	Small	Gillnet	1	9
330	714	Kabola	Alor	Nano	Dropline	15	10
331	714	Kokar	Alor	Nano	Dropline	100	88
332	714	Banggai Kepulauan	Banggai Kepulauan	Nano	Dropline	10	10
333	714	Banggai Laut	Banggai Laut	Nano	Dropline	50	50
334	714	Bontosi	Banggai Laut	Nano	Dropline	1	3
335	714	Desa Bontosi	Banggai Laut	Nano	Dropline	1	2
336	714	Desa Matanga	Banggai Laut	Nano	Longline	5	4
337	714	Desa Tinakin Laut	Banggai Laut	Nano	Dropline	1	1
338	714	Kasuari	Banggai Laut	Nano	Longline	14	16
339	714	PP. Tanjung Pandan	Belitung	Small	Dropline	1	6
340	714	Desa Balimu	Buton	Nano	Dropline	5	6
341	714	Kelurahan Watolo	Buton Tengah	Nano	Gillnet	4	4
342	714	Kelurahan Watolo	Buton Tengah	Nano	Longline	13	13
343	714	Desa Tanjung Batu	Kepulauan Tanimbar	Nano	Dropline	1	2
344	714	Kampung Babar	Kepulauan Tanimbar	Nano	Dropline	1	4
345	714	Kampung Barbar	Kepulauan Tanimbar	Nano	Dropline	6	12
346	714	Pasar Baru Omele Saumlaki	Kepulauan Tanimbar	Nano	Dropline	6	13
347	714	Pasar Baru Omele Saumlaki	Kepulauan Tanimbar	Nano	Longline	1	3
348	714	Pasar Lama Saumlaki	Kepulauan Tanimbar	Nano	Dropline	1	2

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	714	Saumlaki	Kepulauan Tanimbar	Nano	Dropline	3	8
350	714	PPI Soropia	Konawe	Medium	Trap	1	12
351	714	PPI Soropia	Konawe	Nano	Trap	1	1
352	714	Desa Labengki	Konawe Utara	Nano	Dropline	5	5
353	714	Labengki	Konawe Utara	Nano	Dropline	4	5
354	714	Labengki	Konawe Utara	Nano	Longline	1	1
355	714	Asilulu	Maluku Tengah	Nano	Dropline	30	56
356	714	Batu Lubang	Maluku Tengah	Nano	Dropline	30	53
357	714	PP. Tulehu	Maluku Tengah	Large	Dropline	1	34
358	714	Desa Langgur	Maluku Tenggara	Small	Dropline	1	10
359	714	Desa Selayar	Maluku Tenggara	Nano	Dropline	5	7
360	714	Desa Watdek	Maluku Tenggara	Small	Dropline	5	32
361	714	PP. Kema	Minahasa Utara	Large	Dropline	1	30
362	714	Desa Bahonsuai	Morowali	Nano	Dropline	3	3
363	714	Desa Moahino	Morowali	Nano	Longline	2	4
364	714	Desa Umbele	Morowali	Nano	Dropline	2	2
365	714	Desa Umbele	Morowali	Nano	Longline	2	4
366	714	Desa Limbo	Pulau Taliabu	Nano	Longline	30	18
367	714	Dusun Anauni	Seram Bagian Barat	Nano	Dropline	15	15
368	714	Dusun Anauni	Seram Bagian Barat	Nano	Longline	35	44
369	714	Dusun Huaroa	Seram Bagian Barat	Nano	Dropline	50	74
370	714	Dusun Huhua	Seram Bagian Barat	Nano	Dropline	20	27
371	714	Dusun Naeselan	Seram Bagian Barat	Nano	Dropline	20	33
372	714	Dusun Patinea	Seram Bagian Barat	Nano	Dropline	15	21
373	714	Dusun Pohon Batu	Seram Bagian Barat	Nano	Dropline	10	11
374	714	Dusun Waisela	Seram Bagian Barat	Nano	Dropline	4	4
375	714	Desa Mangon	Tual	Small	Dropline	1	7
376	714	PP. Tual	Tual	Medium	Dropline	1	28
377	714	PP. Tual	Tual	Nano	Dropline	1	2
378	714	PP. Tual	Tual	Small	Dropline	4	25
379	714	Binongko	Wakatobi	Medium	Dropline	1	13
380	714	Binongko	Wakatobi	Nano	Dropline	28	16
381	714	Dermaga Desa Wali	Wakatobi	Small	Dropline	1	5
382	714	Desa Lagongga	Wakatobi	Nano	Dropline	7	26
383	714	Desa Lagongga	Wakatobi	Small	Dropline	1	6
384	714	Desa Wali	Wakatobi	Nano	Dropline	2	8
385	714	Pelabuhan Lagelewa	Wakatobi	Nano	Dropline	1	3
386	715	Desa Jayabakti	Banggai	Nano	Dropline	51	40
387	715	Desa Jayabakti	Banggai	Nano	Longline	5	4
388	715	Pagimana	Banggai	Nano	Dropline	2	4
389	715	Pangkalaseang	Banggai	Nano	Dropline	10	10
390	715	Kampung Sekar	Fakfak	Nano	Dropline	7	7
391	715	Kampung Sosar, Kokas	Fakfak	Nano	Dropline	7	7
392	715	Kampung Ugar	Fakfak	Nano	Dropline	17	11
393	715	Pasar Sorpeha	Fakfak	Nano	Dropline	9	22
394	715	PP. PP. Dulan Pok-Pok	Fakfak	Nano	Dropline	215	206
395	715	Bacan	Halmahera Selatan	Nano	Dropline	9	5
396	715	Bacan	Halmahera Selatan	Nano	Longline	1	0
397	715	Bacan Barat	Halmahera Selatan	Nano	Dropline	6	2
398	715	Bacan Tengah	Halmahera Selatan	Nano	Dropline	24	8
399	715	Bacan Timur	Halmahera Selatan	Nano	Dropline	4	1
400	715	Bacan Utara	Halmahera Selatan	Nano	Dropline	5	2
401	715	Desa Akegula	Halmahera Selatan	Nano	Dropline	15	16
402	715	Desa Amasing Kota Barat	Halmahera Selatan	Nano	Longline	1	2
403	715	Desa Babang	Halmahera Selatan	Nano	Dropline	7	4
404	715	Desa Jikotamo	Halmahera Selatan	Nano	Dropline	15	20
405	715	Desa Laiwui	Halmahera Selatan	Nano	Dropline	12	13
406	715	Desa Lalei	Halmahera Selatan	Nano	Dropline	29	17

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	715	Desa Sali Kecil	Halmahera Selatan	Nano	Dropline	20	8
408	715	Desa Tabapoma	Halmahera Selatan	Nano	Dropline	11	4
409	715	Gane Barat	Halmahera Selatan	Nano	Dropline	15	5
410	715	Gane Timur Selatan	Halmahera Selatan	Nano	Dropline	40	13
411	715	Kep. Batang Lomang	Halmahera Selatan	Nano	Dropline	12	4
412	715	Kep. Joronga	Halmahera Selatan	Nano	Dropline	7	2
413	715	Mandioli Selatan	Halmahera Selatan	Nano	Dropline	13	4
414	715	Mandioli Utara	Halmahera Selatan	Nano	Dropline	17	5
415	715	Pasar Tembal	Halmahera Selatan	Nano	Dropline	30	13
416	715	Puau Obilatu	Halmahera Selatan	Nano	Dropline	10	3
417	715	Pulau Obi	Halmahera Selatan	Nano	Dropline	62	18
418	715	Buli	Halmahera Timur	Nano	Dropline	7	7
419	715	Halmahera Timur	Halmahera Timur	Nano	Dropline	48	78
420	715	Desa Trikora	Kaimana	Nano	Dropline	10	10
421	715	Kampung Air Merah	Kaimana	Nano	Dropline	33	33
422	715	Kampung Air Tiba	Kaimana	Nano	Dropline	10	10
423	715	Namatota	Kaimana	Medium	Dropline	2	49
424	715	Namatota	Kaimana	Medium	Longline	2	30
425	715	PU. Kaimana	Kaimana	Large	Longline	1	30
426	715	PU. Kaimana	Kaimana	Medium	Longline	2	43
427	715	Pasar Galala	Kota Tidore Kepulauan	Nano	Dropline	10	10
428	715	Desa Sawai	Maluku Tengah	Nano	Dropline	55	61
429	715	PP. Kema	Minahasa Utara	Large	Dropline	3	130
430	715	PP. Kema	Minahasa Utara	Medium	Dropline	11	320
431	715	Desa Geser	Seram Bagian Timur	Nano	Dropline	44	62
432	715	Desa Kilfura	Seram Bagian Timur	Nano	Dropline	31	27
433	715	Desa Kiltay	Seram Bagian Timur	Nano	Dropline	25	25
434	715	Desa Namalena	Seram Bagian Timur	Nano	Dropline	26	26
435	715	Desa Pantai Pos, Bula	Seram Bagian Timur	Nano	Dropline	10	17
436	715	Desa Pantai Pos, Bula	Seram Bagian Timur	Nano	Longline	10	17
437	715	Desa Waru	Seram Bagian Timur	Nano	Longline	2	3
438	715	Pulau Parang	Seram Bagian Timur	Nano	Dropline	10	17
439	715	Desa Kali Remu	Sorong	Nano	Dropline	2	6
440	715	Desa Kali Remu	Sorong	Nano	Trap	1	3
441	715	Jembatan Puri Sorong	Sorong	Medium	Dropline	4	75
442	715	Jembatan Puri Sorong	Sorong	Small	Dropline	3	20
443	715	PP. Sorong	Sorong	Medium	Dropline	9	170
444	715	PP. Sorong	Sorong	Medium	Longline	1	17
445	715	PP. Sorong	Sorong	Medium	Trap	10	153
446	715	PP. Sorong	Sorong	Nano	Dropline	3	11
447	715	PP. Sorong	Sorong	Small	Trap	2	18
448	715	Bajugan	Tolitoli	Nano	Dropline	10	6
449	716	Biduk-biduk	Berau	Medium	Dropline	1	22
450	716	Biduk-biduk	Berau	Nano	Dropline	23	69
451	716	Desa Tanjung Batu	Berau	Nano	Dropline	64	192
452	716	Giring-giring	Berau	Nano	Dropline	22	66
453	716	Labuan Cermin	Berau	Nano	Dropline	1	3
454	716	P. Derawan	Berau	Nano	Trap	4	7
455	716	Pantai Harapan	Berau	Nano	Dropline	20	60
456	716	Tanjung Batu	Berau	Nano	Trap	6	18
457	716	Tanjung Batu	Berau	Small	Trap	1	8
458	716	Teluk Sulaiman	Berau	Nano	Dropline	29	87
459	716	Desa Sampiro	Bolaang Mongondow Utara	Nano	Dropline	11	4
460	716	Desa Bulontio	Gorontalo Utara	Nano	Dropline	11	5
461	716	Desa Buluwatu	Gorontalo Utara	Nano	Dropline	21	16
462	716	Desa Huntokalo	Gorontalo Utara	Nano	Dropline	10	3
463	716	Desa Tihengo	Gorontalo Utara	Nano	Dropline	26	7
464	716	Desa Dalako Bembanehe	Kepulauan Sangihe	Nano	Dropline	4	2

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	716	Desa Lipang	Kepulauan Sangihe	Nano	Dropline	5	2
466	716	Desa Paruruang	Kepulauan Sangihe	Nano	Dropline	16	8
467	716	Desa Parururang	Kepulauan Sangihe	Nano	Dropline	5	2
468	716	Kampung Lipang	Kepulauan Sangihe	Nano	Dropline	5	1
469	716	Sangihe	Kepulauan Sangihe	Nano	Dropline	2	0
470	716	Tariang Baru	Kepulauan Sangihe	Nano	Longline	4	3
471	716	Buhias	Kepulauan Sitaro	Nano	Dropline	153	124
472	716	Mahongsawang Tagulandang	Kepulauan Sitaro	Nano	Dropline	8	4
473	716	Mongsawang	Kepulauan Sitaro	Nano	Dropline	16	6
474	716	Pulau Biaro	Kepulauan Sitaro	Nano	Dropline	29	7
475	716	Desa Damau	Kepulauan Talaud	Nano	Dropline	8	3
476	716	Dusun Bawunian	Kepulauan Talaud	Nano	Dropline	26	29
477	716	Belakang BRI, Selumit Pantai	Tarakan	Nano	Longline	46	138
478	716	Belakang BRI, Selumit Pantai	Tarakan	Small	Longline	4	20
479	716	Mamburungan Dalam	Tarakan	Nano	Dropline	48	144
480	717	Biak	Biak	Nano	Dropline	1796	1793
481	717	Desa Nikakamp	Biak	Nano	Dropline	4	7
482	717	Desa Tanjung Barari	Biak	Nano	Dropline	5	4
483	717	Fanindi Pantai	Manokwari	Nano	Dropline	10	26
484	717	Kampung Arowi 2	Manokwari	Nano	Dropline	4	9
485	717	Kampung Borobudur 2	Manokwari	Nano	Dropline	12	30
486	717	Kampung Fanindi	Manokwari	Nano	Dropline	20	22
487	717	Kampung Kimi	Nabire	Nano	Dropline	1	1
488	717	Kampung Smoker	Nabire	Nano	Dropline	4	9
489	717	Kampung Waharia	Nabire	Nano	Dropline	2	2
490	717	Pasar Kalibobo	Nabire	Nano	Dropline	1	4
491	717	PP. Sanoba	Nabire	Nano	Dropline	4	14
492	717	Wasior	Teluk Wondama	Nano	Dropline	19	23
493	718	PP. Nizam Zachman	Jakarta Utara	Large	Longline	4	205
494	718	Namatota	Kaimana	Large	Longline	1	72
495	718	Dusun Wamar Desa Durjela	Kepulauan Aru	Medium	Longline	4	73
496	718	PP. Bajomulyo	Kepulauan Aru	Large	Gillnet	1	82
497	718	PP. Benjina	Kepulauan Aru	Large	Longline	2	92
498	718	PP. Dobo	Kepulauan Aru	Large	Gillnet	8	527
499	718	PP. Dobo	Kepulauan Aru	Large	Longline	10	596
500	718	PP. Dobo	Kepulauan Aru	Medium	Dropline	93	1658
501	718	PP. Dobo	Kepulauan Aru	Medium	Gillnet	5	121
502	718	PP. Dobo	Kepulauan Aru	Medium	Longline	10	185
503	718	PP. Dobo	Kepulauan Aru	Nano	Dropline	11	30
504	718	PP. Dobo	Kepulauan Aru	Nano	Longline	8	23
505	718	PP. Dobo	Kepulauan Aru	Small	Dropline	7	56
506	718	PP. Dobo	Kepulauan Aru	Small	Longline	1	7
507	718	PP. Kaimana	Kepulauan Aru	Large	Longline	1	51
508	718	PP. Klidang Lor	Kepulauan Aru	Large	Gillnet	1	73
509	718	PP. Mayangan	Kepulauan Aru	Large	Longline	19	1405
510	718	PP. Merauke	Kepulauan Aru	Large	Longline	4	397
511	718	PP. Nizam Zachman	Kepulauan Aru	Large	Gillnet	1	92
512	718	PP. Pekalongan	Kepulauan Aru	Large	Gillnet	1	115
513	718	PU. Dobo	Kepulauan Aru	Large	Gillnet	3	285
514	718	PU. Dobo	Kepulauan Aru	Large	Longline	36	2670
515	718	Saumlaki	Kepulauan Tanimbar	Nano	Dropline	37	109
516	718	Saumlaki	Kepulauan Tanimbar	Small	Dropline	1	5
517	718	Saumlaki	Kepulauan Tanimbar	Small	Longline	5	37
518	718	PP. Bajomulyo	Merauke	Large	Gillnet	1	91
519	718	PP. Merauke	Merauke	Large	Gillnet	48	3873
520	718	PP. Merauke	Merauke	Large	Longline	2	213
521	718	PP. Merauke	Merauke	Medium	Gillnet	5	138
522	718	PP. Nizam Zachman	Merauke	Large	Gillnet	13	841

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
523	718	PP. Nizam Zachman	Merauke	Large	Longline	1	60
524	718	PP. Poumako	Merauke	Medium	Gillnet	3	88
525	718	PP. Tegal	Merauke	Large	Gillnet	1	148
526	718	PP. Bajomulyo	Mimika	Large	Longline	1	82
527	718	PP. Dobo	Mimika	Large	Gillnet	1	75
528	718	PP. Mayangan	Mimika	Large	Gillnet	1	129
529	718	PP. Merauke	Mimika	Large	Gillnet	2	123
530	718	PP. Merauke	Mimika	Medium	Gillnet	2	49
531	718	PP. Muara Angke	Mimika	Large	Gillnet	1	92
532	718	PP. Nizam Zachman	Mimika	Large	Gillnet	1	88
533	718	PP. Paumako	Mimika	Large	Gillnet	1	30
534	718	PP. Paumako	Mimika	Medium	Gillnet	2	58
535	718	PP. Pekalongan	Mimika	Large	Gillnet	1	112
536	718	PP. Pomako	Mimika	Medium	Gillnet	1	16
537	718	PP. Poumako	Mimika	Large	Gillnet	2	60
538	718	PP. Poumako	Mimika	Medium	Gillnet	12	284
539	718	PP. Poumako	Mimika	Small	Gillnet	3	28
540	718	Timika	Mimika	Medium	Longline	3	88
541	718	PP. Bajomulyo	Pati	Large	Longline	1	119
542	718	Bagansiapiapi	Probolinggo	Large	Longline	1	40
543	718	Pelabuhan Perikanan Mayangan	Probolinggo	Large	Longline	1	35
544	718	PP. Dobo	Probolinggo	Large	Longline	2	142
545	718	PP. Mayangan	Probolinggo	Large	Gillnet	3	124
546	718	PP. Mayangan	Probolinggo	Large	Longline	33	2068
547	718	PP. Mayangan	Probolinggo	Medium	Longline	7	199
548	718	Probolinggo	Probolinggo	Large	Longline	20	1460
549	718	PP. Lappa	Sinjai	Large	Dropline	1	35
550	718	PP. Lappa	Sinjai	Medium	Dropline	10	235
551	718	PP. Bajomulyo	Tual	Large	Longline	1	87
		TOTAL				11536	62678

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: Beverton, 1992), 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., 2020). 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). Graphs for the Top 20 species 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 five 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 therefore consider a majority in the catch around or above the optimum harvest size (large matures) 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 (large mature fish). 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 as a fraction of the spawning stock biomass of that population if it would have been pristine (Meester et al 2001). We calculated SPR on a per-recruit basis from life-history parameters M, F, K, and Linf, and from gear selectivity parameters in the smaller part of the size spectrum caught by the fishery.

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 bheq of the R Fishmethods package. For this estimation, we used the length range of the catch length-frequency distribution starting with the length 5% higher than the modal length and ending with the 99th percentile. We assumed that Z, and its constituents M and F, were constant over length range that we used to estimate Z. We calculated F (fishing mortality) as the difference between Z and M, assuming full selectivity for the size range starting at modal length and ending with the largest fish in the catch. We assumed an S-shaped (logistic) selectivity curve, with 99% selectivity achieved at modal length, and with the length at 50% selectivity halfway between the first percentile and modal length of the catch length-frequency distribution.

Gislason et al (2010) provides evidence that M increases with decreasing length, and fisheries scientists agree that the smaller size classes of each fish species experience higher mortality than larger fish due to higher predation risk. The method we used for calculating Z, however, assumes a Z that is constant, implicating a constant M, over the length range over which we estimated Z. To iron out this inconsistency, we applied the Gislason et al (2010) empirical relationship to the length classes (1 cm width) over which we estimated Z, we calculated the average M over these size classes, and we applied that average to the Z estimation range. Outside this range (i.e., at lengths below 1.05 times modal length and lengths above the 99th percentile), we assumed a varying M following Gislason's formula (Mous et al., 2020).

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. Risk levels on the basis of SPR estimates are determined as follows:

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

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

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

3 Fishing grounds and traceability

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

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

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

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

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

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

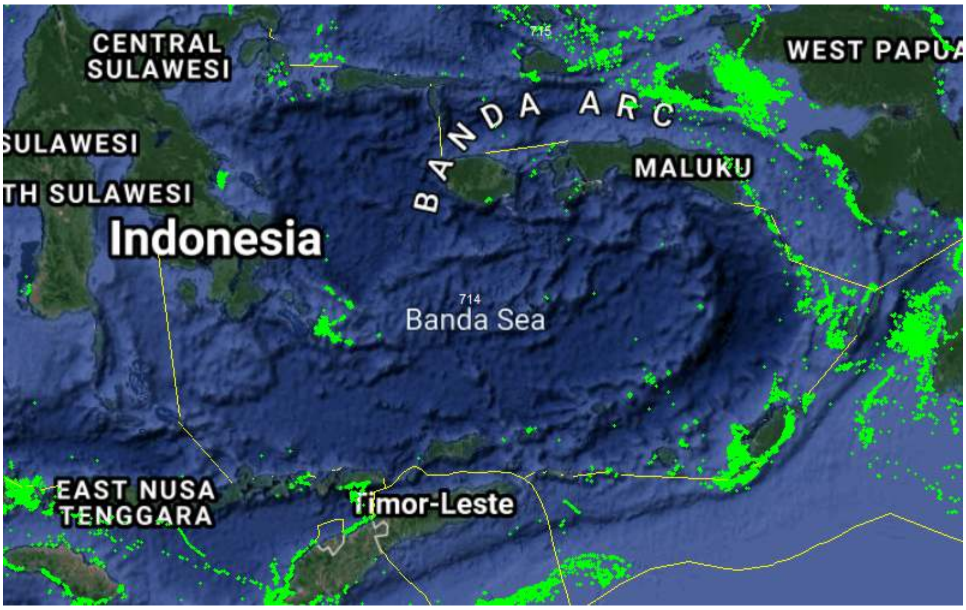


Figure 3.1: Fishing positions of dropliners participating in the CODRS program over the years 2014 - 2019 in WPP 714, as reported by Spot Trace. Reported positions during steaming, anchoring, or docking are excluded from this map.

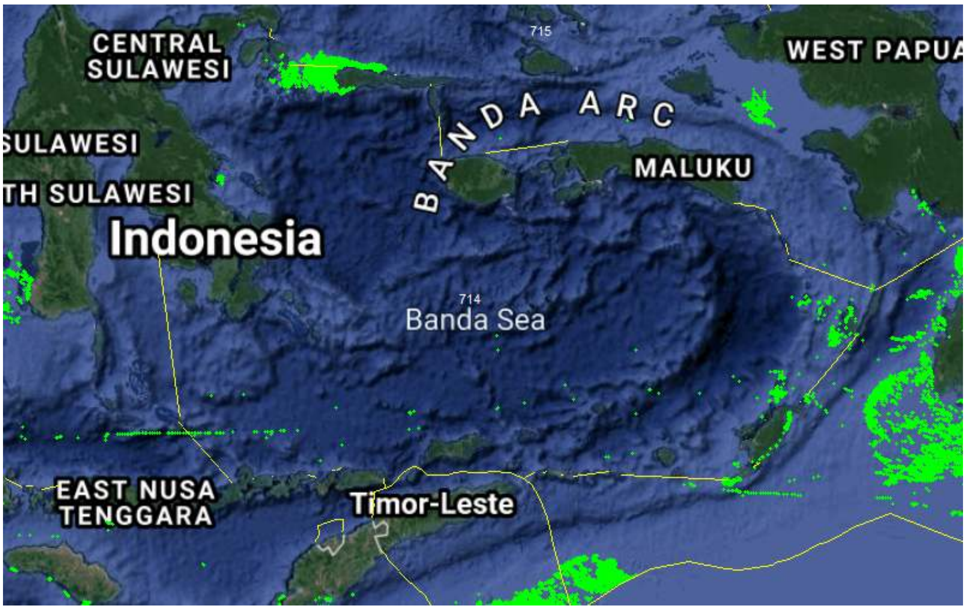


Figure 3.2: Fishing positions of longliners participating in the CODRS program over the years 2014 - 2019 in WPP 714, as reported by Spot Trace. Reported positions during steaming, anchoring, or docking are excluded from this map.

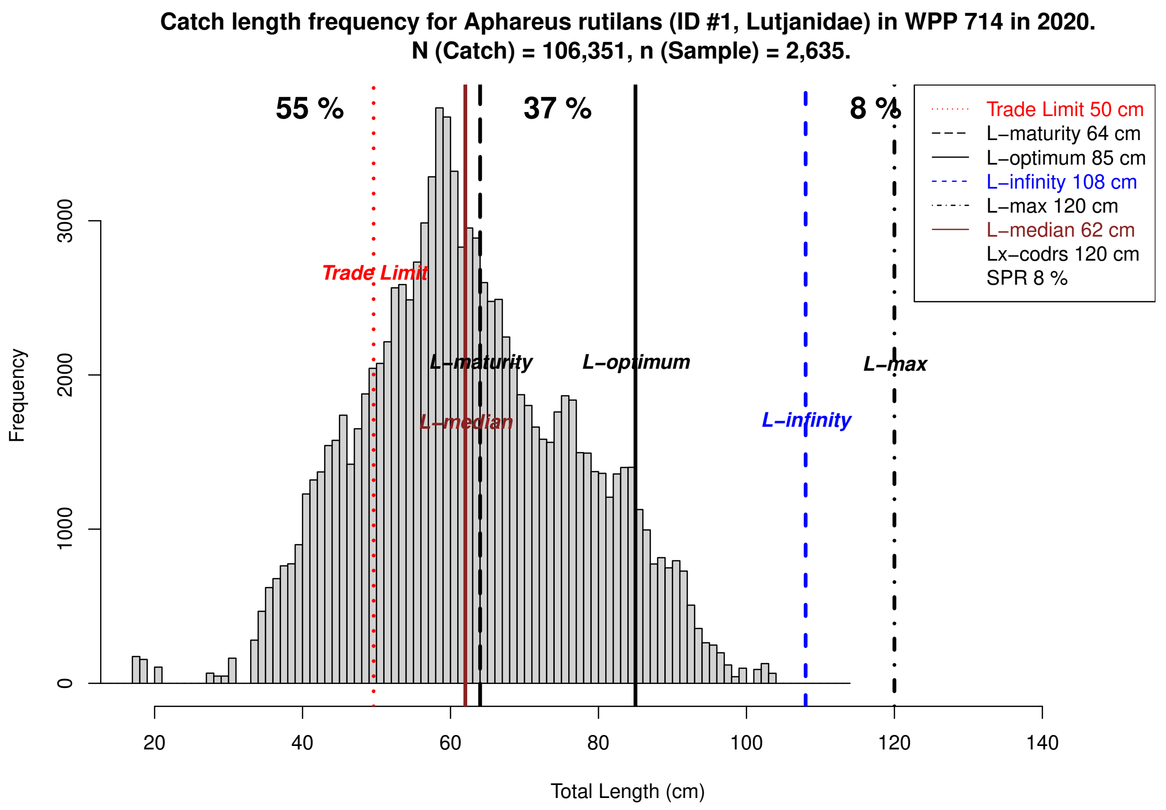
Figure 3.3: Fishing positions of vessels applying more than one gear, participating in the CODRS program over the years 2014 - 2019 in WPP 714, as reported by Spot Trace. Gears used by the vessels in this group are a combination of droplines, longlines, traps, and gillnets. Reported positions during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

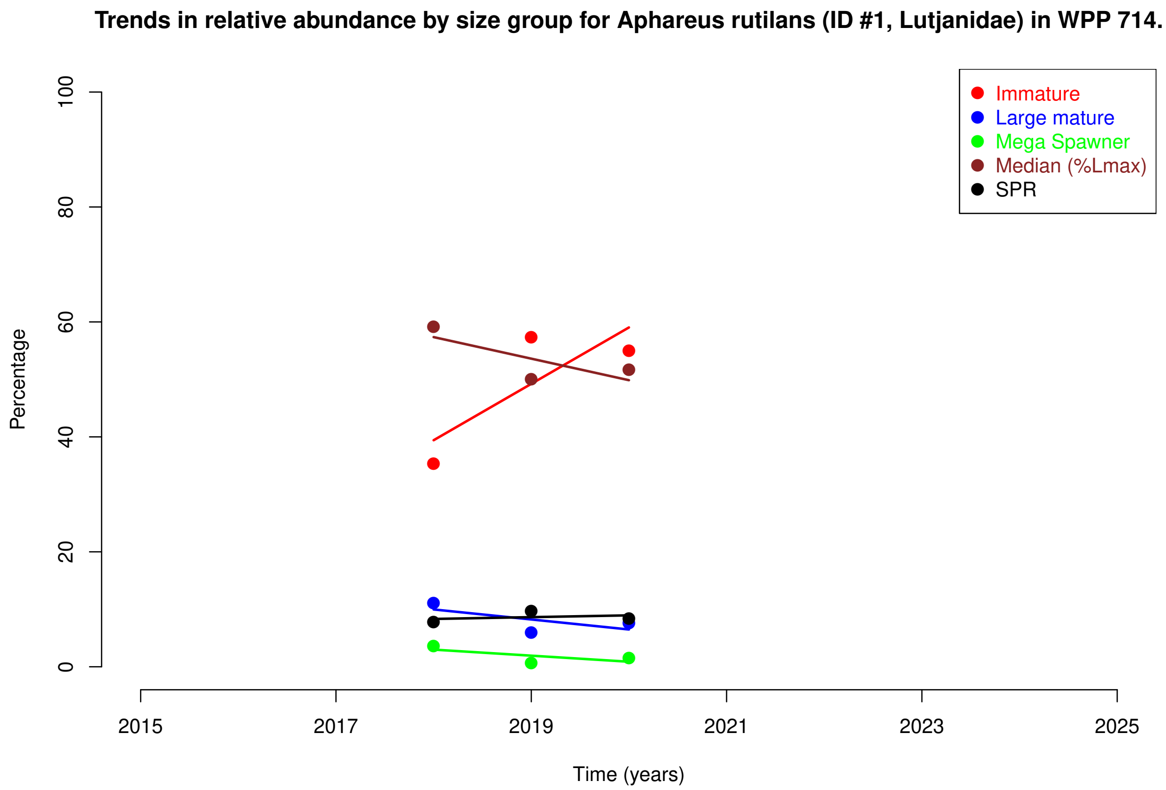
Figure 3.4: A typical small scale snapper fishing fleets from Kasuari, Banggai Laut, Sulawesi Tengah, operating in the Banda Sea (WPP 714) and on nearby fishing grounds.

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

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

4 Length-based assessments of Top 20 most abundant species in CODRS samples





The percentages of Aphareus rutilans (ID #1, Lutjanidae) in 2020.
N (Catch) =106,351, n (Sample) = 2,635
Immature (< 64cm): 55%
Small mature (>= 64cm, < 85cm): 37%
Large mature (>= 85cm): 8%
Mega spawner (>= 93.5cm): 2% (subset of large mature fish)
Spawning Potential Ratio: 8 %

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

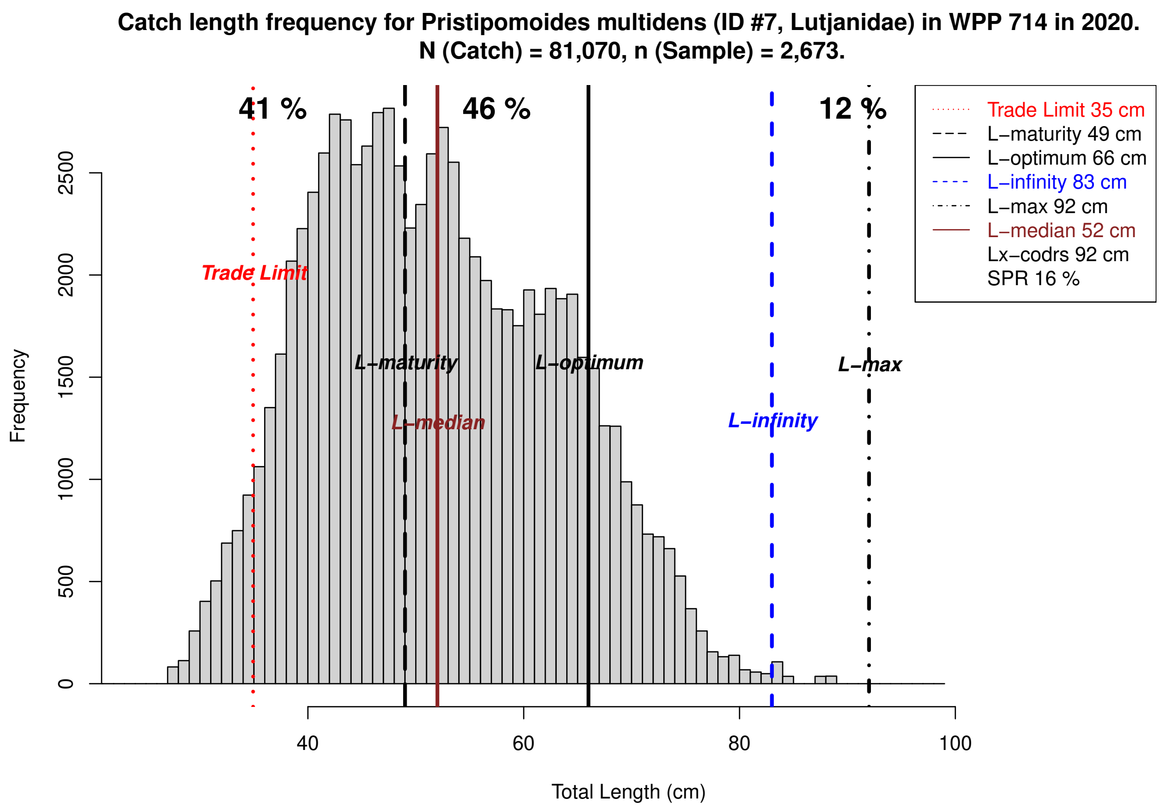
The majority of the fish in the catch have not had a chance to reproduce before capture. This fishery is most likely overfished already if fishing mortality is high for all size classes in the population. An immediate shift away from targeting juvenile fish and a reduction in overall fishing pressure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

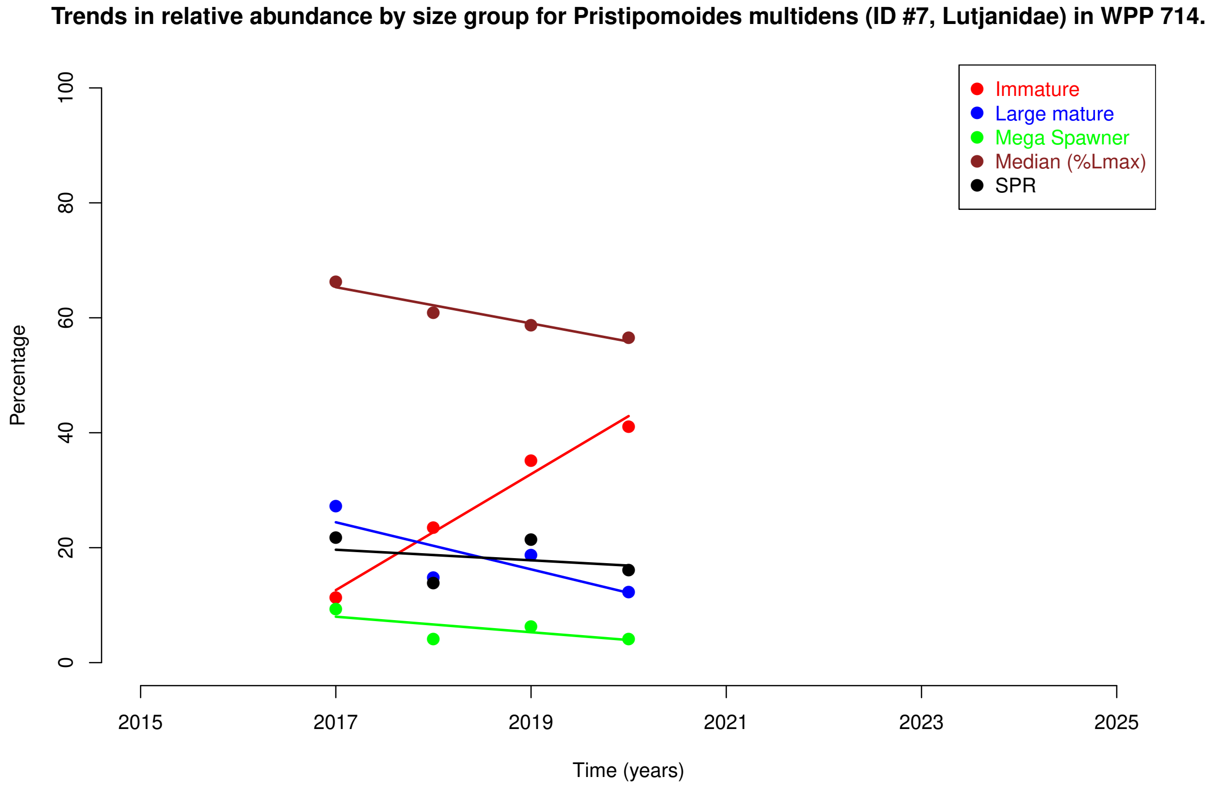
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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

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

Trends in relative abundance by size group for Aphareus rutilans (ID #1, Lutjanidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature rising over recent years, situation deteriorating. P: 0.397
% Large Mature falling over recent years, situation deteriorating. P: 0.537
% Mega Spawner falling over recent years, situation deteriorating. P: 0.513
% SPR rising over recent years, situation improving. P: 0.794


Catch length frequency for Pristipomoides multidens (ID #7, Lutjanidae) in WPP 714 in 2020.
N (Catch) = 81,070, n (Sample) = 2,673.
41 %
46 %
12 %
Trade Limit 35 cm
L−maturity 49 cm
L−optimum 66 cm
L−infinity 83 cm
L−max 92 cm
L−median 52 cm
Lx−codrs 92 cm
SPR 16 %
Trade Limit
L−maturity
L−optimum
L−median
L−infinity
L−max
Frequency
0
500
1000
1500
2000
2500
40
60
80
100
Total Length (cm)


Trends in relative abundance by size group for Pristipomoides multidens (ID #7, Lutjanidae) in WPP 714.
Immature
Large mature
Mega Spawner
Median (%Lmax)
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 2020.
N (Catch) =81,070, n (Sample) = 2,673
Immature (< 49cm): 41%
Small mature (>= 49cm, < 66cm): 46%
Large mature (>= 66cm): 12%
Mega spawner (>= 72.6cm): 4% (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.

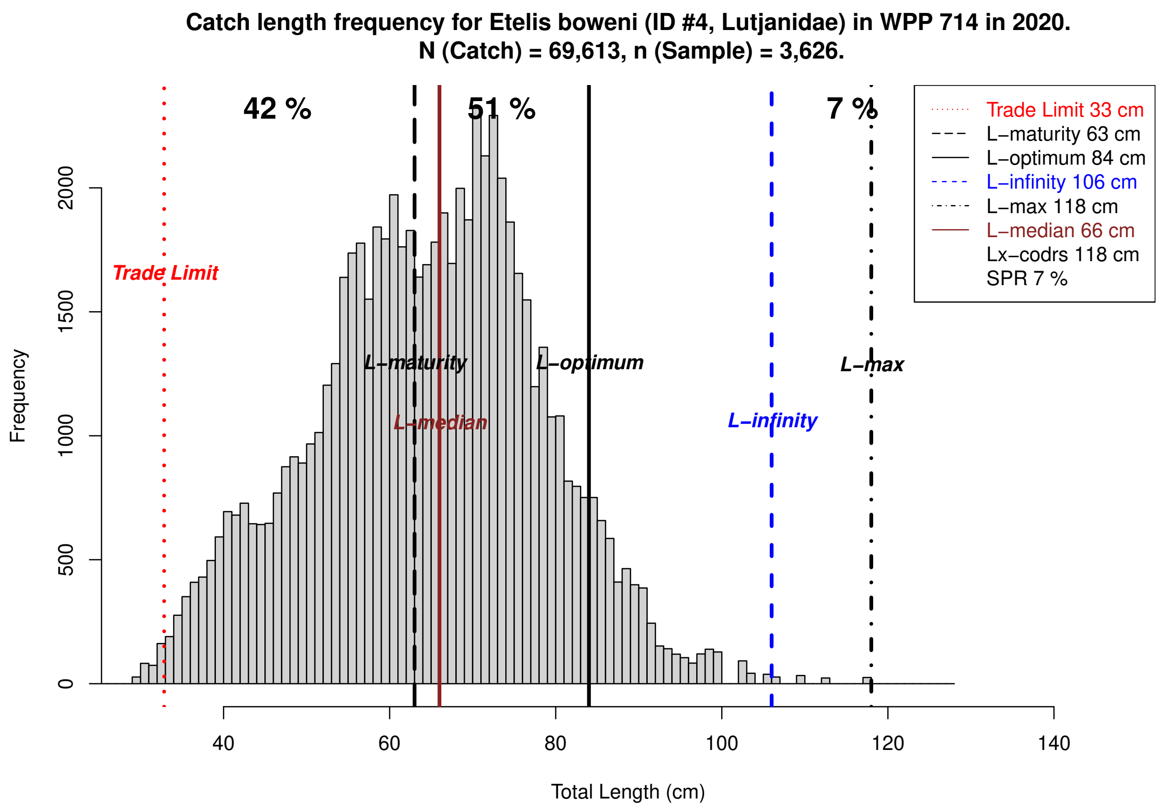
Between 30% and 50% of the fish in the catch are immature and have not had a chance to reproduce before capture. The fishery is in immediate danger of overfishing through overharvesting of juveniles, if fishing pressure is high. Catching small and immature fish needs to be actively avoided and a limit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

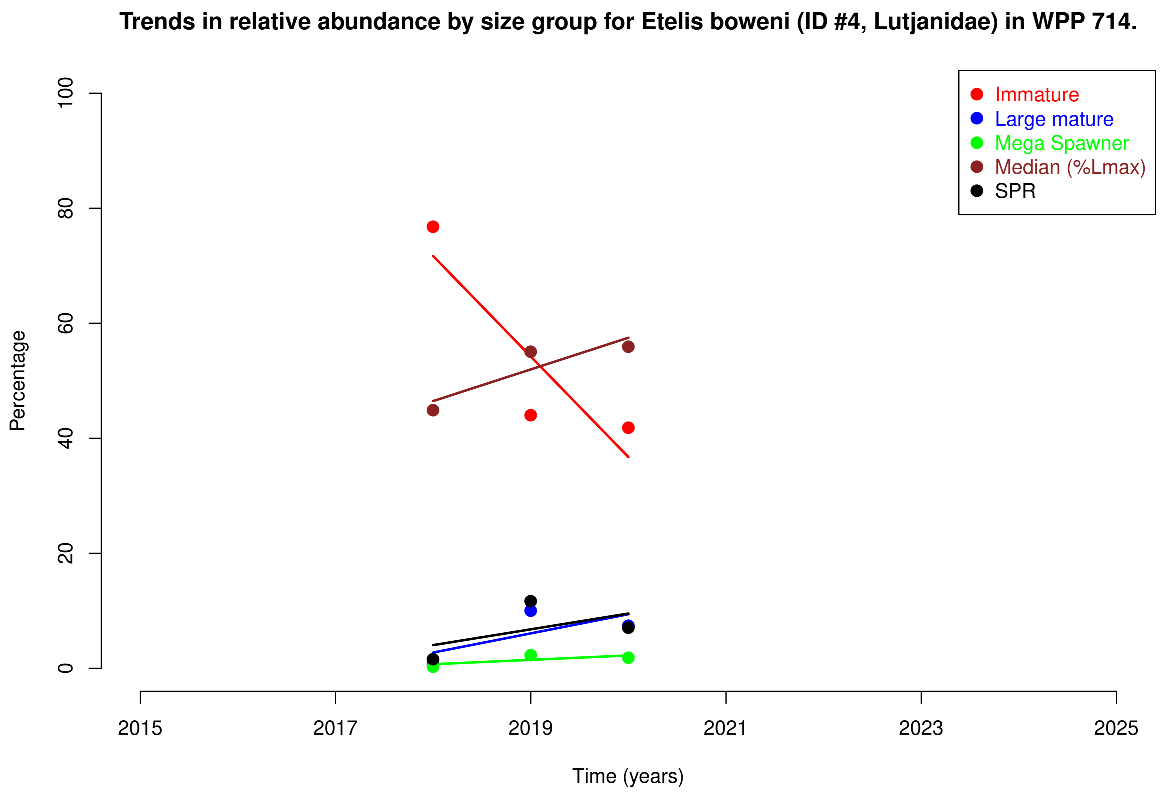
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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: 0.011
% Large Mature falling over recent years, situation deteriorating. P: 0.191
% Mega Spawner falling over recent years, situation deteriorating. P: 0.296
% SPR falling over recent years, situation deteriorating. P: 0.697


Catch length frequency for Etelis boweni (ID #4, Lutjanidae) in WPP 714 in 2020.
N (Catch) = 69,613, n (Sample) = 3,626.
42 %
51 %
7 %
Trade Limit 33 cm
L–maturity 63 cm
L–optimum 84 cm
L–infinity 106 cm
L–max 118 cm
L–median 66 cm
Lx–codrs 118 cm
SPR 7 %
Trade Limit
L–maturity
L–optimum
L–max
L–median
L–infinity
Frequency
Total Length (cm)


Trends in relative abundance by size group for Etelis boweni (ID #4, Lutjanidae) in WPP 714.
Immature
Large mature
Mega Spawner
Median (%Lmax)
SPR
Percentage
Time (years)

The percentages of Etelis boweni (ID #4, Lutjanidae) in 2020.
N (Catch) =69,613, n (Sample) = 3,626
Immature (< 63cm): 42%
Small mature (>= 63cm, < 84cm): 51%
Large mature (>= 84cm): 7%
Mega spawner (>= 92.4cm): 2% (subset of large mature fish)
Spawning Potential Ratio: 7 %

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

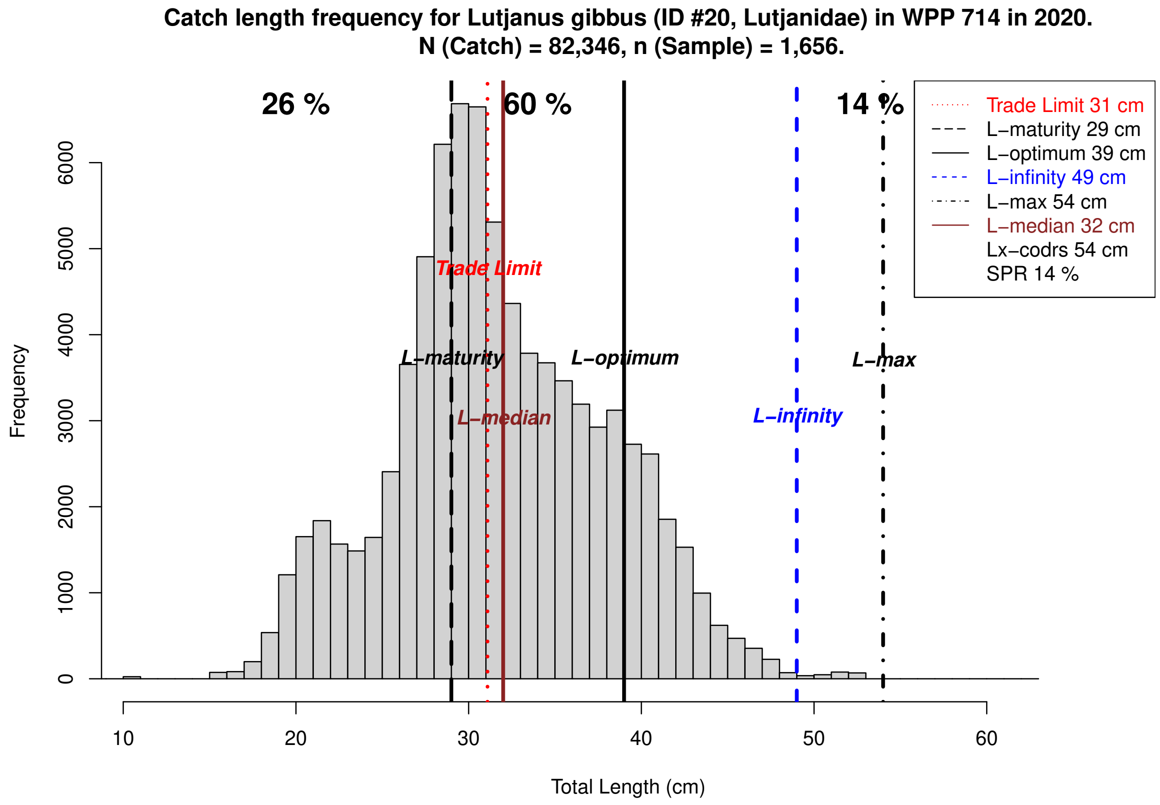
Between 30% and 50% of the fish in the catch are immature and have not had a chance to reproduce before capture. The fishery is in immediate danger of overfishing through overharvesting of juveniles, if fishing pressure is high. Catching small and immature fish needs to be actively avoided and a limit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

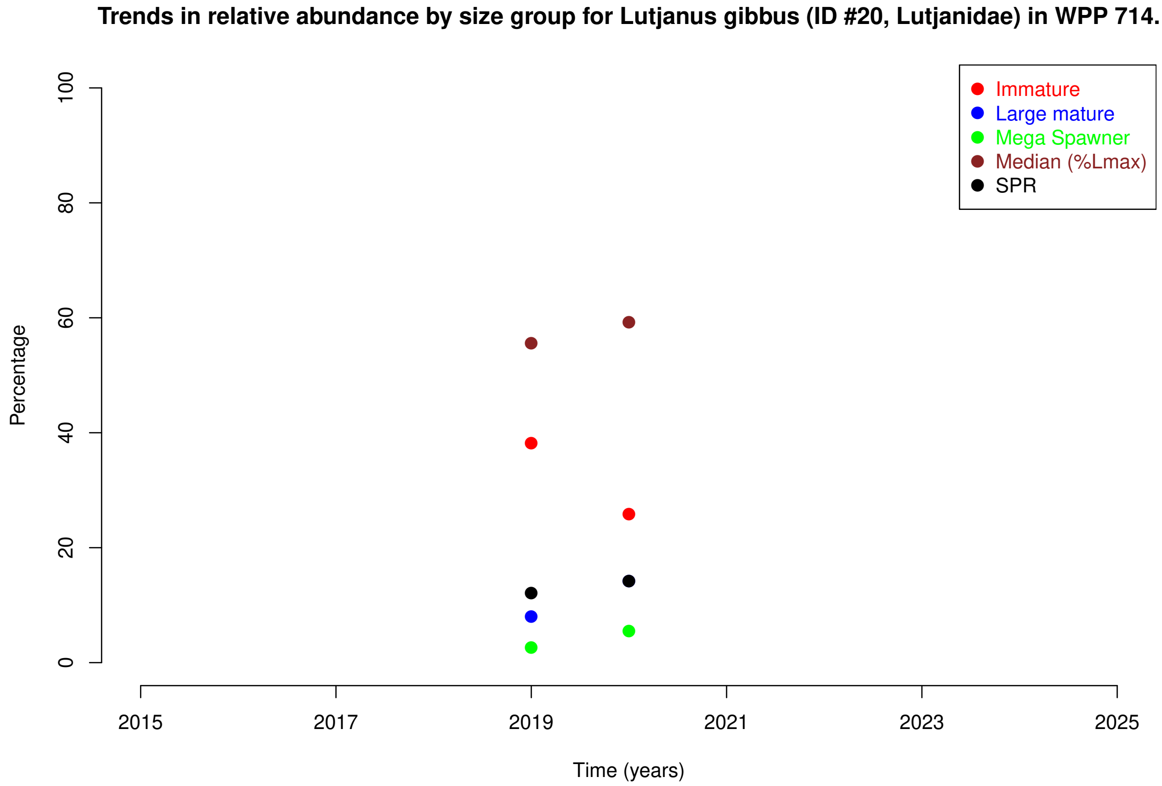
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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

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

Trends in relative abundance by size group for Etelis boweni (ID #4, Lutjanidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature falling over recent years, situation improving. P: 0.298
% Large Mature rising over recent years, situation improving. P: 0.510
% Mega Spawner rising over recent years, situation improving. P: 0.479
% SPR rising over recent years, situation improving. P: 0.636


Catch length frequency for Lutjanus gibbus (ID #20, Lutjanidae) in WPP 714 in 2020.
N (Catch) = 82,346, n (Sample) = 1,656.
26 %
60 %
14 %
Trade Limit 31 cm
L−maturity 29 cm
L−optimum 39 cm
L−infinity 49 cm
L−max 54 cm
L−median 32 cm
Lx−codrs 54 cm
SPR 14 %
Trade Limit
L−maturity
L−optimum
L−median
L−infinity
L−max
Frequency
0
1000
2000
3000
4000
5000
6000
10
20
30
40
50
60
Total Length (cm)


Trends in relative abundance by size group for Lutjanus gibbus (ID #20, Lutjanidae) in WPP 714.
Immature
Large mature
Mega Spawner
Median (%Lmax)
SPR
Percentage
0
20
40
60
80
100
2015
2017
2019
2021
2023
2025
Time (years)

The percentages of Lutjanus gibbus (ID #20, Lutjanidae) in 2020.
N (Catch) =82,346, n (Sample) = 1,656
Immature (< 29cm): 26%
Small mature (>= 29cm, < 39cm): 60%
Large mature (>= 39cm): 14%
Mega spawner (>= 42.9cm): 5% (subset of large mature fish)
Spawning Potential Ratio: 14 %

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

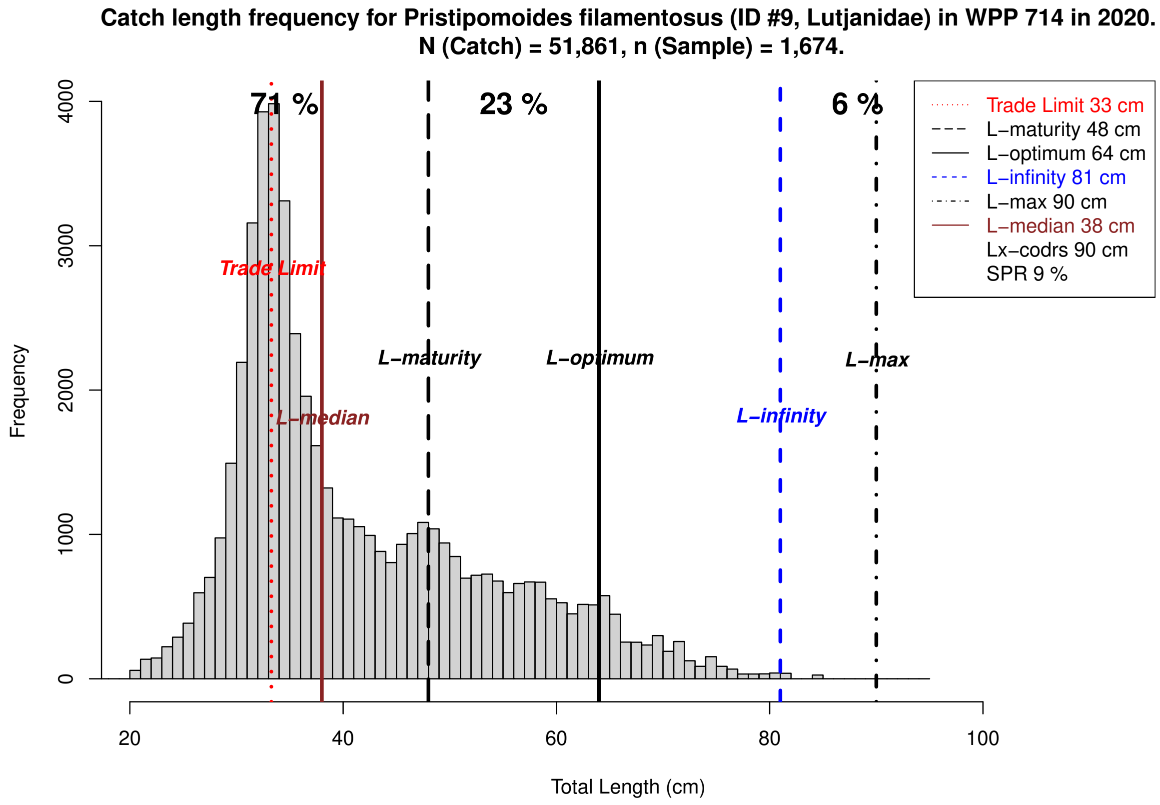
Between 20% and 30% of the fish in the catch are specimens that have not yet reproduced. This is reason for concern in terms of potential overfishing through overharvesting of juveniles, if fishing pressure is high and percentages immature fish would further rise. Targeting larger fish and avoiding small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

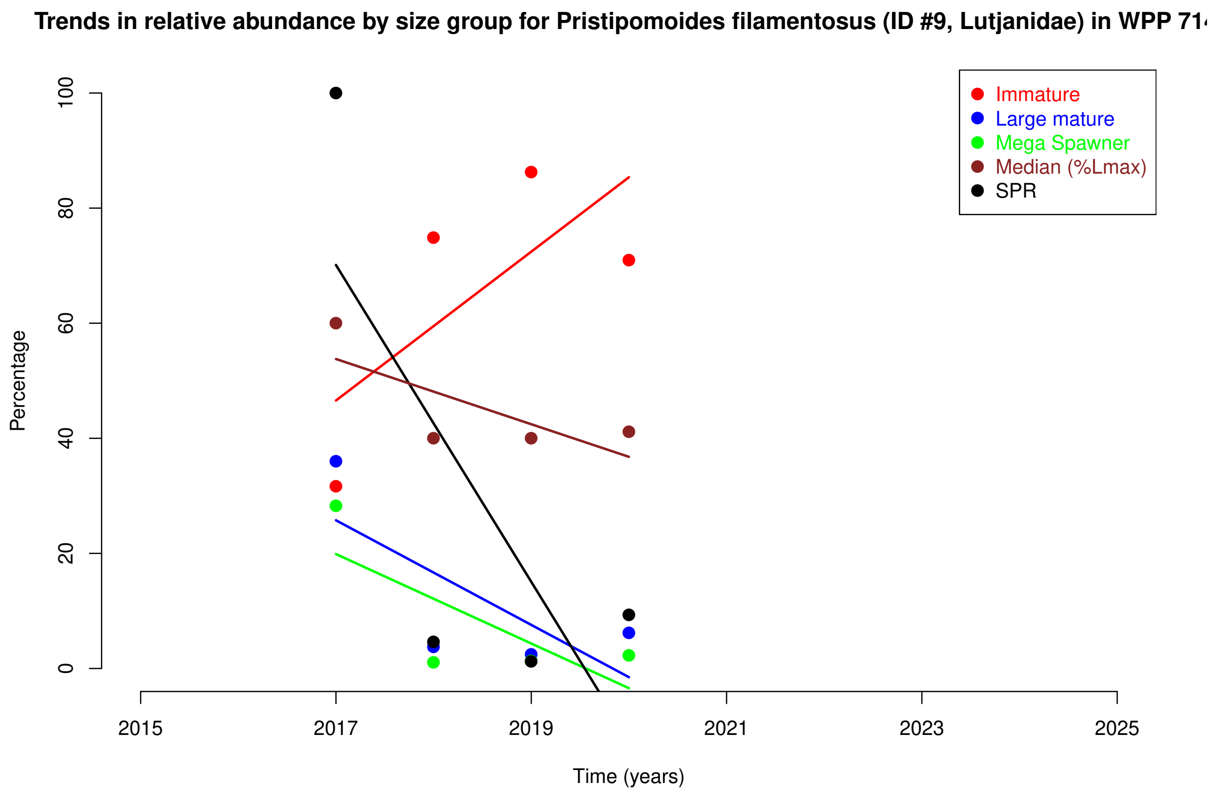
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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 gibbus (ID #20, Lutjanidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature trend not available.
% Large Mature trend not available.
% Mega Spawner trend not available.
% SPR trend not available.


Catch length frequency for Pristipomoides filamentosus (ID #9, Lutjanidae) in WPP 714 in 2020.
N (Catch) = 51,861, n (Sample) = 1,674.
71 %
23 %
6 %
Trade Limit
L−maturity
L−optimum
L−max
L−median
L−infinity
Trade Limit 33 cm
L−maturity 48 cm
L−optimum 64 cm
L−infinity 81 cm
L−max 90 cm
L−median 38 cm
Lx−codrs 90 cm
SPR 9 %
Frequency
0
1000
2000
3000
4000
20
40
60
80
100
Total Length (cm)


Trends in relative abundance by size group for Pristipomoides filamentosus (ID #9, Lutjanidae) in WPP 71
Immature
Large mature
Mega Spawner
Median (%Lmax)
SPR
Percentage
0
20
40
60
80
100
2015
2017
2019
2021
2023
2025
Time (years)

The percentages of Pristipomoides filamentosus (ID #9, Lutjanidae) in 2020.
N (Catch) =51,861, n (Sample) = 1,674
Immature (< 48cm): 71%
Small mature (>= 48cm, < 64cm): 23%
Large mature (>= 64cm): 6%
Mega spawner (>= 70.4cm): 2% (subset of large mature fish)
Spawning Potential Ratio: 9 %

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

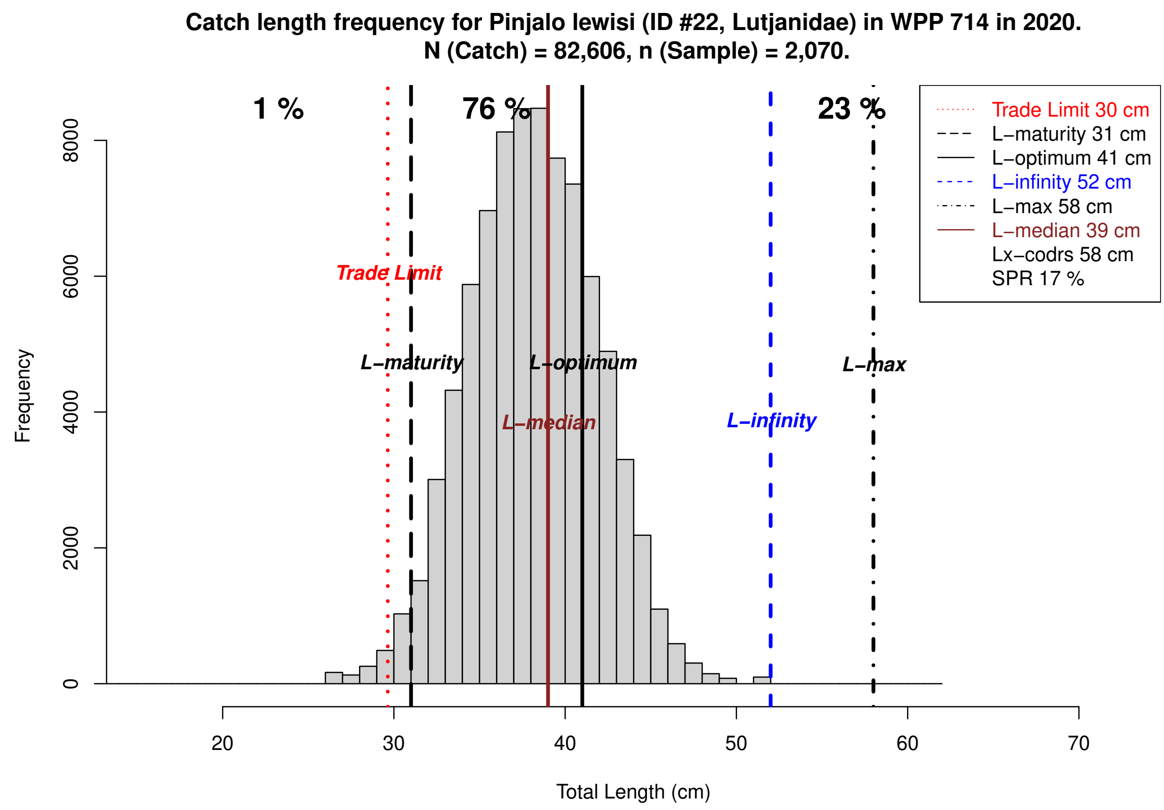
The majority of the fish in the catch have not had a chance to reproduce before capture. This fishery is most likely overfished already if fishing mortality is high for all size classes in the population. An immediate shift away from targeting juvenile fish and a reduction in overall fishing pressure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

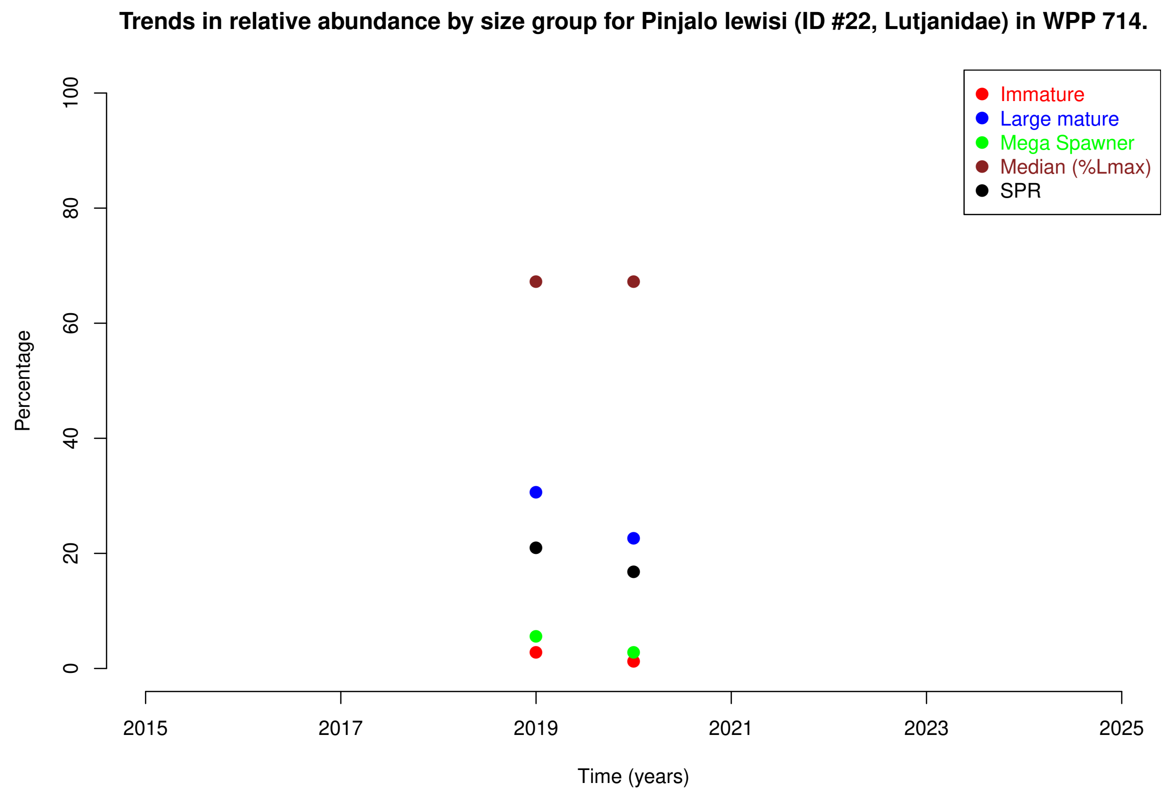
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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

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

Trends in relative abundance by size group for Pristipomoides filamentosus (ID #9, Lutjanidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature rising over recent years, situation deteriorating. P: 0.297
% Large Mature falling over recent years, situation deteriorating. P: 0.268
% Mega Spawner falling over recent years, situation deteriorating. P: 0.249
% SPR falling over recent years, situation deteriorating. P: 0.253


Catch length frequency for Pinjalo lewisi (ID #22, Lutjanidae) in WPP 714 in 2020.
N (Catch) = 82,606, n (Sample) = 2,070.
1 %
76 %
23 %
Trade Limit 30 cm
L−maturity 31 cm
L−optimum 41 cm
L−infinity 52 cm
L−max 58 cm
L−median 39 cm
Lx−codrs 58 cm
SPR 17 %
Trade Limit
L−maturity
L−optimum
L−median
L−infinity
L−max
Frequency
0
2000
4000
6000
8000
20
30
40
50
60
70
Total Length (cm)


Trends in relative abundance by size group for Pinjalo lewisi (ID #22, Lutjanidae) in WPP 714.
Immature
Large mature
Mega Spawner
Median (%Lmax)
SPR
Percentage
0
20
40
60
80
100
2015
2017
2019
2021
2023
2025
Time (years)

The percentages of Pinjalo lewisi (ID #22, Lutjanidae) in 2020.
N (Catch) =82,606, n (Sample) = 2,070
Immature (< 31cm): 1%
Small mature (>= 31cm, < 41cm): 76%
Large mature (>= 41cm): 23%
Mega spawner (>= 45.1cm): 3% (subset of large mature fish)
Spawning Potential Ratio: 17 %

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.

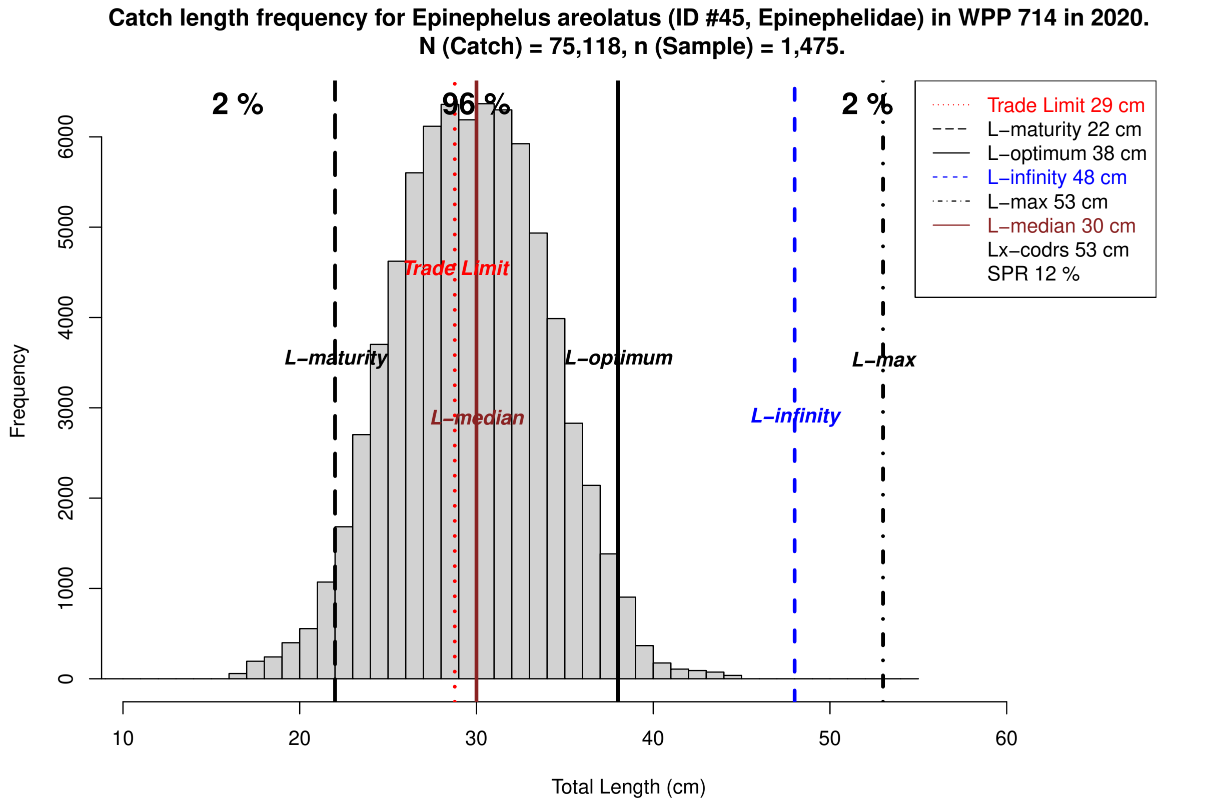
At least 90% of the fish in the catch are mature specimens that have spawned at least once before they were caught. The fishery does not depend on immature size classes for this species and is considered safe for this indicator. This fishery will not be causing overfishing through over harvesting of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

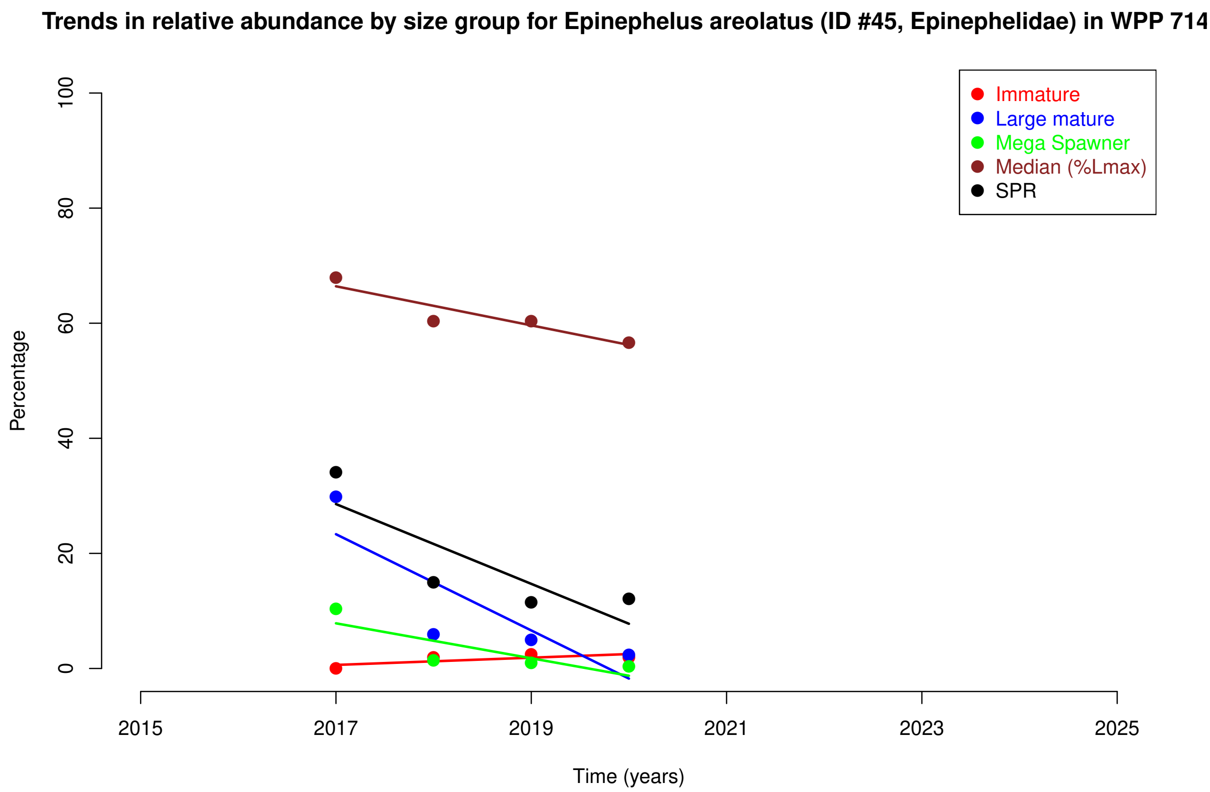
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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 Pinjalo lewisi (ID #22, Lutjanidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature trend not available.
% Large Mature trend not available.
% Mega Spawner trend not available.
% SPR trend not available.


Catch length frequency for Epinephelus areolatus (ID #45, Epinephelidae) in WPP 714 in 2020.
N (Catch) = 75,118, n (Sample) = 1,475.
2 %
96 %
2 %
Trade Limit 29 cm
L–maturity 22 cm
L–optimum 38 cm
L–infinity 48 cm
L–max 53 cm
L–median 30 cm
Lx–codrs 53 cm
SPR 12 %
Trade Limit
L–maturity
L–optimum
L–max
L–median
L–infinity
Frequency
Total Length (cm)


Trends in relative abundance by size group for Epinephelus areolatus (ID #45, Epinephelidae) in WPP 714
Immature
Large mature
Mega Spawner
Median (%Lmax)
SPR
Percentage
Time (years)

The percentages of Epinephelus areolatus (ID #45, Epinephelidae) in 2020.
N (Catch) =75,118, n (Sample) = 1,475
Immature (< 22cm): 2%
Small mature (>= 22cm, < 38cm): 96%
Large mature (>= 38cm): 2%
Mega spawner (>= 41.8cm): 0% (subset of large mature fish)
Spawning Potential Ratio: 12 %

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.

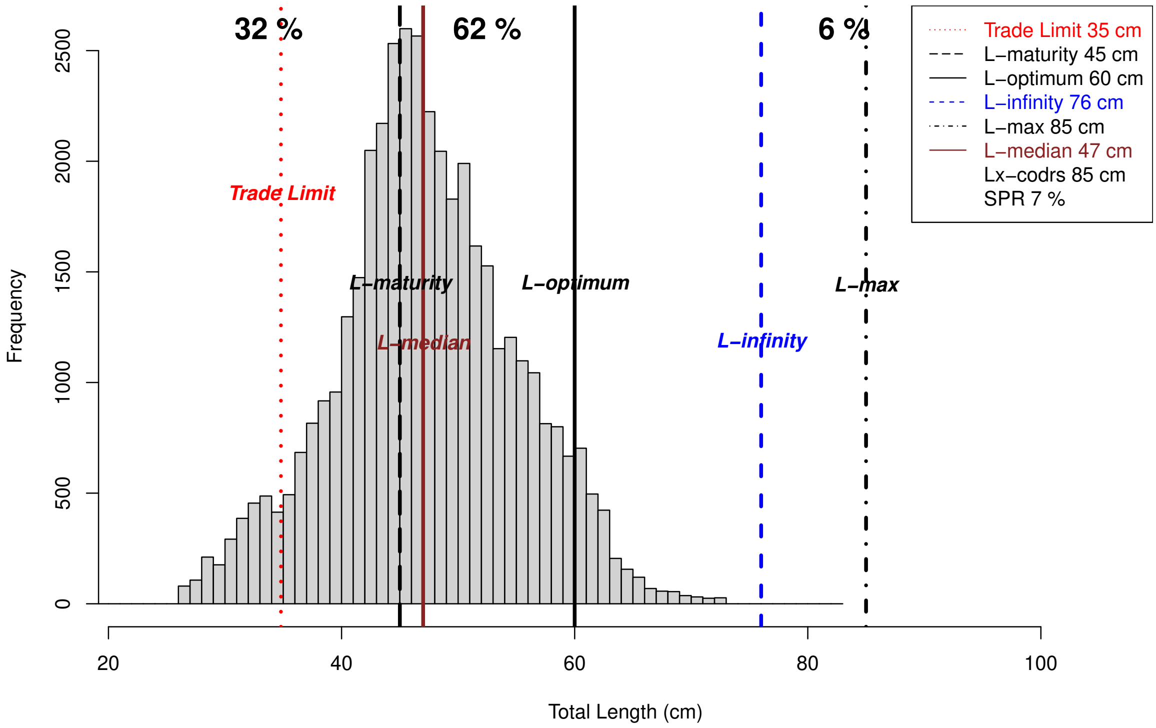
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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.

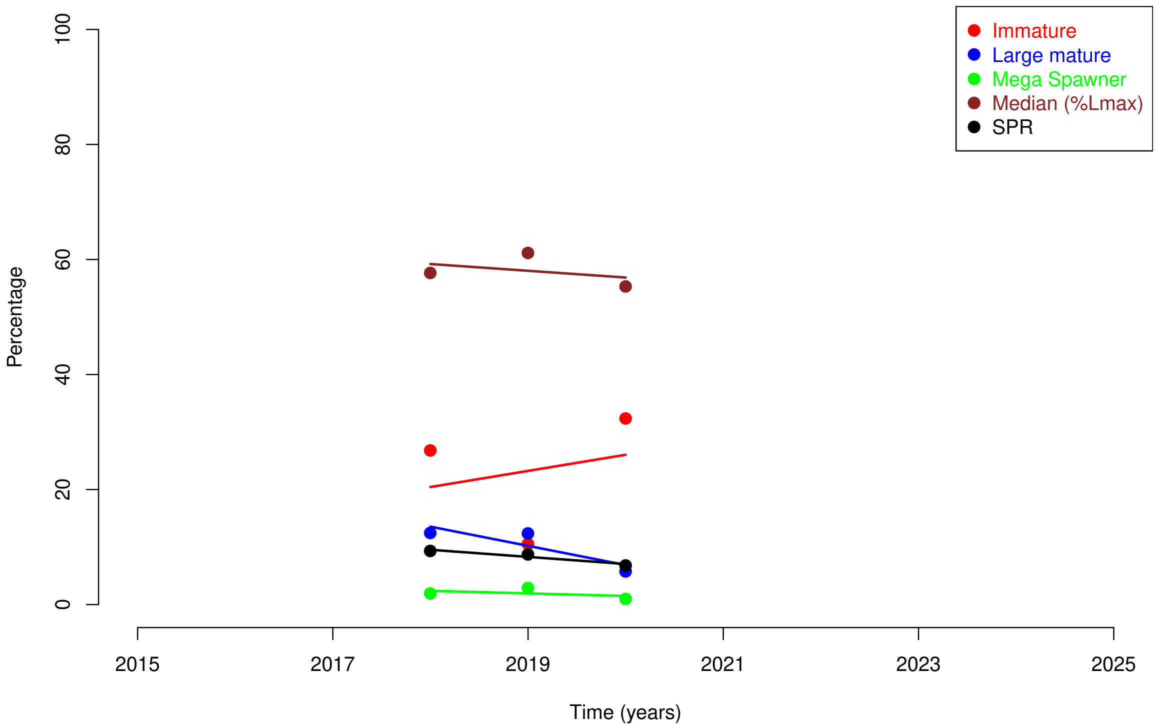
SPR is less than 25%. The fishery probably over-exploits the stock, and there is a substantial risk that the fishery will cause severe decline of the stock if fishing effort is not reduced. Risk level is high.

Trends in relative abundance by size group for Epinephelus areolatus (ID #45, Epinephelidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature rising over recent years, situation deteriorating. P: 0.236
% Large Mature falling over recent years, situation deteriorating. P: 0.158
% Mega Spawner falling over recent years, situation deteriorating. P: 0.172
% SPR falling over recent years, situation deteriorating. P: 0.165

Catch length frequency for Paracaesio kusakarii (ID #34, Lutjanidae) in WPP 714 in 2020.
N (Catch) = 41,579, n (Sample) = 1,359.



Trends in relative abundance by size group for Paracaesio kusakarii (ID #34, Lutjanidae) in WPP 714.



The percentages of Paracaesio kusakarii (ID #34, Lutjanidae) in 2020.
N (Catch) =41,579, n (Sample) = 1,359
Immature (< 45cm): 32%
Small mature (>= 45cm, < 60cm): 62%
Large mature (>= 60cm): 6%
Mega spawner (>= 66cm): 1% (subset of large mature fish)
Spawning Potential Ratio: 7 %

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

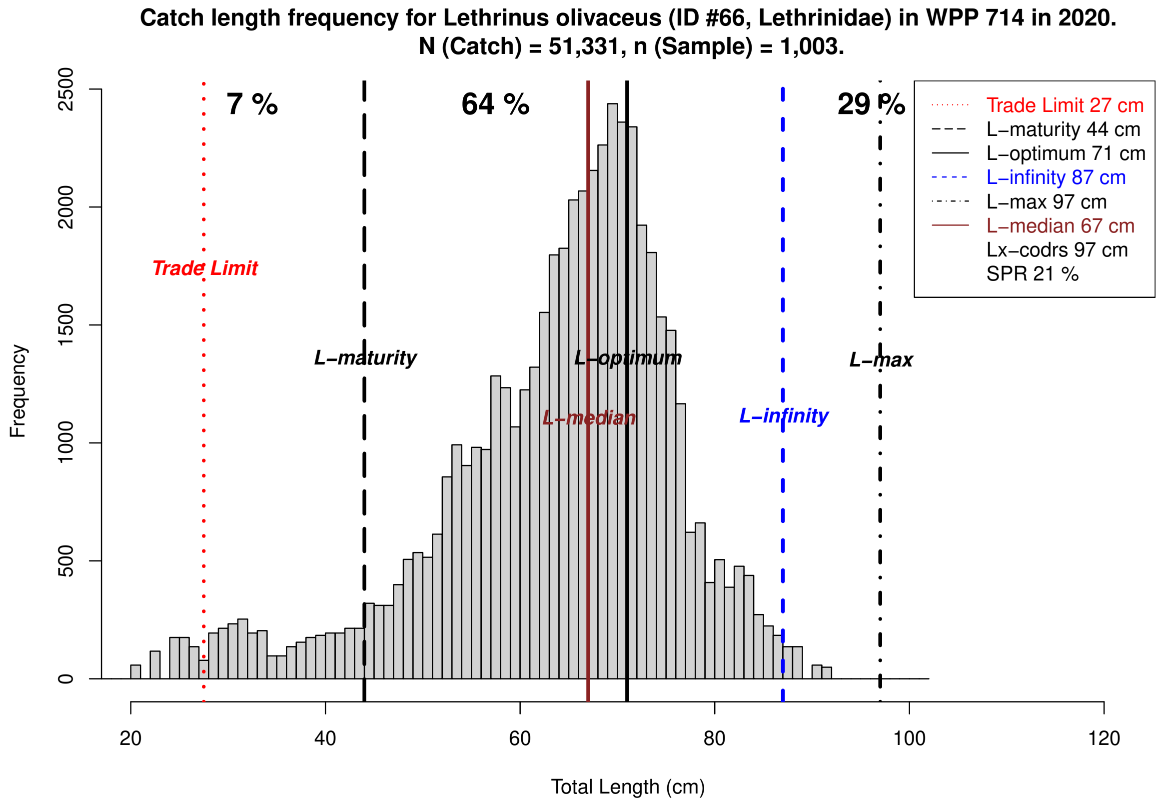
Between 30% and 50% of the fish in the catch are immature and have not had a chance to reproduce before capture. The fishery is in immediate danger of overfishing through overharvesting of juveniles, if fishing pressure is high. Catching small and immature fish needs to be actively avoided and a limit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

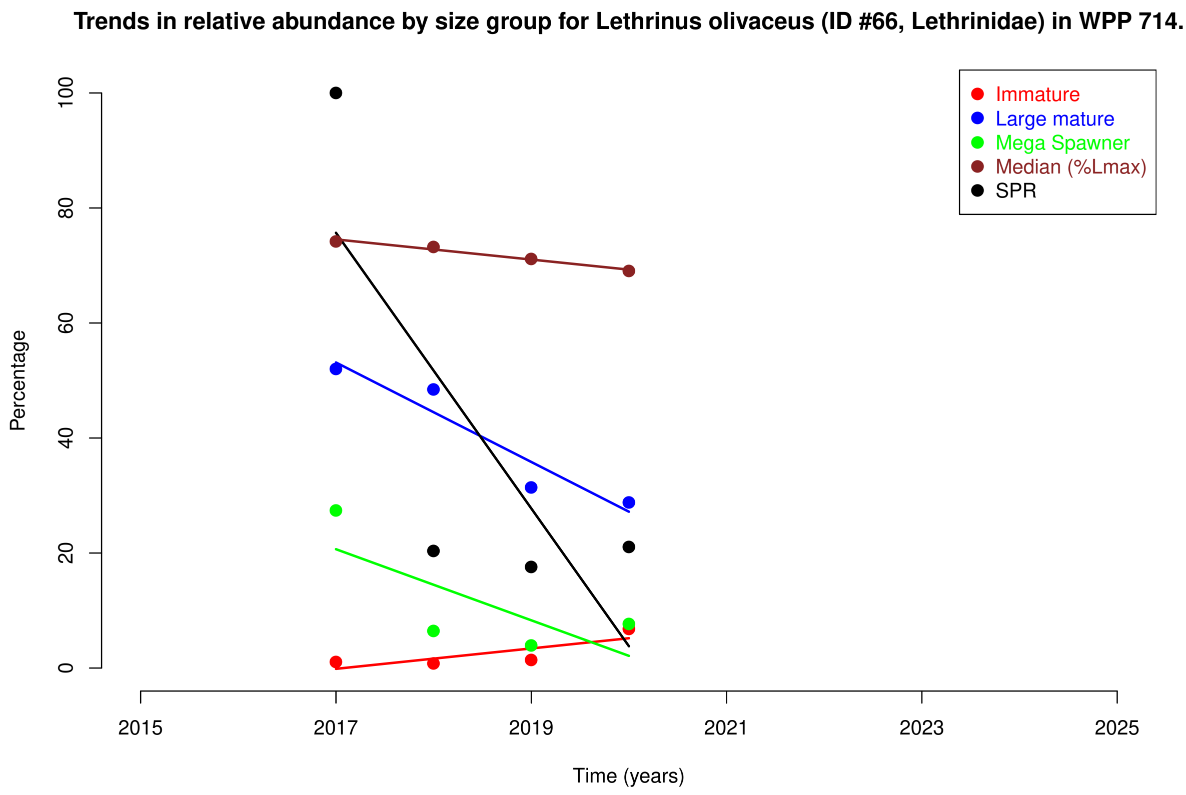
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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

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

Trends in relative abundance by size group for Paracaesio kusakarii (ID #34, Lutjanidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature rising over recent years, situation deteriorating. P: 0.841
% Large Mature falling over recent years, situation deteriorating. P: 0.326
% Mega Spawner falling over recent years, situation deteriorating. P: 0.683
% SPR falling over recent years, situation deteriorating. P: 0.191


Catch length frequency for Lethrinus olivaceus (ID #66, Lethrinidae) in WPP 714 in 2020.
N (Catch) = 51,331, n (Sample) = 1,003.
7 %
64 %
29 %
Trade Limit
L−maturity
L−optimum
L−median
L−infinity
L−max
Trade Limit 27 cm
L−maturity 44 cm
L−optimum 71 cm
L−infinity 87 cm
L−max 97 cm
L−median 67 cm
Lx−codrs 97 cm
SPR 21 %
Frequency
Total Length (cm)


Trends in relative abundance by size group for Lethrinus olivaceus (ID #66, Lethrinidae) in WPP 714.
Immature
Large mature
Mega Spawner
Median (%Lmax)
SPR
Percentage
Time (years)

The percentages of Lethrinus olivaceus (ID #66, Lethrinidae) in 2020.
N (Catch) =51,331, n (Sample) = 1,003
Immature (< 44cm): 7%
Small mature (>= 44cm, < 71cm): 64%
Large mature (>= 71cm): 29%
Mega spawner (>= 78.1cm): 8% (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.

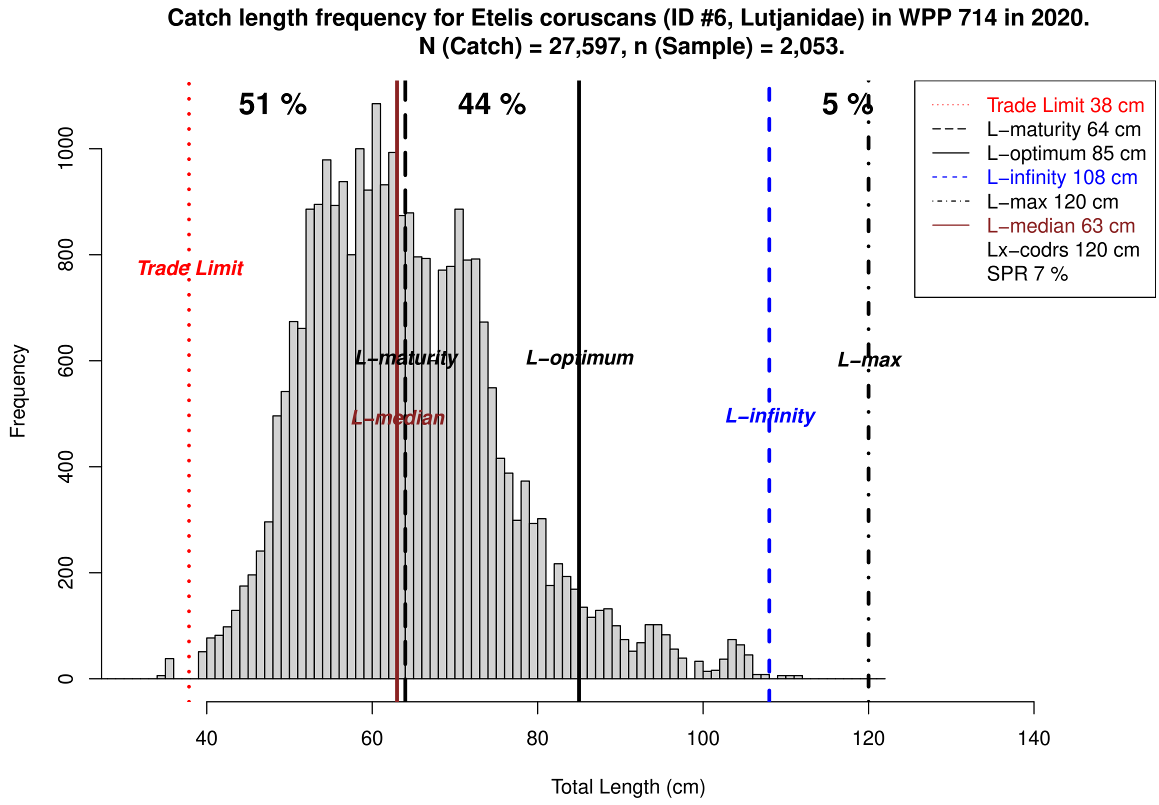
At least 90% of the fish in the catch are mature specimens that have spawned at least once before they were caught. The fishery does not depend on immature size classes for this species and is considered safe for this indicator. This fishery will not be causing overfishing through over harvesting of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

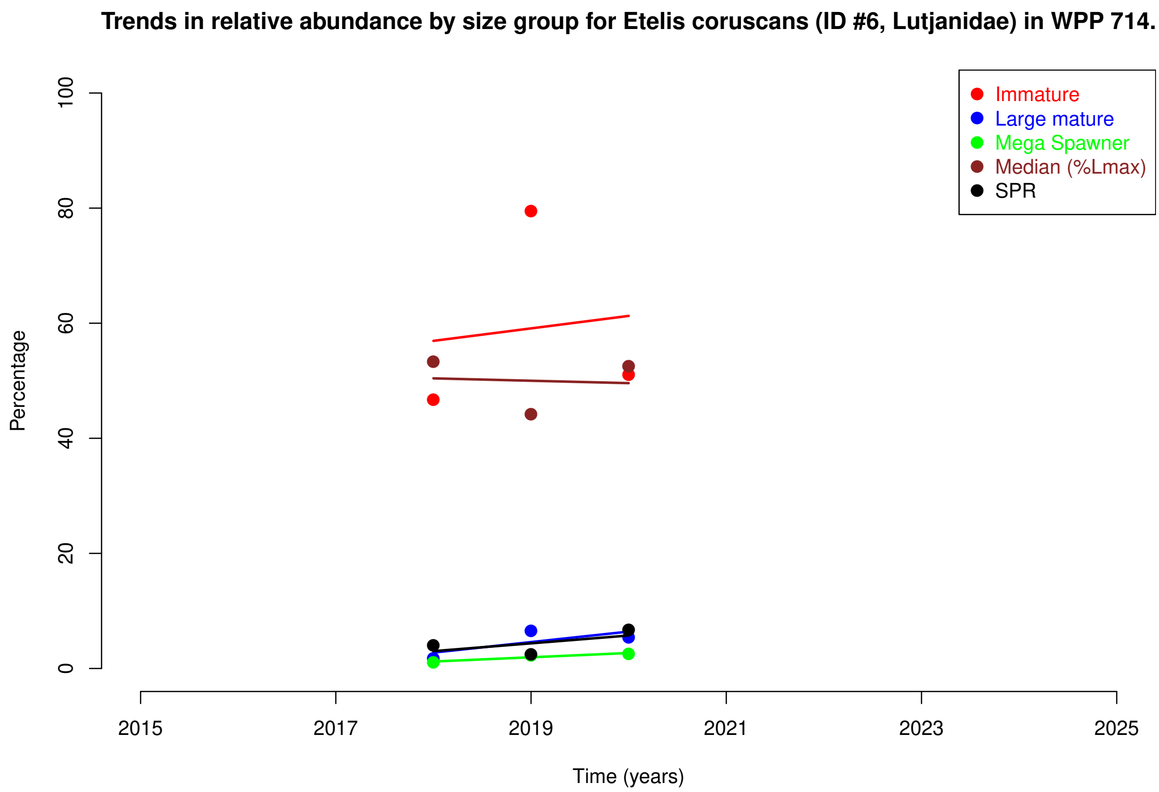
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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 Lethrinus olivaceus (ID #66, Lethrinidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature rising over recent years, situation deteriorating. P: 0.195
% Large Mature falling over recent years, situation deteriorating. P: 0.049
% Mega Spawner falling over recent years, situation deteriorating. P: 0.261
% SPR falling over recent years, situation deteriorating. P: 0.230


Catch length frequency for Etelis coruscans (ID #6, Lutjanidae) in WPP 714 in 2020.
N (Catch) = 27,597, n (Sample) = 2,053.
51 %
44 %
5 %
Trade Limit
L−maturity
L−optimum
L−median
L−infinity
L−max
Trade Limit 38 cm
L−maturity 64 cm
L−optimum 85 cm
L−infinity 108 cm
L−max 120 cm
L−median 63 cm
Lx−codrs 120 cm
SPR 7 %
Frequency
Total Length (cm)


Trends in relative abundance by size group for Etelis coruscans (ID #6, Lutjanidae) in WPP 714.
Immature
Large mature
Mega Spawner
Median (%Lmax)
SPR
Percentage
Time (years)

The percentages of Etelis coruscans (ID #6, Lutjanidae) in 2020.
N (Catch) =27,597, n (Sample) = 2,053
Immature (< 64cm): 51%
Small mature (>= 64cm, < 85cm): 44%
Large mature (>= 85cm): 5%
Mega spawner (>= 93.5cm): 3% (subset of large mature fish)
Spawning Potential Ratio: 7 %

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

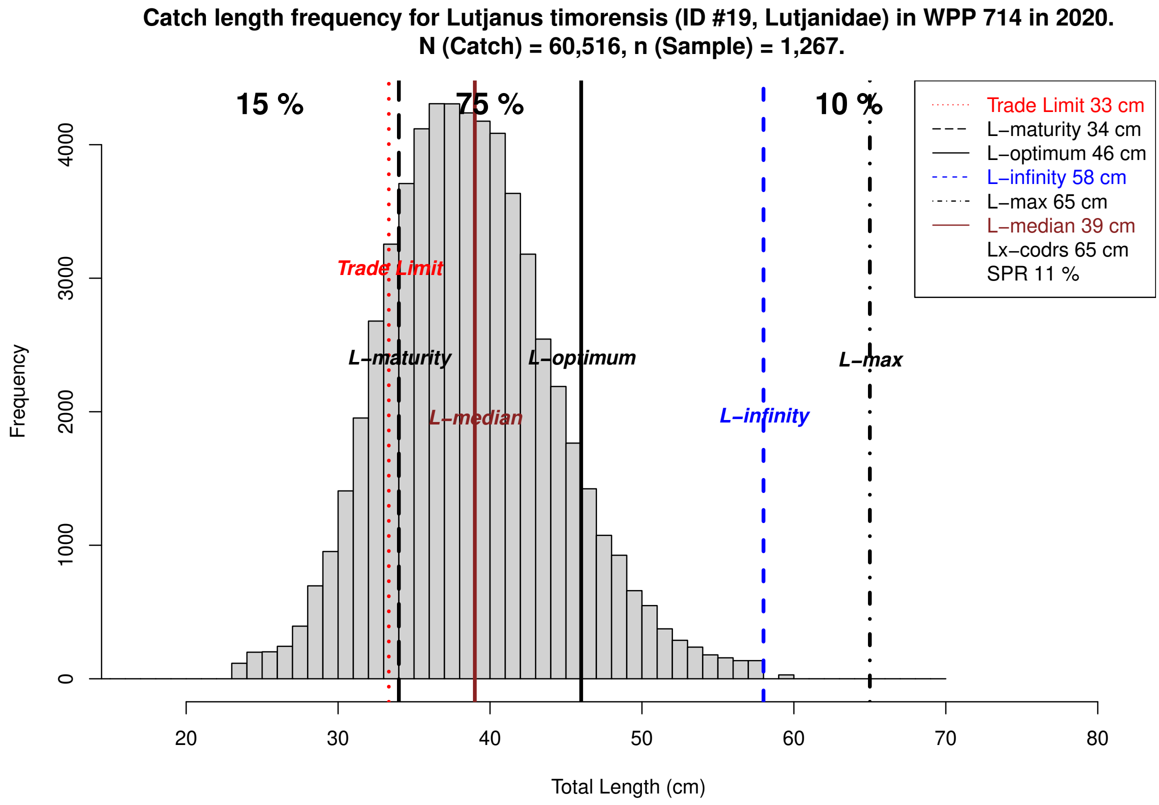
The majority of the fish in the catch have not had a chance to reproduce before capture. This fishery is most likely overfished already if fishing mortality is high for all size classes in the population. An immediate shift away from targeting juvenile fish and a reduction in overall fishing pressure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

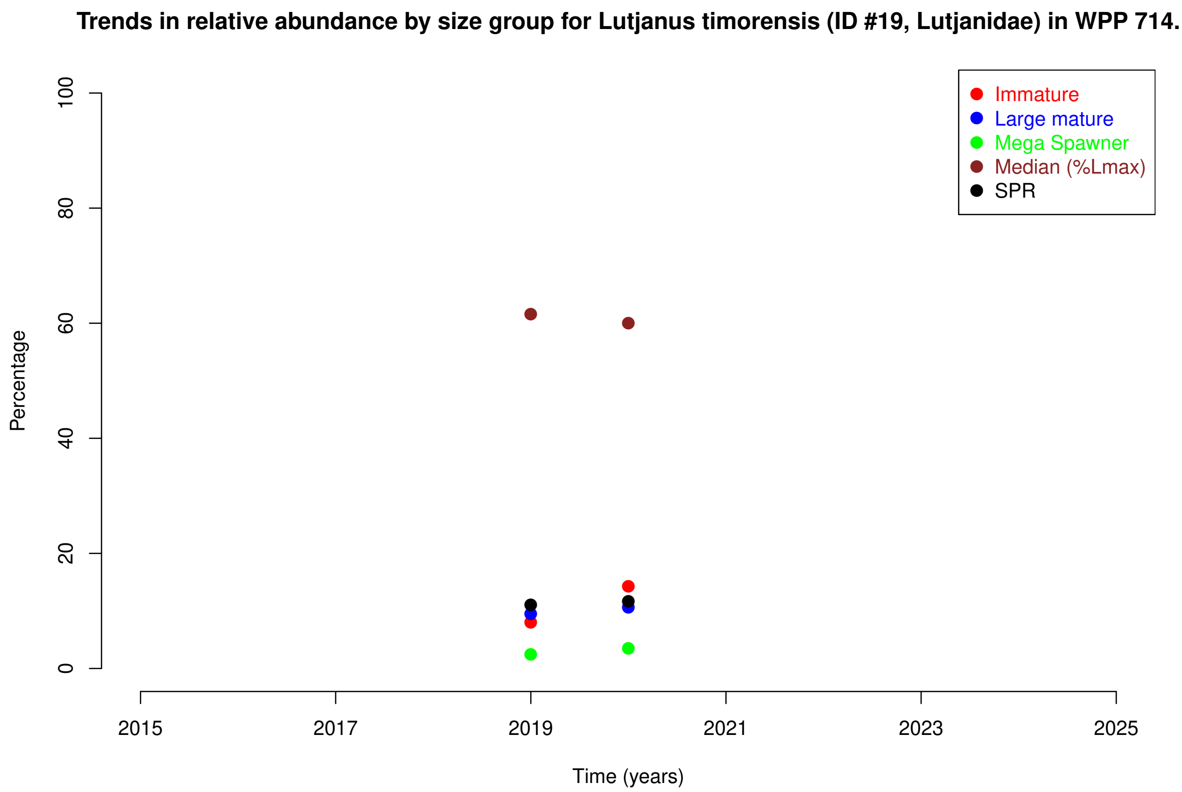
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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

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

Trends in relative abundance by size group for Etelis coruscans (ID #6, Lutjanidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature rising over recent years, situation deteriorating. P: 0.922
% Large Mature rising over recent years, situation improving. P: 0.471
% Mega Spawner rising over recent years, situation improving. P: 0.218
% SPR rising over recent years, situation improving. P: 0.567


Catch length frequency for Lutjanus timorensis (ID #19, Lutjanidae) in WPP 714 in 2020.
N (Catch) = 60,516, n (Sample) = 1,267.
15 %
75 %
10 %
Trade Limit 33 cm
L−maturity 34 cm
L−optimum 46 cm
L−infinity 58 cm
L−max 65 cm
L−median 39 cm
Lx−codrs 65 cm
SPR 11 %
Trade Limit
L−maturity
L−optimum
L−median
L−infinity
L−max
Frequency
0
1000
2000
3000
4000
20
30
40
50
60
70
80
Total Length (cm)


Trends in relative abundance by size group for Lutjanus timorensis (ID #19, Lutjanidae) in WPP 714.
Immature
Large mature
Mega Spawner
Median (%Lmax)
SPR
Percentage
0
20
40
60
80
100
2015
2017
2019
2021
2023
2025
Time (years)

The percentages of Lutjanus timorensis (ID #19, Lutjanidae) in 2020.
N (Catch) =60,516, n (Sample) = 1,267
Immature (< 34cm): 15%
Small mature (>= 34cm, < 46cm): 75%
Large mature (>= 46cm): 10%
Mega spawner (>= 50.6cm): 3% (subset of large mature fish)
Spawning Potential Ratio: 11 %

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

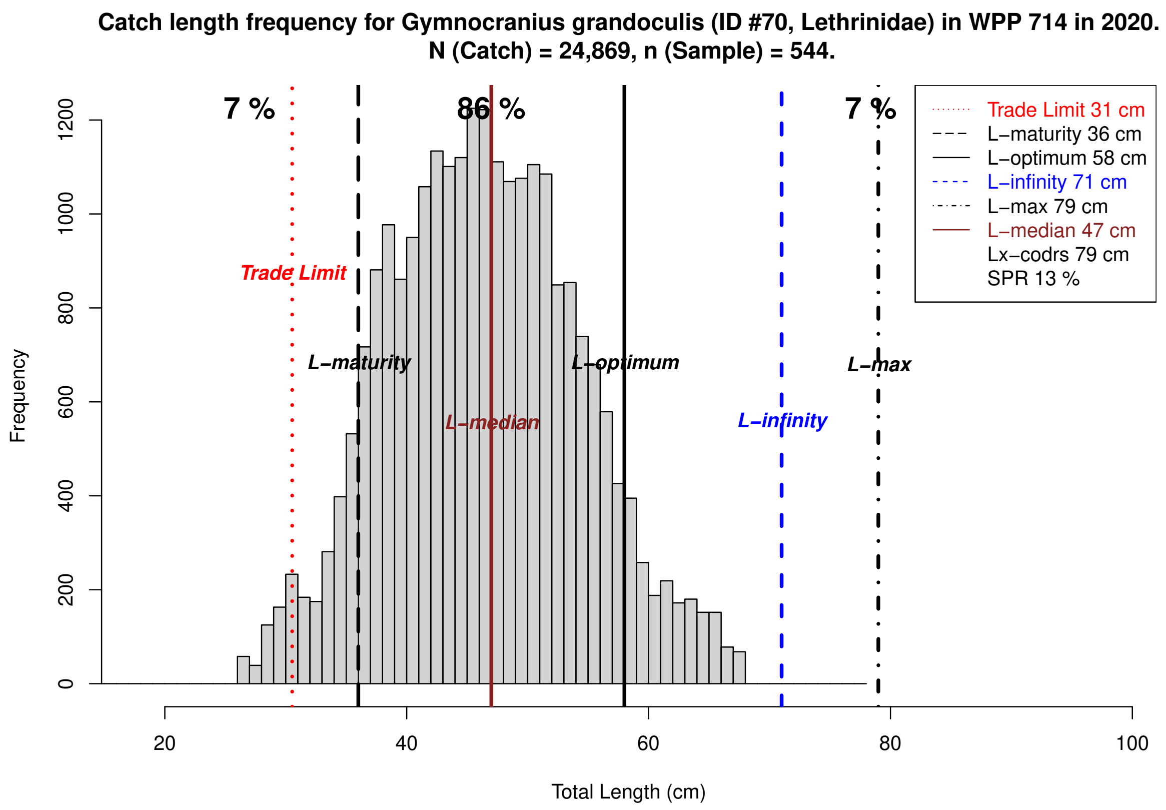
Between 10% and 20% of the fish in the catch are juveniles that have not yet reproduced. There is no immediate concern in terms of overfishing through over harvesting of juveniles, but the fishery needs to be monitored closely for any further increase in this indicator and incentives need to be geared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

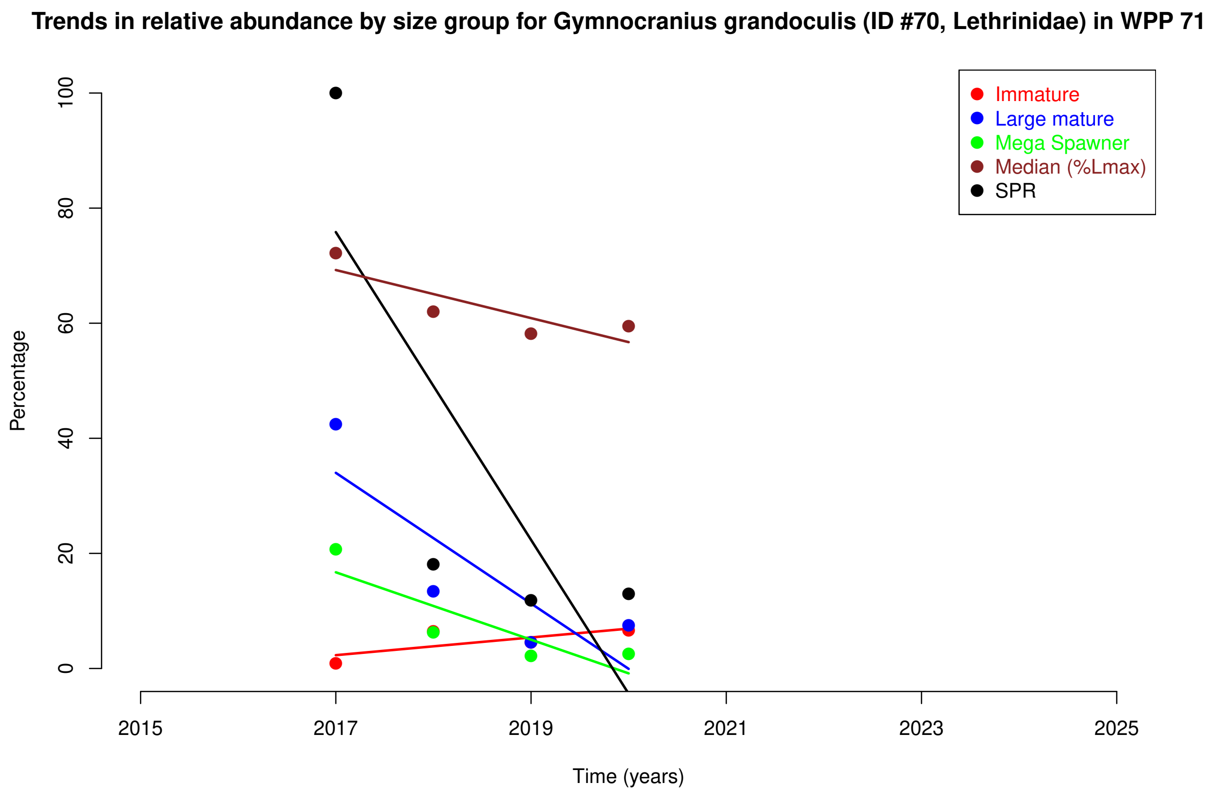
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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

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

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


Catch length frequency for Gymnocranius grandoculis (ID #70, Lethrinidae) in WPP 714 in 2020.
N (Catch) = 24,869, n (Sample) = 544.
7 %
86 %
7 %
Trade Limit
L−maturity
L−optimum
L−median
L−infinity
L−max
Trade Limit 31 cm
L−maturity 36 cm
L−optimum 58 cm
L−infinity 71 cm
L−max 79 cm
L−median 47 cm
Lx−codrs 79 cm
SPR 13 %
Frequency
Total Length (cm)


Trends in relative abundance by size group for Gymnocranius grandoculis (ID #70, Lethrinidae) in WPP 71
Immature
Large mature
Mega Spawner
Median (%Lmax)
SPR
Percentage
Time (years)

The percentages of Gymnocranius grandoculis (ID #70, Lethrinidae) in 2020.
N (Catch) =24,869, n (Sample) = 544
Immature (< 36cm): 7%
Small mature (>= 36cm, < 58cm): 86%
Large mature (>= 58cm): 7%
Mega spawner (>= 63.8cm): 3% (subset of large mature fish)
Spawning Potential Ratio: 13 %

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

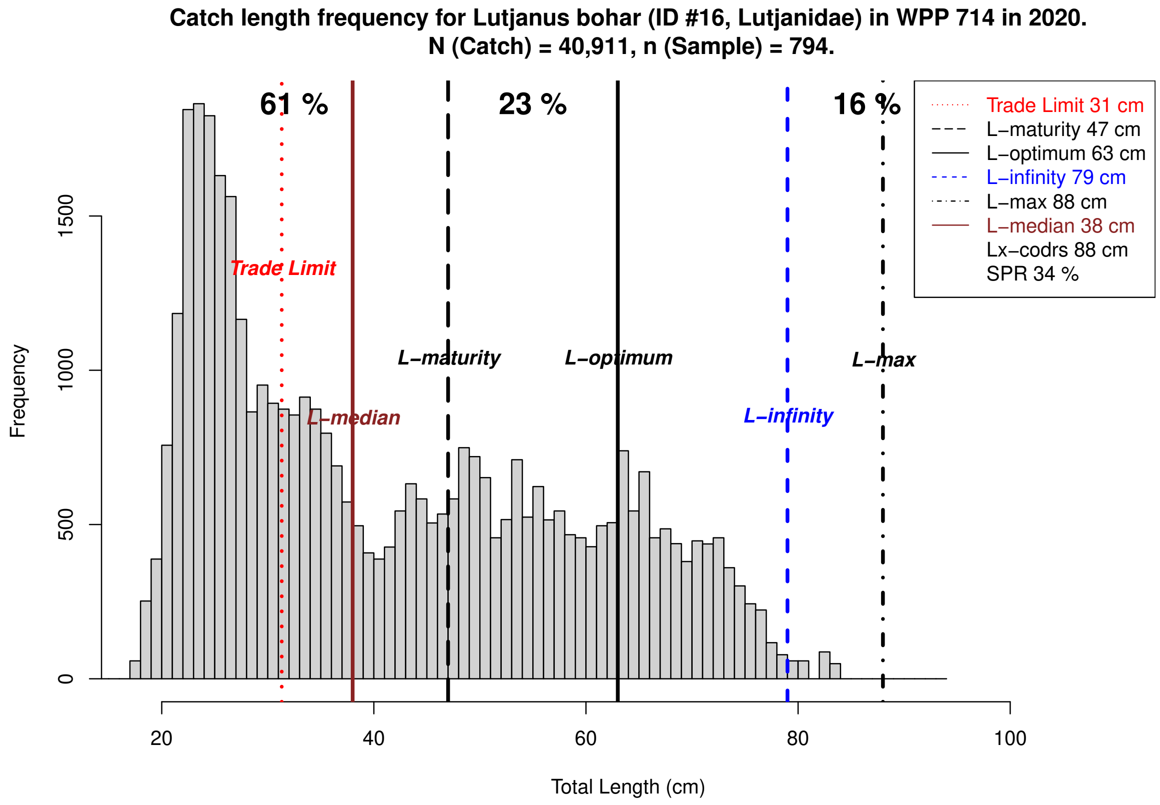
At least 90% of the fish in the catch are mature specimens that have spawned at least once before they were caught. The fishery does not depend on immature size classes for this species and is considered safe for this indicator. This fishery will not be causing overfishing through over harvesting of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

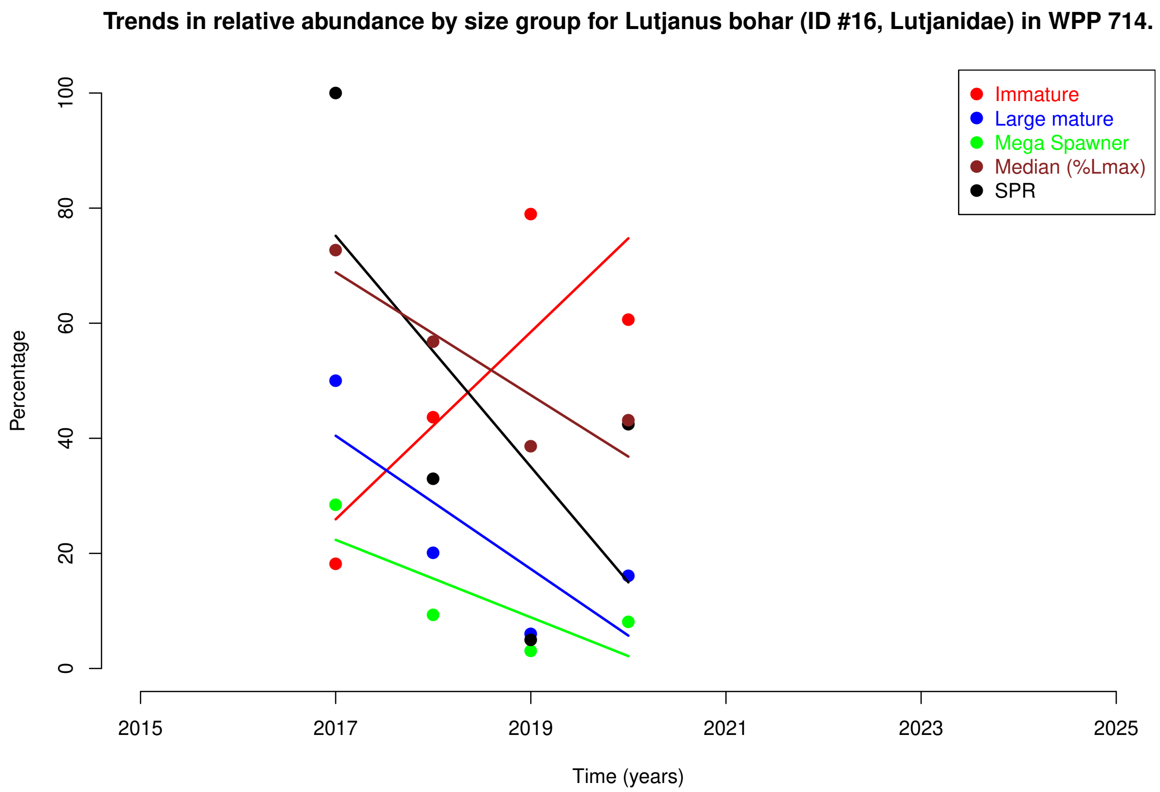
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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 Gymnocranius grandoculis (ID #70, Lethrinidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature rising over recent years, situation deteriorating. P: 0.259
% Large Mature falling over recent years, situation deteriorating. P: 0.156
% Mega Spawner falling over recent years, situation deteriorating. P: 0.131
% SPR falling over recent years, situation deteriorating. P: 0.196


Catch length frequency for Lutjanus bohar (ID #16, Lutjanidae) in WPP 714 in 2020.
N (Catch) = 40,911, n (Sample) = 794.
61 %
23 %
16 %
Trade Limit 31 cm
L−maturity 47 cm
L−optimum 63 cm
L−infinity 79 cm
L−max 88 cm
L−median 38 cm
Lx−codrs 88 cm
SPR 34 %
Trade Limit
L−maturity
L−optimum
L−max
L−median
L−infinity
Frequency
0
500
1000
1500
20
40
60
80
100
Total Length (cm)


Trends in relative abundance by size group for Lutjanus bohar (ID #16, Lutjanidae) in WPP 714.
Immature
Large mature
Mega Spawner
Median (%Lmax)
SPR
Percentage
0
20
40
60
80
100
2015
2017
2019
2021
2023
2025
Time (years)

The percentages of Lutjanus bohar (ID #16, Lutjanidae) in 2020.
N (Catch) =40,911, n (Sample) = 794
Immature (< 47cm): 61%
Small mature (>= 47cm, < 63cm): 23%
Large mature (>= 63cm): 16%
Mega spawner (>= 69.3cm): 8% (subset of large mature fish)
Spawning Potential Ratio: 34 %

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

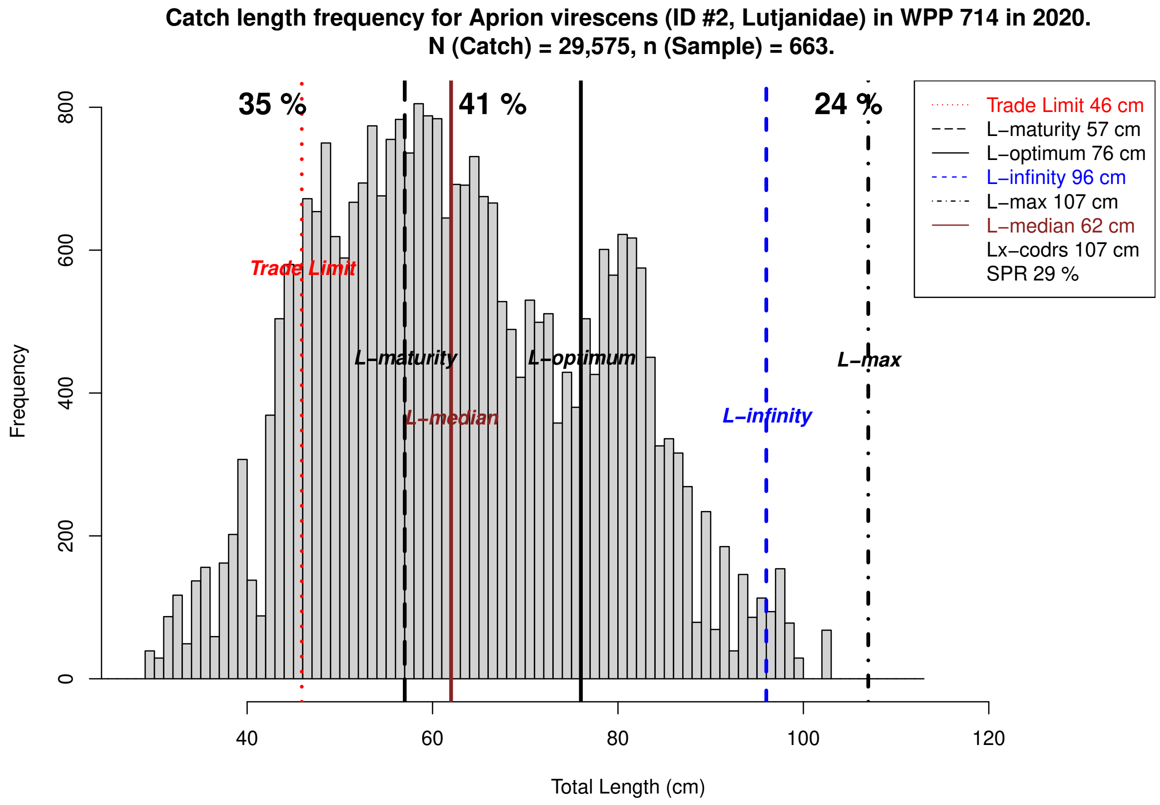
The majority of the fish in the catch have not had a chance to reproduce before capture. This fishery is most likely overfished already if fishing mortality is high for all size classes in the population. An immediate shift away from targeting juvenile fish and a reduction in overall fishing pressure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

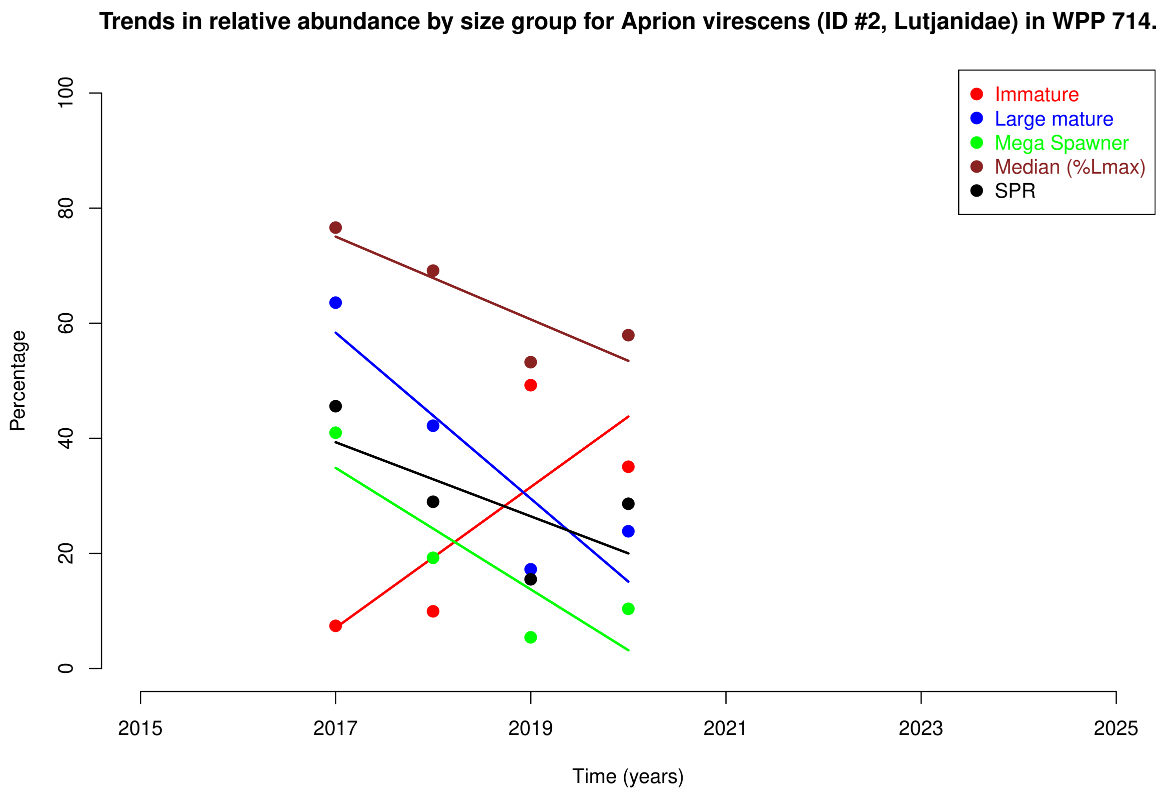
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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

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

Trends in relative abundance by size group for Lutjanus bohar (ID #16, Lutjanidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature rising over recent years, situation deteriorating. P: 0.187
% Large Mature falling over recent years, situation deteriorating. P: 0.210
% Mega Spawner falling over recent years, situation deteriorating. P: 0.220
% SPR falling over recent years, situation deteriorating. P: 0.351


Catch length frequency for Aprion virescens (ID #2, Lutjanidae) in WPP 714 in 2020.
N (Catch) = 29,575, n (Sample) = 663.
35 %
41 %
24 %
Trade Limit
L−maturity
L−optimum
L−median
L−infinity
L−max
Trade Limit 46 cm
L−maturity 57 cm
L−optimum 76 cm
L−infinity 96 cm
L−max 107 cm
L−median 62 cm
Lx−codrs 107 cm
SPR 29 %
Frequency
0
200
400
600
800
40
60
80
100
120
Total Length (cm)


Trends in relative abundance by size group for Aprion virescens (ID #2, Lutjanidae) in WPP 714.
Immature
Large mature
Mega Spawner
Median (%Lmax)
SPR
Percentage
0
20
40
60
80
100
2015
2017
2019
2021
2023
2025
Time (years)

The percentages of Aprion virescens (ID #2, Lutjanidae) in 2020.
N (Catch) =29,575, n (Sample) = 663
Immature (< 57cm): 35%
Small mature (>= 57cm, < 76cm): 41%
Large mature (>= 76cm): 24%
Mega spawner (>= 83.6cm): 10% (subset of large mature fish)
Spawning Potential Ratio: 29 %

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

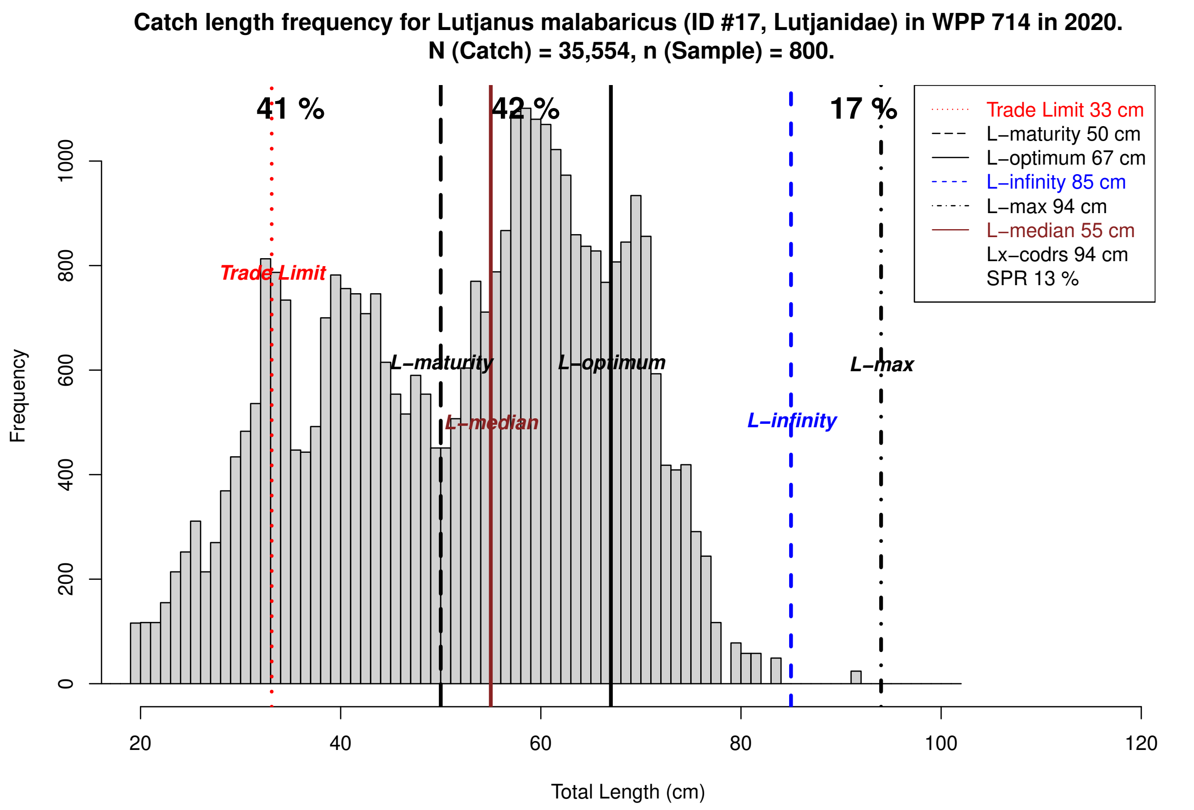
Between 30% and 50% of the fish in the catch are immature and have not had a chance to reproduce before capture. The fishery is in immediate danger of overfishing through overharvesting of juveniles, if fishing pressure is high. Catching small and immature fish needs to be actively avoided and a limit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

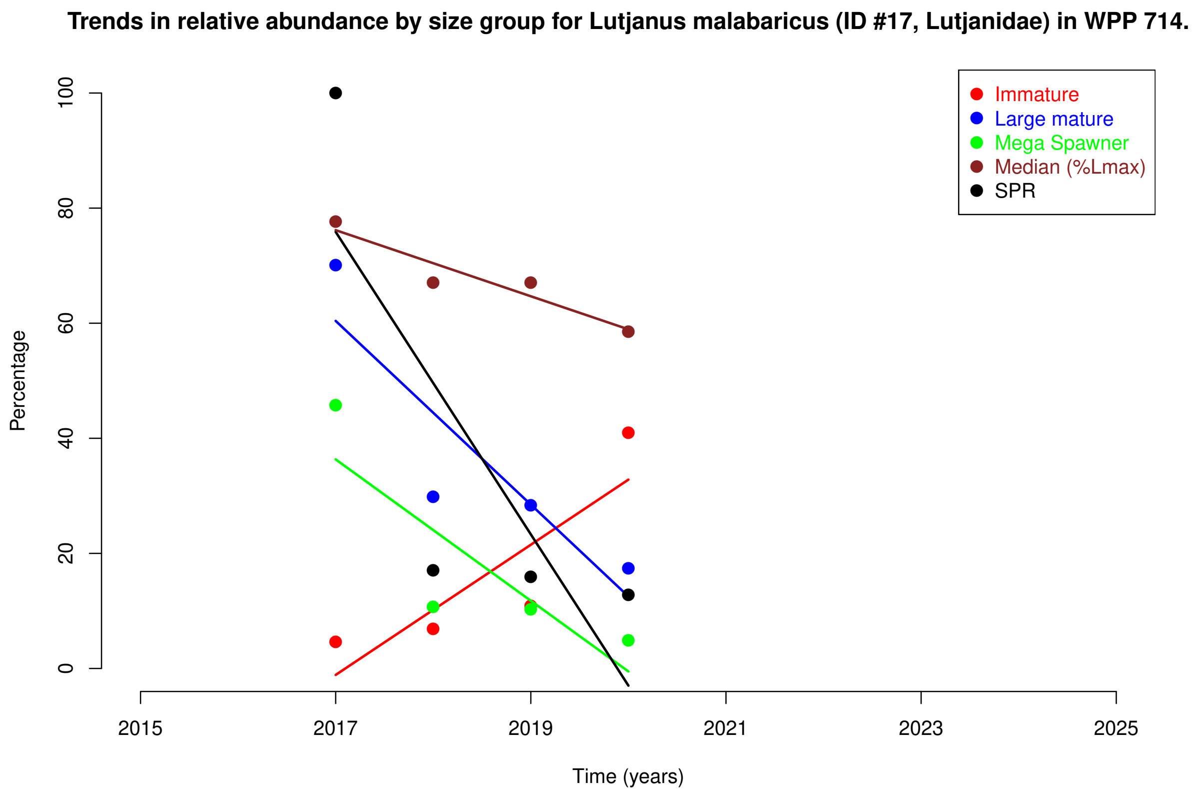
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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

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

Trends in relative abundance by size group for Aprion virescens (ID #2, Lutjanidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature rising over recent years, situation deteriorating. P: 0.219
% Large Mature falling over recent years, situation deteriorating. P: 0.105
% Mega Spawner falling over recent years, situation deteriorating. P: 0.133
% SPR falling over recent years, situation deteriorating. P: 0.326


Catch length frequency for Lutjanus malabaricus (ID #17, Lutjanidae) in WPP 714 in 2020.
N (Catch) = 35,554, n (Sample) = 800.
41 %
42 %
17 %
Trade Limit 33 cm
L–maturity 50 cm
L–optimum 67 cm
L–infinity 85 cm
L–max 94 cm
L–median 55 cm
Lx–codrs 94 cm
SPR 13 %
Trade Limit
L–maturity
L–optimum
L–max
L–median
L–infinity
Frequency
Total Length (cm)
0
200
400
600
800
1000
20
40
60
80
100
120


Trends in relative abundance by size group for Lutjanus malabaricus (ID #17, Lutjanidae) in WPP 714.
Immature
Large mature
Mega Spawner
Median (%Lmax)
SPR
Percentage
Time (years)
0
20
40
60
80
100
2015
2017
2019
2021
2023
2025

The percentages of Lutjanus malabaricus (ID #17, Lutjanidae) in 2020.
N (Catch) =35,554, n (Sample) = 800
Immature (< 50cm): 41%
Small mature (>= 50cm, < 67cm): 42%
Large mature (>= 67cm): 17%
Mega spawner (>= 73.7cm): 5% (subset of large mature fish)
Spawning Potential Ratio: 13 %

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

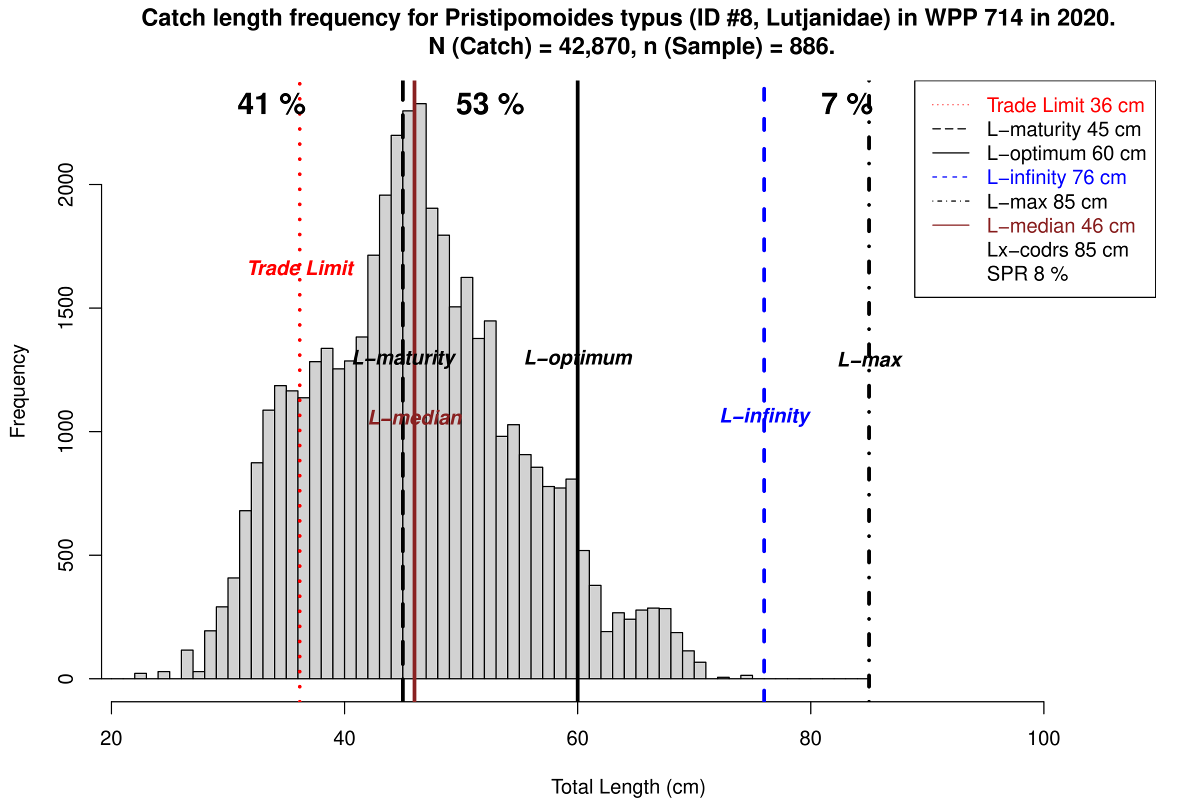
Between 30% and 50% of the fish in the catch are immature and have not had a chance to reproduce before capture. The fishery is in immediate danger of overfishing through overharvesting of juveniles, if fishing pressure is high. Catching small and immature fish needs to be actively avoided and a limit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

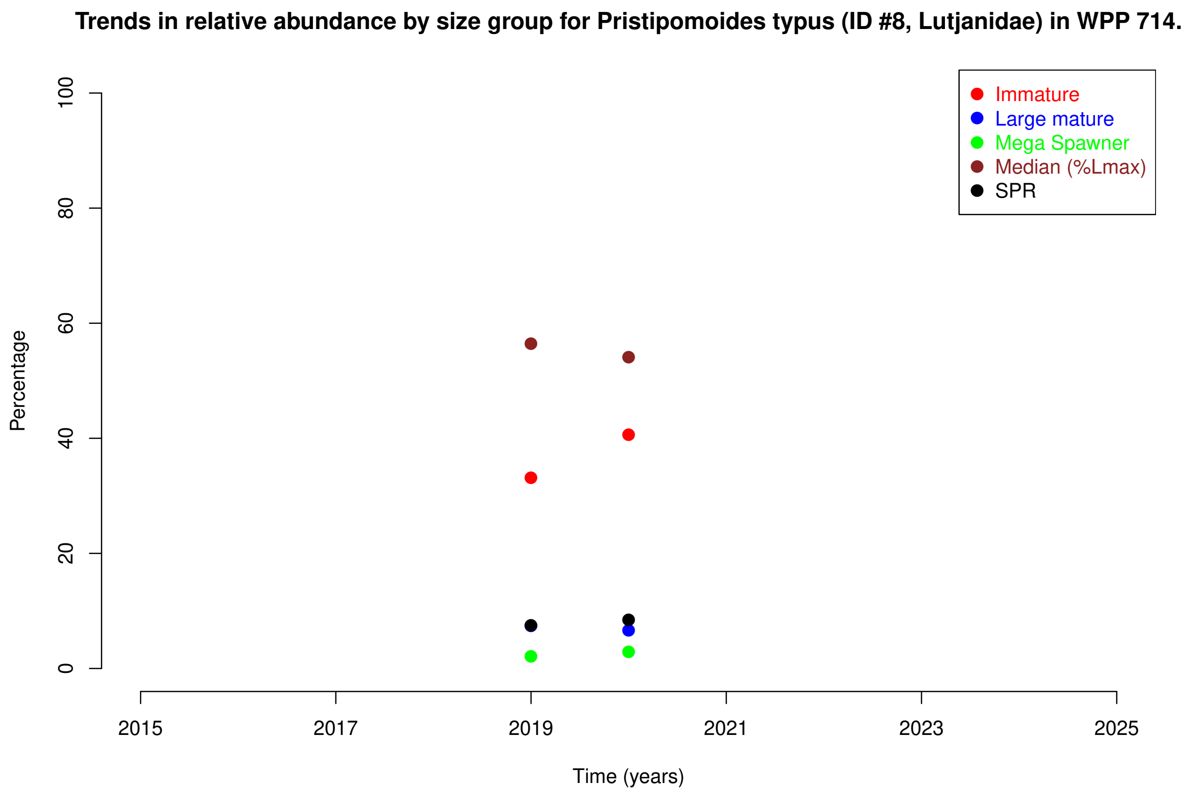
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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

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

Trends in relative abundance by size group for Lutjanus 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: 0.139
% Large Mature falling over recent years, situation deteriorating. P: 0.109
% Mega Spawner falling over recent years, situation deteriorating. P: 0.153
% SPR falling over recent years, situation deteriorating. P: 0.200


Catch length frequency for Pristipomoides typus (ID #8, Lutjanidae) in WPP 714 in 2020.
N (Catch) = 42,870, n (Sample) = 886.
41 %
53 %
7 %
Trade Limit
L−maturity
L−optimum
L−max
L−median
L−infinity
Frequency
Total Length (cm)
Trade Limit 36 cm
L−maturity 45 cm
L−optimum 60 cm
L−infinity 76 cm
L−max 85 cm
L−median 46 cm
Lx−codrs 85 cm
SPR 8 %


Trends in relative abundance by size group for Pristipomoides typus (ID #8, Lutjanidae) in WPP 714.
Immature
Large mature
Mega Spawner
Median (%Lmax)
SPR
Percentage
Time (years)

The percentages of Pristipomoides typus (ID #8, Lutjanidae) in 2020.
N (Catch) =42,870, n (Sample) = 886
Immature (< 45cm): 41%
Small mature (>= 45cm, < 60cm): 53%
Large mature (>= 60cm): 7%
Mega spawner (>= 66cm): 3% (subset of large mature fish)
Spawning Potential Ratio: 8 %

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

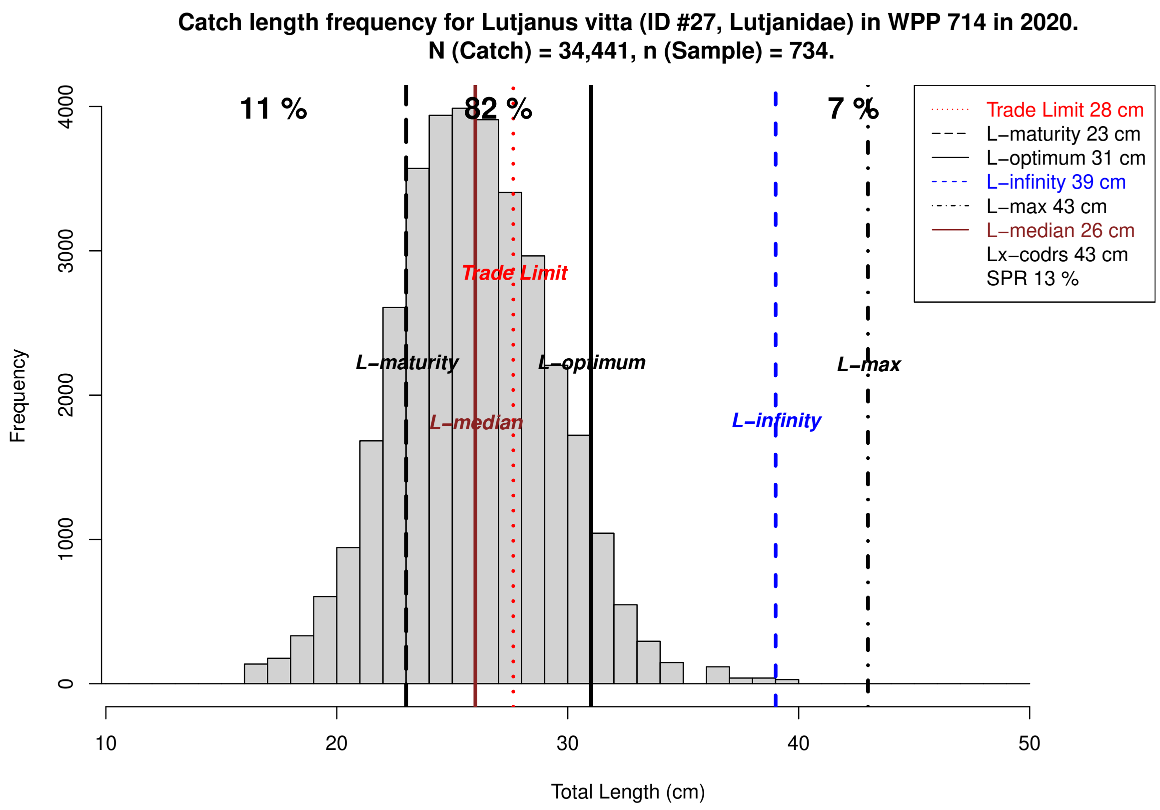
Between 30% and 50% of the fish in the catch are immature and have not had a chance to reproduce before capture. The fishery is in immediate danger of overfishing through overharvesting of juveniles, if fishing pressure is high. Catching small and immature fish needs to be actively avoided and a limit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

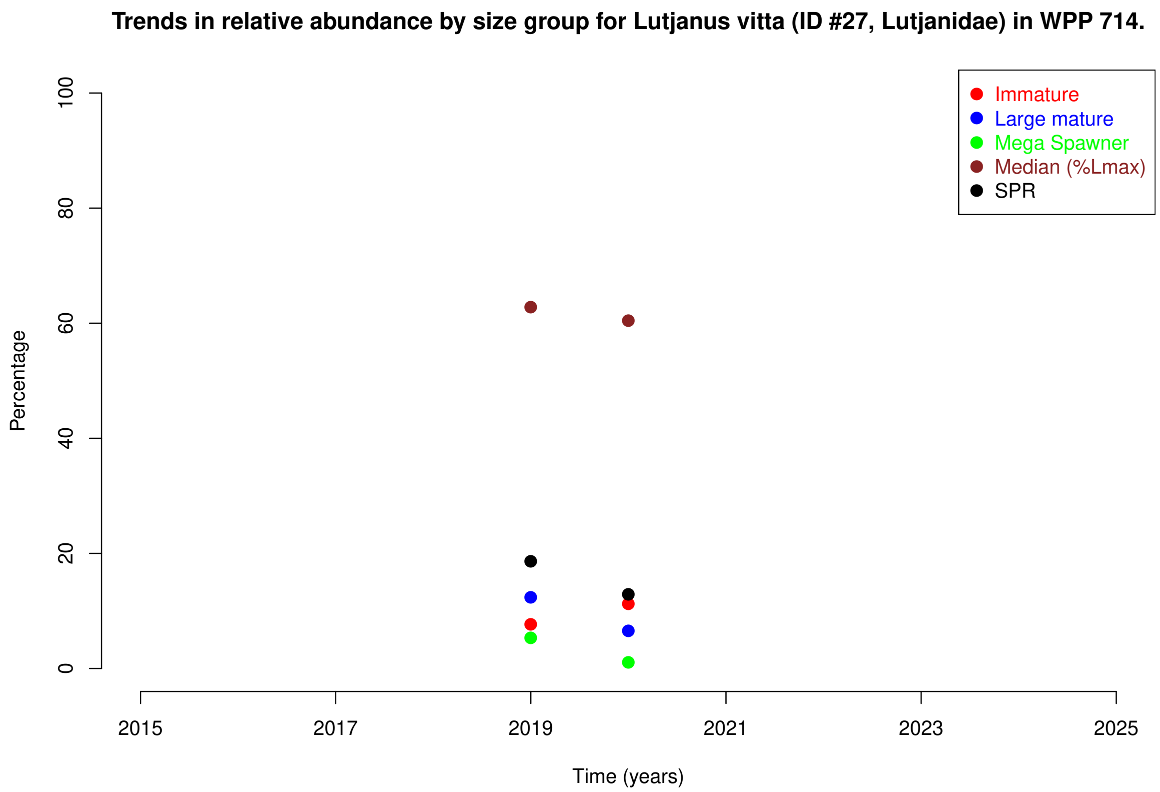
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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

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

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


Catch length frequency for Lutjanus vitta (ID #27, Lutjanidae) in WPP 714 in 2020.
N (Catch) = 34,441, n (Sample) = 734.
11 %
82 %
7 %
Trade Limit 28 cm
L–maturity 23 cm
L–optimum 31 cm
L–infinity 39 cm
L–max 43 cm
L–median 26 cm
Lx–codrs 43 cm
SPR 13 %
Trade Limit
L–maturity
L–optimum
L–max
L–median
L–infinity
Frequency
Total Length (cm)
0
1000
2000
3000
4000
10
20
30
40
50


Trends in relative abundance by size group for Lutjanus vitta (ID #27, Lutjanidae) in WPP 714.
Immature
Large mature
Mega Spawner
Median (%Lmax)
SPR
Percentage
Time (years)
0
20
40
60
80
100
2015
2017
2019
2021
2023
2025

The percentages of Lutjanus vitta (ID #27, Lutjanidae) in 2020.
N (Catch) =34,441, n (Sample) = 734
Immature (< 23cm): 11%
Small mature (>= 23cm, < 31cm): 82%
Large mature (>= 31cm): 7%
Mega spawner (>= 34.1cm): 1% (subset of large mature fish)
Spawning Potential Ratio: 13 %

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

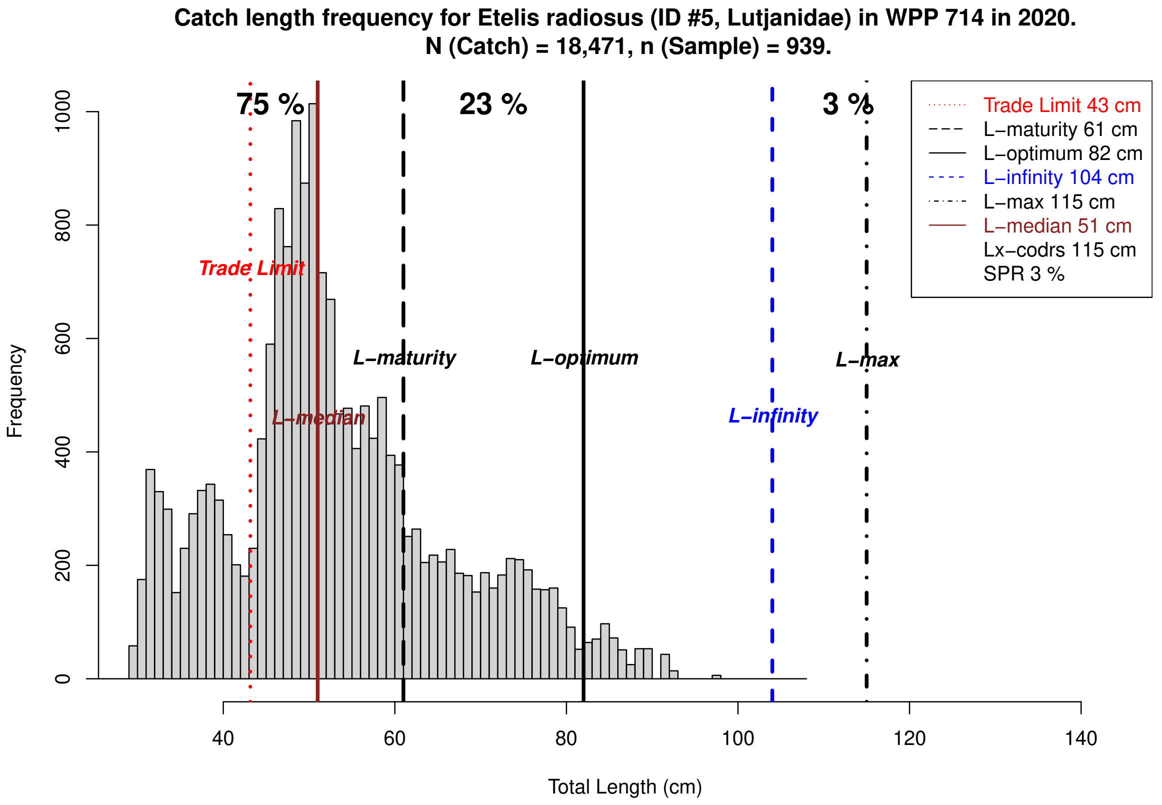
Between 10% and 20% of the fish in the catch are juveniles that have not yet reproduced. There is no immediate concern in terms of overfishing through over harvesting of juveniles, but the fishery needs to be monitored closely for any further increase in this indicator and incentives need to be geared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

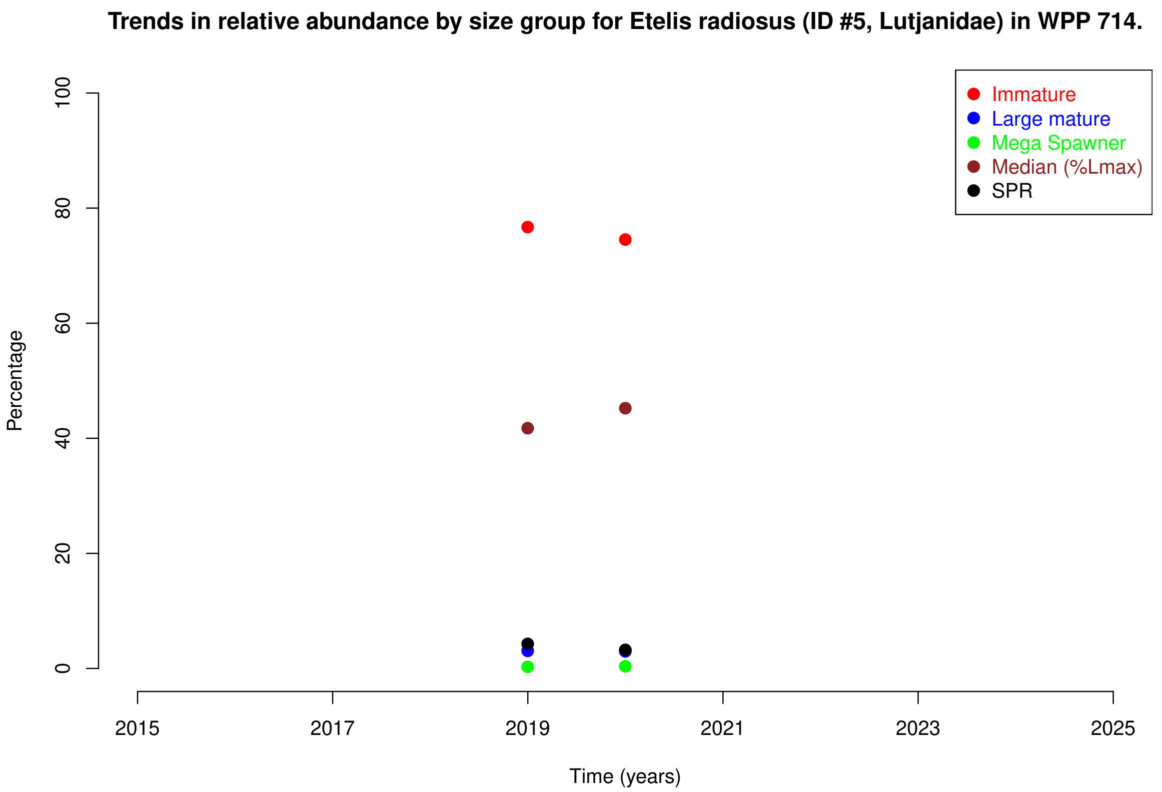
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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

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

Trends in relative abundance by size group for Lutjanus vitta (ID #27, Lutjanidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature trend not available.
% Large Mature trend not available.
% Mega Spawner trend not available.
% SPR trend not available.


Catch length frequency for Etelis radiosus (ID #5, Lutjanidae) in WPP 714 in 2020.
N (Catch) = 18,471, n (Sample) = 939.
75 %
23 %
3 %
Trade Limit
L–maturity
L–optimum
L–max
L–median
L–infinity
Trade Limit 43 cm
L–maturity 61 cm
L–optimum 82 cm
L–infinity 104 cm
L–max 115 cm
L–median 51 cm
Lx–codrs 115 cm
SPR 3 %
Frequency
0
200
400
600
800
1000
40
60
80
100
120
140
Total Length (cm)


Trends in relative abundance by size group for Etelis radiosus (ID #5, Lutjanidae) in WPP 714.
Immature
Large mature
Mega Spawner
Median (%Lmax)
SPR
Percentage
0
20
40
60
80
100
2015
2017
2019
2021
2023
2025
Time (years)

The percentages of Etelis radiosus (ID #5, Lutjanidae) in 2020.
N (Catch) =18,471, n (Sample) = 939
Immature (< 61cm): 75%
Small mature (>= 61cm, < 82cm): 23%
Large mature (>= 82cm): 3%
Mega spawner (>= 90.2cm): 0% (subset of large mature fish)
Spawning Potential Ratio: 3 %

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

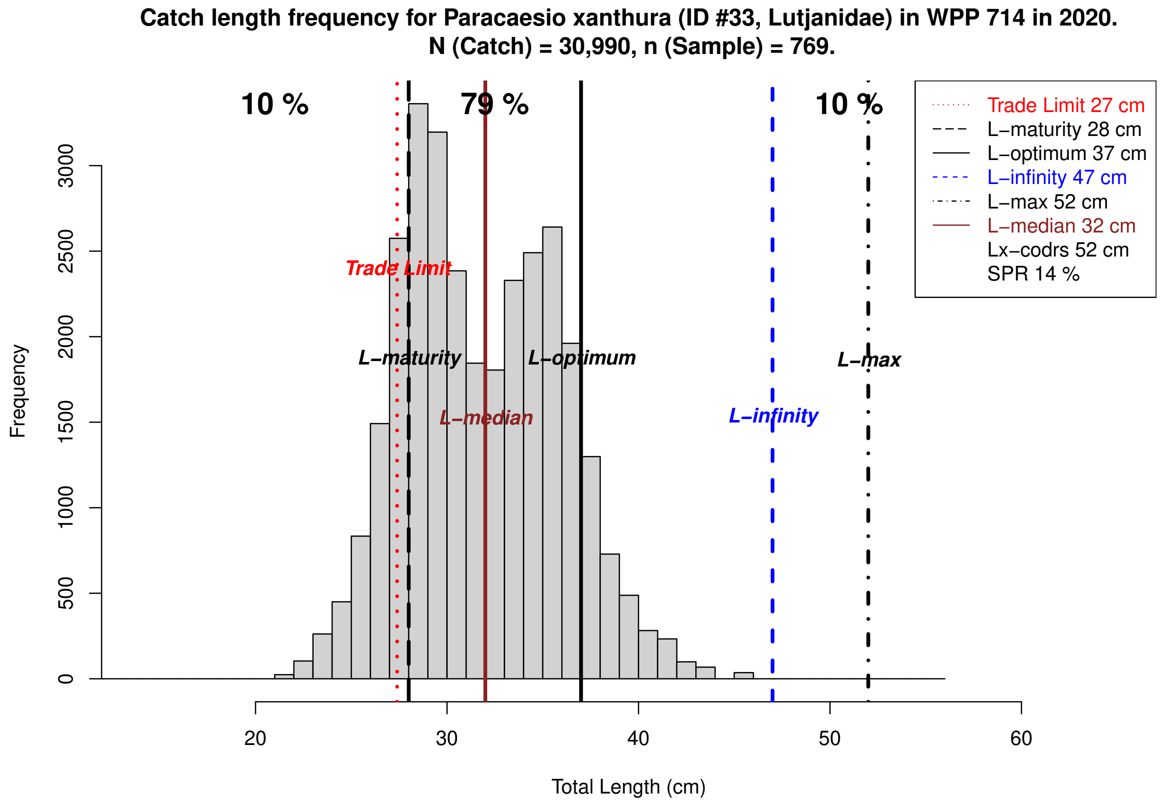
The majority of the fish in the catch have not had a chance to reproduce before capture. This fishery is most likely overfished already if fishing mortality is high for all size classes in the population. An immediate shift away from targeting juvenile fish and a reduction in overall fishing pressure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

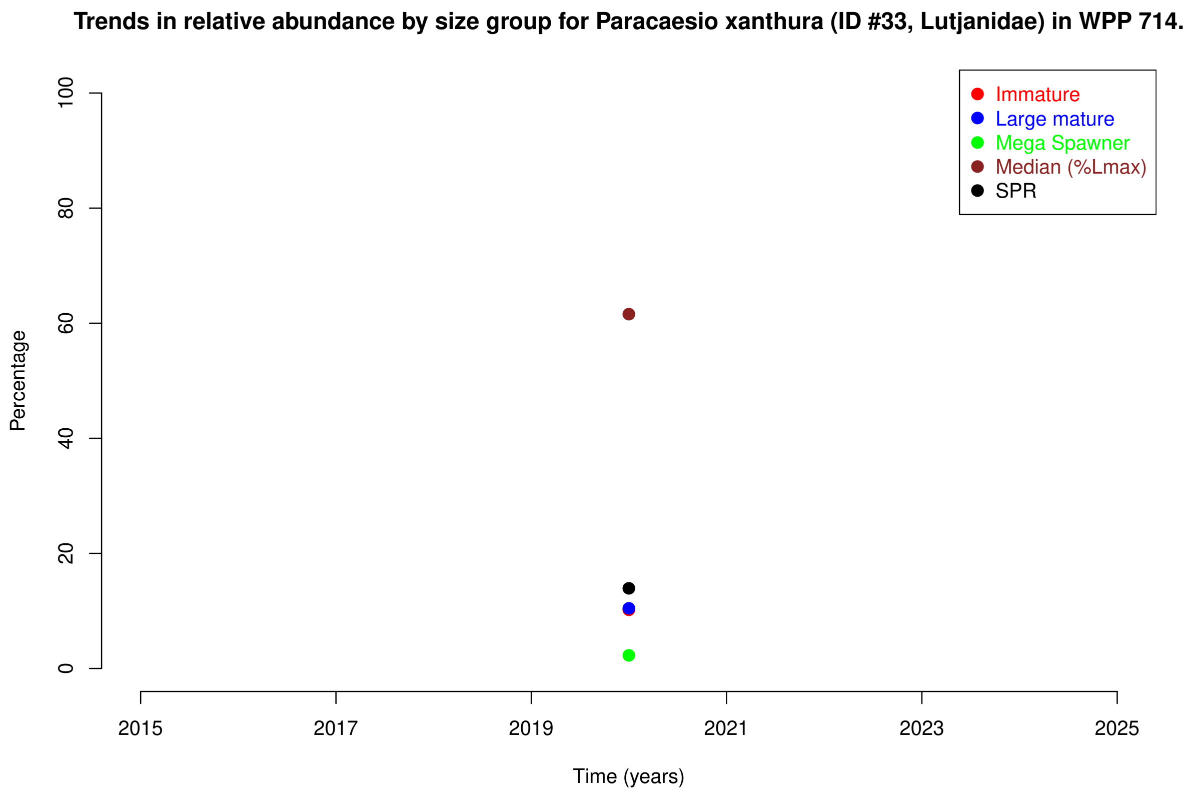
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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

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

Trends in relative abundance by size group for Etelis radiosus (ID #5, Lutjanidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature trend not available.
% Large Mature trend not available.
% Mega Spawner trend not available.
% SPR trend not available.


Catch length frequency for Paracaesio xanthura (ID #33, Lutjanidae) in WPP 714 in 2020.
N (Catch) = 30,990, n (Sample) = 769.
10 %
79 %
10 %
Trade Limit 27 cm
L–maturity 28 cm
L–optimum 37 cm
L–infinity 47 cm
L–max 52 cm
L–median 32 cm
Lx–codrs 52 cm
SPR 14 %
Trade Limit
L–maturity
L–optimum
L–median
L–infinity
L–max
Frequency
Total Length (cm)


Trends in relative abundance by size group for Paracaesio xanthura (ID #33, Lutjanidae) in WPP 714.
Immature
Large mature
Mega Spawner
Median (%Lmax)
SPR
Percentage
Time (years)

The percentages of Paracaesio xanthura (ID #33, Lutjanidae) in 2020.
N (Catch) =30,990, n (Sample) = 769
Immature (< 28cm): 10%
Small mature (>= 28cm, < 37cm): 79%
Large mature (>= 37cm): 10%
Mega spawner (>= 40.7cm): 2% (subset of large mature fish)
Spawning Potential Ratio: 14 %

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

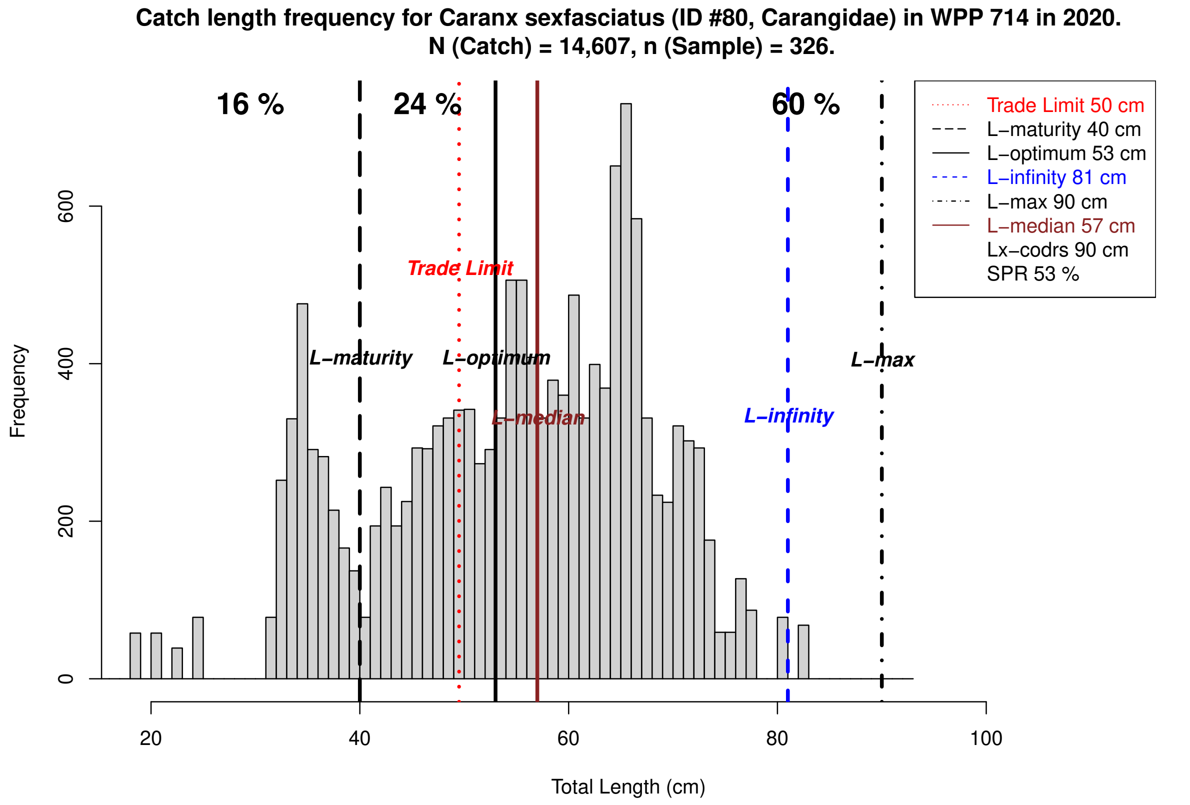
Between 10% and 20% of the fish in the catch are juveniles that have not yet reproduced. There is no immediate concern in terms of overfishing through over harvesting of juveniles, but the fishery needs to be monitored closely for any further increase in this indicator and incentives need to be geared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

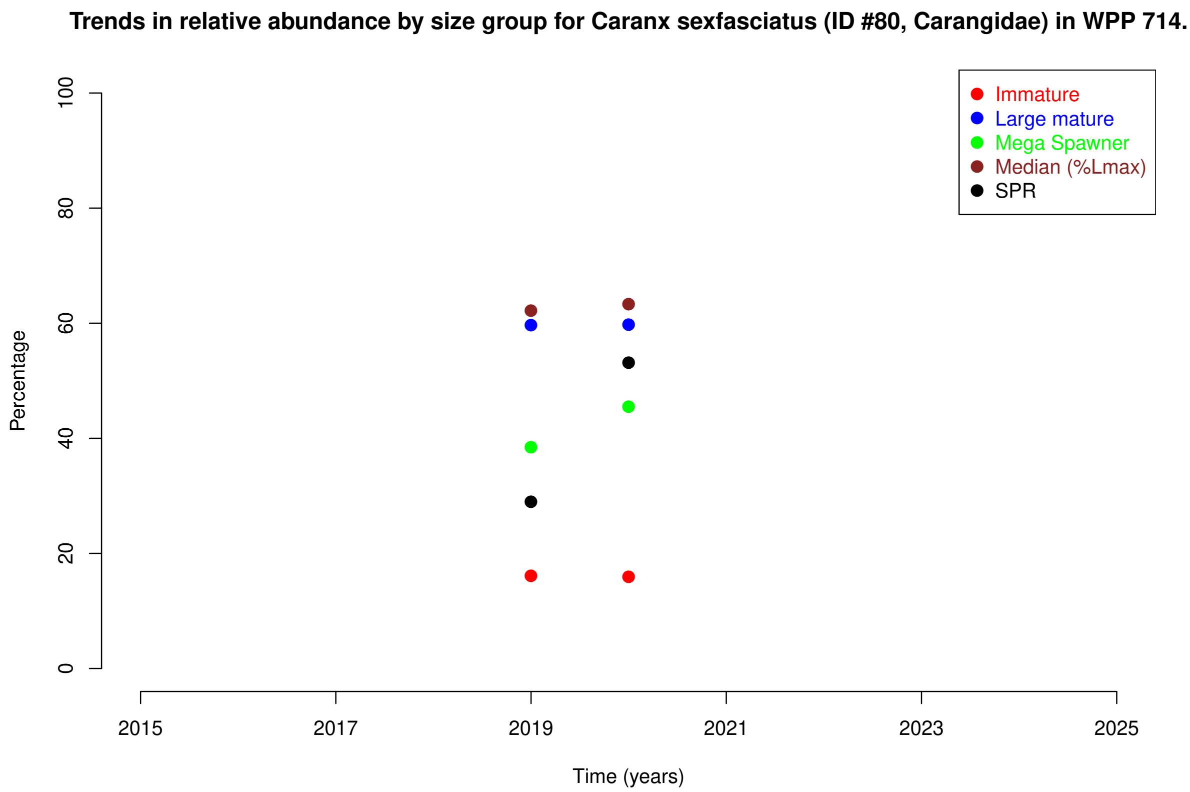
The vast majority of the fish in the catch have not yet achieved their growth potential. The harvest of small fish promotes growth overfishing and the size distribution for this species indicates that over exploitation through growth overfishing may already be happening. Risk level is high.

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

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

Trends in relative abundance by size group for Paracaesio xanthura (ID #33, Lutjanidae), as calculated from linear regressions. The P value indicates the chance that this calculated trend is merely a result of stochastic variance.
% Immature trend not available.
% Large Mature trend not available.
% Mega Spawner trend not available.
% SPR trend not available.


Catch length frequency for Caranx sexfasciatus (ID #80, Carangidae) in WPP 714 in 2020.
N (Catch) = 14,607, n (Sample) = 326.
16 %
24 %
60 %
Trade Limit 50 cm
L−maturity 40 cm
L−optimum 53 cm
L−infinity 81 cm
L−max 90 cm
L−median 57 cm
Lx−codrs 90 cm
SPR 53 %
Trade Limit
L−maturity
L−optimum
L−median
L−infinity
L−max
Frequency
0
200
400
600
20
40
60
80
100
Total Length (cm)


Trends in relative abundance by size group for Caranx sexfasciatus (ID #80, Carangidae) in WPP 714.
Immature
Large mature
Mega Spawner
Median (%Lmax)
SPR
Percentage
0
20
40
60
80
100
2015
2017
2019
2021
2023
2025
Time (years)

The percentages of Caranx sexfasciatus (ID #80, Carangidae) in 2020.
N (Catch) =14,607, n (Sample) = 326
Immature (< 40cm): 16%
Small mature (>= 40cm, < 53cm): 24%
Large mature (>= 53cm): 60%
Mega spawner (>= 58.3cm): 46% (subset of large mature fish)
Spawning Potential Ratio: 53 %

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

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

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

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

Table 4.1: Values of indicators in length-based assessments for the top 50 most abundant species by total CODRS samples in WPP 714 in 2020.

Rank	#ID	Species	Trade Limit Prop. Lmat	Immature %	Exploitation %	Mega Spawn %	SPR %
1	1	Aphareus rutilans	0.78	55	92	2	8
2	7	Pristipomoides multidens	0.71	41	88	4	16
3	4	Etelis boweni	0.52	42	93	2	7
4	20	Lutjanus gibbus	1.07	26	86	5	14
5	9	Pristipomoides filamentosus	0.69	71	94	2	9
6	22	Pinjalo lewisi	0.96	1	77	3	17
7	45	Epinephelus areolatus	1.31	2	98	0	12
8	34	Paracaesio kusakarii	0.77	32	94	1	7
9	66	Lethrinus olivaceus	0.62	7	71	8	21
10	6	Etelis coruscans	0.59	51	95	3	7
11	19	Lutjanus timorensis	0.98	15	90	3	11
12	70	Gymnocranius grandoculis	0.85	7	93	3	13
13	16	Lutjanus bohar	0.67	61	84	8	34
14	2	Aprion virescens	0.81	35	76	10	29
15	17	Lutjanus malabaricus	0.66	41	83	5	13
16	8	Pristipomoides typus	0.80	41	93	3	8
17	27	Lutjanus vitta	1.20	11	93	1	13
18	5	Etelis radiosus	0.71	75	97	0	3
19	33	Paracaesio xanthura	0.98	10	90	2	14
20	80	Caranx sexfasciatus	1.24	16	40	46	53
21	37	Cephalopholis miniata	1.46	0	80	4	31
22	15	Lutjanus argentimaculatus	0.62	12	74	11	24
23	63	Lethrinus lentjan	1.05	6	97	0	11
24	85	Erythrocles schlegelii	1.28	1	91	4	12
25	38	Cephalopholis sexmaculata	1.34	4	94	1	15
26	67	Lethrinus amboinensis	1.08	1	54	28	near 100
27	39	Cephalopholis sonnerati	1.03	9	83	6	25
28	28	Lutjanus boutton	1.20	0	51	27	near 100
29	62	Variola albimarginata	1.38	1	87	3	20
30	61	Plectropomus leopardus	1.04	6	95	2	13
31	81	Caranx tille	1.38	5	39	50	near 100
32	35	Paracaesio stonei	0.87	6	88	1	12
33	78	Caranx ignobilis	0.89	23	75	18	16
34	10	Pristipomoides sieboldii	0.97	6	71	12	22
35	50	Epinephelus coioides	0.96	5	86	5	17
36	90	Diagramma pictum	1.02	0	55	15	near 100
37	69	Wattsia mossambica	1.09	9	98	0	8
38	60	Plectropomus maculatus	0.91	1	82	6	23
39	84	Seriola rivoliana	1.00	39	72	15	15
40	94	Sphyraena forsteri	1.45	0	85	4	16
41	18	Lutjanus sebae		unknown	unknown	unknown	unknown
42	65	Lethrinus nebulosus	0.95	0	42	23	near 100
43	31	Symphorus nematophorus		unknown	unknown	unknown	unknown
45	82	Elagatis bipinnulata		unknown	unknown	unknown	unknown
46	48	Epinephelus bilobatus		unknown	unknown	unknown	unknown
47	79	Caranx lugubris		unknown	unknown	unknown	unknown
48	43	Epinephelus morrhua		unknown	unknown	unknown	unknown
49	46	Epinephelus bleekeri		unknown	unknown	unknown	unknown
50	93	Sphyraena barracuda		unknown	unknown	unknown	unknown

Table 4.2: Risk levels in the fisheries for the top 50 most abundant species by total CODRS samples in WPP 714 in 2020.

Rank	#ID	Species	Trade Limit	Immature	Exploitation	Mega Spawn	SPR
1	1	Aphareus rutilans	high	high	high	high	high
2	7	Pristipomoides multidens	high	high	high	high	high
3	4	Etelis boweni	high	high	high	high	high
4	20	Lutjanus gibbus	medium	medium	high	high	high
5	9	Pristipomoides filamentosus	high	high	high	high	high
6	22	Pinjalo lewisi	medium	low	high	high	high
7	45	Epinephelus areolatus	low	low	high	high	high
8	34	Paracaesio kusakarii	high	high	high	high	high
9	66	Lethrinus olivaceus	high	low	high	high	high
10	6	Etelis coruscans	high	high	high	high	high
11	19	Lutjanus timorensis	medium	medium	high	high	high
12	70	Gymnocranius grandoculis	high	low	high	high	high
13	16	Lutjanus bohar	high	high	high	high	medium
14	2	Aprion virescens	high	high	high	high	medium
15	17	Lutjanus malabaricus	high	high	high	high	high
16	8	Pristipomoides typus	high	high	high	high	high
17	27	Lutjanus vitta	low	medium	high	high	high
18	5	Etelis radiosus	high	high	high	high	high
19	33	Paracaesio xanthura	medium	medium	high	high	high
20	80	Caranx sexfasciatus	low	medium	low	low	low
21	37	Cephalopholis miniata	low	low	high	high	medium
22	15	Lutjanus argentimaculatus	high	medium	high	high	high
23	63	Lethrinus lentjan	medium	low	high	high	high
24	85	Erythrocles schlegelii	low	low	high	high	high
25	38	Cephalopholis sexmaculata	low	low	high	high	high
26	67	Lethrinus amboinensis	medium	low	medium	medium	low
27	39	Cephalopholis sonnerati	medium	low	high	high	medium
28	28	Lutjanus boutton	low	low	medium	medium	low
29	62	Variola albimarginata	low	low	high	high	high
30	61	Plectropomus leopardus	medium	low	high	high	high
31	81	Caranx tille	low	low	low	low	low
32	35	Paracaesio stonei	high	low	high	high	high
33	78	Caranx ignobilis	high	medium	high	high	high
34	10	Pristipomoides sieboldii	medium	low	high	high	high
35	50	Epinephelus coioides	medium	low	high	high	high
36	90	Diagramma pictum	medium	low	medium	high	low
37	69	Wattsia mossambica	medium	low	high	high	high
38	60	Plectropomus maculatus	medium	low	high	high	high
39	84	Seriola rivoliana	medium	high	high	high	high
40	94	Sphyraena forsteri	low	low	high	high	high
41	18	Lutjanus sebae	unknown	unknown	unknown	unknown	unknown
42	65	Lethrinus nebulosus	medium	low	low	medium	low
43	31	Symphorus nematophorus	unknown	unknown	unknown	unknown	unknown
45	82	Elagatis bipinnulata	unknown	unknown	unknown	unknown	unknown
46	48	Epinephelus bilobatus	unknown	unknown	unknown	unknown	unknown
47	79	Caranx lugubris	unknown	unknown	unknown	unknown	unknown
48	43	Epinephelus morrhua	unknown	unknown	unknown	unknown	unknown
49	46	Epinephelus bleekeri	unknown	unknown	unknown	unknown	unknown
50	93	Sphyraena barracuda	unknown	unknown	unknown	unknown	unknown

Table 4.3: Trends during recent years for SPR and relative abundance by size group for the top 50 most abundant species by total CODRS samples in WPP 714.

Rank	#ID	Species	% Immature	% Large Mature	% Mega Spawner	% SPR
1	1	Aphareus rutilans	deteriorating	deteriorating	deteriorating	improving
2	7	Pristipomoides multidens	deteriorating	deteriorating	deteriorating	deteriorating
3	4	Etelis boweni	improving	improving	improving	improving
4	20	Lutjanus gibbus	unknown	unknown	unknown	unknown
5	9	Pristipomoides filamentosus	deteriorating	deteriorating	deteriorating	deteriorating
6	22	Pinjalo lewisi	unknown	unknown	unknown	unknown
7	45	Epinephelus areolatus	deteriorating	deteriorating	deteriorating	deteriorating
8	34	Paracaesio kusakarii	deteriorating	deteriorating	deteriorating	deteriorating
9	66	Lethrinus olivaceus	deteriorating	deteriorating	deteriorating	deteriorating
10	6	Etelis coruscans	deteriorating	improving	improving	improving
11	19	Lutjanus timorensis	unknown	unknown	unknown	unknown
12	70	Gymnocranius grandoculis	deteriorating	deteriorating	deteriorating	deteriorating
13	16	Lutjanus bohar	deteriorating	deteriorating	deteriorating	deteriorating
14	2	Aprion virescens	deteriorating	deteriorating	deteriorating	deteriorating
15	17	Lutjanus malabaricus	deteriorating	deteriorating	deteriorating	deteriorating
16	8	Pristipomoides typus	unknown	unknown	unknown	unknown
17	27	Lutjanus vitta	unknown	unknown	unknown	unknown
18	5	Etelis radiosus	unknown	unknown	unknown	unknown
19	33	Paracaesio xanthura	unknown	unknown	unknown	unknown
20	80	Caranx sexfasciatus	unknown	unknown	unknown	unknown
21	37	Cephalopholis miniata	unknown	unknown	unknown	unknown
22	15	Lutjanus argentimaculatus	deteriorating	deteriorating	deteriorating	deteriorating
23	63	Lethrinus lentjan	unknown	unknown	unknown	unknown
24	85	Erythrocles schlegelii	unknown	unknown	unknown	unknown
25	38	Cephalopholis sexmaculata	unknown	unknown	unknown	unknown
26	67	Lethrinus amboinensis	unknown	unknown	unknown	unknown
27	39	Cephalopholis sonnerati	deteriorating	improving	improving	improving
28	28	Lutjanus boutton	unknown	unknown	unknown	unknown
29	62	Variola albimarginata	unknown	unknown	unknown	unknown
30	61	Plectropomus leopardus	unknown	unknown	unknown	unknown
31	81	Caranx tille	unknown	unknown	unknown	unknown
32	35	Paracaesio stonei	unknown	unknown	unknown	unknown
33	78	Caranx ignobilis	deteriorating	deteriorating	deteriorating	deteriorating
34	10	Pristipomoides sieboldii	unknown	unknown	unknown	unknown
35	50	Epinephelus coioides	unknown	unknown	unknown	unknown
36	90	Diagramma pictum	unknown	unknown	unknown	unknown
37	69	Wattsia mossambica	unknown	unknown	unknown	unknown
38	60	Plectropomus maculatus	unknown	unknown	unknown	unknown
39	84	Seriola rivoliana	unknown	unknown	unknown	unknown
40	94	Sphyraena forsteri	unknown	unknown	unknown	unknown
41	18	Lutjanus sebae	unknown	unknown	unknown	unknown
42	65	Lethrinus nebulosus	unknown	unknown	unknown	unknown
43	31	Symphorus nematophorus	unknown	unknown	unknown	unknown
45	82	Elagatis bipinnulata	unknown	unknown	unknown	unknown
46	48	Epinephelus bilobatus	unknown	unknown	unknown	unknown
47	79	Caranx lugubris	unknown	unknown	unknown	unknown
48	43	Epinephelus morrhua	unknown	unknown	unknown	unknown
49	46	Epinephelus bleekeri	unknown	unknown	unknown	unknown
50	93	Sphyraena barracuda	unknown	unknown	unknown	unknown

5 Discussion and conclusions

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

The deep demersal hook and line fisheries for snappers, groupers and emperors are fairly clean fisheries when it comes to the species spectrum in the catch, even though it is much more species-rich then sometimes assumed, also within the “snapper” category, which forms the main target group. Small amounts of bycatch include various trevallies and other species, including some small sharks (Table 5.7 and Table 5.8).

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

Based on available length frequencies of multi-species snapper, grouper and emperor catches from WPP 714, the risks of overfishing are high (Table Table 4.1 and Table 4.2) and SPR is dangerously low (Table 5.1) for most of the major target species in this fisheries management area. The deep water snapper feeding aggregations occur at predictable and well known locations and these large snappers are therefore among the most vulnerable species in these fisheries. Fishing mortality seems to be unacceptably high while the catches of these species include large percentages of relatively small and immature specimen. For many species of snappers, sizes are consistently targeted well below the size where these fish reach maturity. Bigger specimen of the largest snapper species are becoming extremely rare in Indonesia.

Fishing effort and fishing mortality have been too high in recent years in WPP 714 and the situation is currently not improving for the majority of target species. Time trends for the major target species (ranked by abundance in samples) 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 some of the direct effect on CpUE. Overall we are currently looking at a high risk of overfishing for all major target species in WPP 714, combined with a worrisome trend of deterioration in the stocks, based on the size based stock assessments from the bottom long line fisheries.

The groupers seem to be somewhat less vulnerable to the deep demersal fisheries than the snappers. This may be because most groupers are staying closer to high rugosity bottom habitat, which is avoided by trap and long line vessels due to risk of entanglement, while drop line fishers are targeting schooling snappers that are hovering higher in the water column, above the grouper habitat. Fishing mortality (from deep demersal fisheries) in large mature groupers may be somewhat lower than what we see for the snappers. Groupers generally mature as females at a size relative to their maximum size which is lower than for snappers. This strategy enables them to reproduce before they are being caught, although fecundity is still relatively low at sizes below the optimum length. Fecundity for the population as a whole peaks at the optimum size for each species, and this is also the size around which sex change from females to males happens in groupers.

For those grouper species which spend all or most of their life cycle in deep water habitats, the relatively low vulnerability to the deep slope hook and line fisheries is very good news. For other grouper species which spend major parts of their life cycle in shallower habitats, like coral reefs or mangroves or estuaries for example, the reality is that their populations in general are not in good 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 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 target species in the deep demersal fisheries are traded at sizes that are too small, and this impairs sustainability. The impact is clearly visible already in landed catches.

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

Besides size selectivity, fishing effort is a very important factor in resulting overall catch and size frequency of the catch. All major target 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 deep demersal fisheries, judging from a number of indicators as presented in this report. At present these fisheries show clear signs of over-exploitation in WPP 714.

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

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

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

Recommendations for specific regulations may include:

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

Table 5.1: SPR values over the period 2016 to 2024 for the top 20 most abundant species in CODRS samples in WPP 714, based on total catch LFD analysis, for all gear types combined and adjusted for relative effort by gear type.

Rank	Species	2016	2017	2018	2019	2020	2021	2022	2023	2024
1	Aphareus rutilans	NA	NA	8	10	8	NA	NA	NA	NA
2	Pristipomoides multidens	NA	22	14	21	16	NA	NA	NA	NA
3	Etelis boweni	NA	NA	2	12	7	NA	NA	NA	NA
4	Lutjanus gibbus	NA	NA	NA	12	14	NA	NA	NA	NA
5	Pristipomoides filamentosus	NA	100	5	1	9	NA	NA	NA	NA
6	Pinjalo lewisi	NA	NA	NA	21	17	NA	NA	NA	NA
7	Epinephelus areolatus	NA	34	15	11	12	NA	NA	NA	NA
8	Paracaesio kusakarii	NA	NA	9	9	7	NA	NA	NA	NA
9	Lethrinus olivaceus	NA	100	20	18	21	NA	NA	NA	NA
10	Etelis coruscans	NA	NA	4	2	7	NA	NA	NA	NA
11	Lutjanus timorensis	NA	NA	NA	11	12	NA	NA	NA	NA
12	Gymnocranius grandoculis	NA	100	18	12	13	NA	NA	NA	NA
13	Lutjanus bohar	NA	100	33	5	42	NA	NA	NA	NA
14	Aprion virescens	NA	46	29	15	29	NA	NA	NA	NA
15	Lutjanus malabaricus	NA	100	17	16	13	NA	NA	NA	NA
16	Pristipomoides typus	NA	NA	NA	8	8	NA	NA	NA	NA
17	Lutjanus vitta	NA	NA	NA	19	13	NA	NA	NA	NA
18	Etelis radiosus	NA	NA	NA	4	3	NA	NA	NA	NA
19	Paracaesio xanthura	NA	NA	NA	NA	14	NA	NA	NA	NA
20	Caranx sexfasciatus	NA	NA	NA	29	53	NA	NA	NA	NA

Table 5.2: CpUE (kg/GT/day) trends by fleet segment for Aphareus rutilans in WPP 714

CpUE	2016	2017	2018	2019	2020	2021	2022	2023	2024
Nano Dropline	0.4	NA	2.6	2.4	3.0	NA	NA	NA	NA
Nano Longline	0.4	0.5	NA	0.2	2.4	NA	NA	NA	NA
Small Dropline	0.4	21.7	0.0	1.1	3.9	NA	NA	NA	NA
Small Longline	NA	NA	NA	NA	NA	NA	NA	NA	NA
Medium Dropline	0.4	0.1	6.1	0.5	0.6	NA	NA	NA	NA
Medium Longline	NA	NA	NA	NA	NA	NA	NA	NA	NA
Large Dropline	0.5	0.6	0.9	0.9	0.7	NA	NA	NA	NA
Large Longline	NA	NA	NA	NA	NA	NA	NA	NA	NA

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

CpUE	2016	2017	2018	2019	2020	2021	2022	2023	2024
Nano Dropline	0.8	NA	1.1	0.1	0.4	NA	NA	NA	NA
Nano Longline	0.8	0.6	1.3	NA	0.8	NA	NA	NA	NA
Small Dropline	0.8	NA	NA	0.5	6.3	NA	NA	NA	NA
Small Longline	NA	NA	NA	NA	NA	NA	NA	NA	NA
Medium Dropline	0.8	2.7	2.1	5.2	7.2	NA	NA	NA	NA
Medium Longline	NA	NA	NA	NA	NA	NA	NA	NA	NA
Large Dropline	0.6	NA	1.0	3.9	15.9	NA	NA	NA	NA
Large Longline	NA	NA	NA	NA	NA	NA	NA	NA	NA

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

CpUE	2016	2017	2018	2019	2020	2021	2022	2023	2024
Nano Dropline	4.0	1.1	10.1	2.2	2.4	NA	NA	NA	NA
Nano Longline	6.0	1.6	1.0	1.2	0.5	NA	NA	NA	NA
Small Dropline	4.0	NA	0.3	0.2	0.3	NA	NA	NA	NA
Small Longline	NA	NA	NA	NA	NA	NA	NA	NA	NA
Medium Dropline	4.0	NA	NA	NA	0.0	NA	NA	NA	NA
Medium Longline	NA	NA	NA	NA	NA	NA	NA	NA	NA
Large Dropline	0.0	0.2	0.0	0.1	0.0	NA	NA	NA	NA
Large Longline	NA	NA	NA	NA	NA	NA	NA	NA	NA

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

CpUE	2016	2017	2018	2019	2020	2021	2022	2023	2024
Nano Dropline	2.2	13.2	2.9	1.4	1.4	NA	NA	NA	NA
Nano Longline	3.0	4.3	1.8	0.2	0.9	NA	NA	NA	NA
Small Dropline	2.2	1.0	NA	0.7	3.0	NA	NA	NA	NA
Small Longline	NA	NA	NA	NA	NA	NA	NA	NA	NA
Medium Dropline	2.2	0.1	2.4	2.1	2.3	NA	NA	NA	NA
Medium Longline	NA	NA	NA	NA	NA	NA	NA	NA	NA
Large Dropline	0.6	1.8	0.7	0.0	0.1	NA	NA	NA	NA
Large Longline	NA	NA	NA	NA	NA	NA	NA	NA	NA

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

CpUE	2016	2017	2018	2019	2020	2021	2022	2023	2024
Nano Dropline	50.8	72.8	43.2	19.0	22.1	NA	NA	NA	NA
Nano Longline	73.9	65.4	45.4	21.9	18.8	NA	NA	NA	NA
Small Dropline	50.8	32.1	8.3	9.6	25.9	NA	NA	NA	NA
Small Longline	NA	NA	NA	NA	NA	NA	NA	NA	NA
Medium Dropline	50.8	6.2	25.2	13.7	20.7	NA	NA	NA	NA
Medium Longline	NA	NA	NA	NA	NA	NA	NA	NA	NA
Large Dropline	4.2	13.4	7.7	10.1	33.2	NA	NA	NA	NA
Large Longline	NA	NA	NA	NA	NA	NA	NA	NA	NA

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

Family Name	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total	%Sample
Acanthuridae	0	0	1	68	69	31	0	0	0	169	0.113
Ariidae	0	0	12	17	5	0	0	0	0	34	0.023
Ariommatidae	0	0	0	6	3	1	0	0	0	10	0.007
Balistidae	0	0	11	163	125	93	0	0	0	392	0.263
Belonidae	0	0	0	0	2	0	0	0	0	2	0.001
Bramidae	1	0	0	0	0	1	0	0	0	2	0.001
Caesionidae	0	0	1	20	65	77	0	0	0	163	0.109
Carangidae	0	0	143	1161	717	193	0	0	0	2214	1.483
Chaetodontidae	0	0	0	0	0	1	0	0	0	1	0.001
Coryphaenidae	0	0	3	7	14	1	0	0	0	25	0.017
Ephippidae	0	0	0	2	3	0	0	0	0	5	0.003
Epinephelidae	2	2	21	2085	1412	445	0	0	0	3967	2.657
Fistulariidae	0	0	0	1	0	0	0	0	0	1	0.001
Gempylidae	0	0	0	66	0	0	0	0	0	66	0.044
Haemulidae	0	0	0	19	7	1	0	0	0	27	0.018
Holocentridae	0	0	24	2396	1131	264	0	0	0	3815	2.555
Istiophoridae	0	0	0	0	0	1	0	0	0	1	0.001
Labridae	0	0	1	9	9	38	0	0	0	57	0.038
Latidae	0	0	0	0	3	0	0	0	0	3	0.002
Lethrinidae	0	1	48	835	624	323	0	0	0	1831	1.226
Lutjanidae	1	0	33	1684	1373	663	0	0	0	3754	2.514
Malacanthidae	0	0	0	6	10	6	0	0	0	22	0.015
Monacanthidae	0	0	0	0	2	2	0	0	0	4	0.003
Mugilidae	0	0	0	0	1	0	0	0	0	1	0.001
Mullidae	0	0	6	73	68	113	0	0	0	260	0.174
Muraenesocidae	0	0	0	1	0	0	0	0	0	1	0.001
Nemipteridae	0	0	13	135	250	73	0	0	0	471	0.315
Other	4	4	70	202	95	25	0	0	0	400	0.268
Pomacanthidae	0	0	0	0	0	0	0	0	0	0	0.000
Priacanthidae	0	0	3	231	269	83	0	0	0	586	0.392
Rays	0	0	0	20	5	1	0	0	0	26	0.017
Scaridae	0	0	0	12	9	2	0	0	0	23	0.015
Scombridae	1	0	154	624	213	190	0	0	0	1182	0.792
Serranidae	0	0	0	2	6	1	0	0	0	9	0.006
Sharks	0	0	19	68	48	10	0	0	0	145	0.097
Siganidae	0	0	0	0	5	0	0	0	0	5	0.003
Sphyraenidae	0	0	13	159	42	23	0	0	0	237	0.159
Synodontidae	0	0	0	0	1	0	0	0	0	1	0.001
Tetraodontidae	0	0	0	1	0	0	0	0	0	1	0.001
Zanclidae	0	0	0	0	1	0	0	0	0	1	0.001
Total	9	7	576	10073	6587	2662	0	0	0	19914	13.335

Table 5.8: Sample sizes over the period 2016 to 2024 for the others species in WPP 714 Longline

Family Name	2016	2017	2018	2019	2020	2021	2022	2023	2024	Total	%Sample
Acanthuridae	0	0	0	0	1	1	0	0	0	2	0.001
Ariidae	0	2	0	0	0	2	0	0	0	4	0.003
Ariommatidae	0	0	0	0	0	0	0	0	0	0	0.000
Balistidae	0	0	5	11	18	7	0	0	0	41	0.027
Belonidae	0	0	0	0	0	0	0	0	0	0	0.000
Bramidae	5	0	0	0	0	0	0	0	0	5	0.003
Caesionidae	0	0	0	0	2	11	0	0	0	13	0.009
Carangidae	27	7	13	34	87	21	0	0	0	189	0.127
Chaetodontidae	0	0	0	0	0	0	0	0	0	0	0.000
Coryphaenidae	0	0	0	0	6	1	0	0	0	7	0.005
Ephippidae	0	0	0	2	0	0	0	0	0	2	0.001
Epinephelidae	82	60	38	63	72	47	0	0	0	362	0.242
Fistulariidae	0	0	0	0	0	0	0	0	0	0	0.000
Gempylidae	0	0	0	1	2	0	0	0	0	3	0.002
Haemulidae	2	1	0	8	6	1	0	0	0	18	0.012
Holocentridae	2	0	0	59	47	3	0	0	0	111	0.074
Istiophoridae	0	0	0	0	0	0	0	0	0	0	0.000
Labridae	0	0	0	0	0	3	0	0	0	3	0.002
Latidae	0	0	0	0	0	0	0	0	0	0	0.000
Lethrinidae	3	42	41	263	417	91	0	0	0	857	0.574
Lutjanidae	2	11	0	240	264	112	0	0	0	629	0.421
Malacanthidae	0	0	0	0	2	1	0	0	0	3	0.002
Monacanthidae	0	0	0	0	0	0	0	0	0	0	0.000
Mugilidae	0	0	0	0	0	0	0	0	0	0	0.000
Mullidae	0	0	0	5	3	2	0	0	0	10	0.007
Muraenesocidae	0	0	0	1	7	0	0	0	0	8	0.005
Nemipteridae	0	0	0	106	217	85	0	0	0	408	0.273
Other	45	58	19	56	23	6	0	0	0	207	0.139
Pomacanthidae	0	0	0	0	0	0	0	0	0	0	0.000
Priacanthidae	0	0	0	116	71	12	0	0	0	199	0.133
Rays	12	3	0	99	119	14	0	0	0	247	0.165
Scaridae	0	0	0	1	0	1	0	0	0	2	0.001
Scombridae	39	22	5	60	8	15	0	0	0	149	0.100
Serranidae	0	0	0	0	0	0	0	0	0	0	0.000
Sharks	67	56	59	52	128	10	0	0	0	372	0.249
Siganidae	0	0	0	0	0	0	0	0	0	0	0.000
Sphyraenidae	16	7	7	12	10	7	0	0	0	59	0.040
Synodontidae	0	0	0	0	0	0	0	0	0	0	0.000
Tetraodontidae	0	0	0	3	0	0	0	0	0	3	0.002
Zanclidae	0	0	0	0	0	0	0	0	0	0	0.000
Total	302	269	187	1192	1510	453	0	0	0	3913	2.620

6 References

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